Factors affecting the economic and social well-being of agriculturalists in less-developed countries and agriculture's contribution to general economic expansion

Roger Wayne Hexem
Iowa State University

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HEXEM, Roger Wayne, 1935-
FACTORS AFFECTING THE ECONOMIC AND SOCIAL
WELL-BEING OF AGRICULTURALISTS IN LESS-
DEVELOPED COUNTRIES AND AGRICULTURE'S
CONTRIBUTION TO GENERAL ECONOMIC EXPANSION
(VOLUMES 1 AND 2).

Iowa State University, Ph.D., 1971
Economics, agricultural

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Factors affecting the economic and social well-being of agri-culturalists in less-developed countries and agriculture's contribution to general economic expansion

by

Roger Wayne Hexem

Volume 1 of 2

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of The Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major Subject: Agricultural Economics

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

Head of Major Department

Signature was redacted for privacy.

Dean of Graduate College

Iowa State University Of Science and Technology Ames, Iowa 1971
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Objective, Methods of Procedure, and Organization of the Study</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Literature Cited</td>
<td>18</td>
</tr>
<tr>
<td>II</td>
<td>BASIC ECONOMIC CONCEPTS AND ADAPTATIONS TO LESS-DEVELOPED AREAS</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Production Function</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Marginal Conditions for Economic Efficiency</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Least-cost combinations of resources</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Optimal output configurations</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Tenurial arrangements and the marginal conditions</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Demand for Inputs of Production</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Single input, static demand</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Two-factor static demand</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Supply of Inputs of Production</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Agricultural labor</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Agricultural credit</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Land</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Product Supply</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Investment Decisions</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Uncertainty</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Price uncertainty</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Technical and technological uncertainty</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Institutional uncertainty</td>
<td>57</td>
</tr>
<tr>
<td>Awareness</td>
<td>173</td>
<td></td>
</tr>
<tr>
<td>Adaptability and adoptability</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>Producers' objectives</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td>Optimal Production Technique</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Two input, one output, static case</td>
<td>182</td>
<td></td>
</tr>
<tr>
<td>Two input, two output, static case</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>Two input, two output, dynamic case</td>
<td>192</td>
<td></td>
</tr>
<tr>
<td>Two input, two output, static macro-economic case</td>
<td>194</td>
<td></td>
</tr>
<tr>
<td>Two input, two output, dynamic macro-economic case</td>
<td>197</td>
<td></td>
</tr>
<tr>
<td>Choice Indicators and Imputation of Product to Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature Cited</td>
<td>201</td>
<td></td>
</tr>
<tr>
<td>CHAPTER V. RURAL CREDIT INSTITUTIONS</td>
<td>208</td>
<td></td>
</tr>
<tr>
<td>Demand for Credit</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Sources of Credit</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Lenders' objectives</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>Terms of credit</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>Competition among lenders</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Regulation of lending practices</td>
<td>251</td>
<td></td>
</tr>
<tr>
<td>Credit availability relative to needs</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td>259</td>
<td></td>
</tr>
<tr>
<td>Literature Cited</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>CHAPTER VI. MARKET SYSTEMS AS A COMPONENT OF SOCIAL OVERHEAD CAPITAL FACILITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role of Marketing Mechanism</td>
<td>264</td>
<td></td>
</tr>
<tr>
<td>Market-exchange system</td>
<td>268</td>
<td></td>
</tr>
<tr>
<td>Expenditures on consumer goods affecting quantities marketed</td>
<td>271</td>
<td></td>
</tr>
<tr>
<td>Merchant-trader-landlord middlemen</td>
<td>275</td>
<td></td>
</tr>
<tr>
<td>Want creation</td>
<td>281</td>
<td></td>
</tr>
<tr>
<td>Credit to producers</td>
<td>282</td>
<td></td>
</tr>
<tr>
<td>Collection, aggregation and distribution processes</td>
<td>283</td>
<td></td>
</tr>
<tr>
<td>Communication of information on supply-demand conditions</td>
<td>287</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship and mobilization of resources</td>
<td>287</td>
<td></td>
</tr>
<tr>
<td>Market speculation</td>
<td>288</td>
<td></td>
</tr>
<tr>
<td>Number of middlemen</td>
<td>289</td>
<td></td>
</tr>
<tr>
<td>Market-exchange system with merchant-trader</td>
<td>291</td>
<td></td>
</tr>
<tr>
<td>Proportion of production marketed</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Size of production unit</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>Production of edible versus nonedible commodities</td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>Market Efficiency</td>
<td>306</td>
<td></td>
</tr>
<tr>
<td>Technical versus economic efficiency</td>
<td>307</td>
<td></td>
</tr>
<tr>
<td>Static versus dynamic efficiency</td>
<td>309</td>
<td></td>
</tr>
<tr>
<td>Signals through the pricing mechanism</td>
<td>309</td>
<td></td>
</tr>
<tr>
<td>Resource mobility under price changes</td>
<td>311</td>
<td></td>
</tr>
<tr>
<td>Marketing margins</td>
<td>313</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Product differentiation</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>Equalization of prices</td>
<td>316</td>
<td></td>
</tr>
<tr>
<td>Public Investment in the Economy's Infrastructure</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>Returns to private investment</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>Need for an Efficient Marketing System</td>
<td>323</td>
<td></td>
</tr>
<tr>
<td>Literature Cited</td>
<td>328</td>
<td></td>
</tr>
<tr>
<td>CHAPTER VII. GOVERNMENT PROGRAMS AND POLICIES</td>
<td>331</td>
<td></td>
</tr>
<tr>
<td>Public Price Policies</td>
<td>334</td>
<td></td>
</tr>
<tr>
<td>Acreage response to output price relationships</td>
<td>339</td>
<td></td>
</tr>
<tr>
<td>Acreage response to prices plus additional independent variables</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>Yield response to price relationships</td>
<td>364</td>
<td></td>
</tr>
<tr>
<td>Quantities marketed as a function of market prices</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>Public price supports, ceilings, and subsidizations</td>
<td>386</td>
<td></td>
</tr>
<tr>
<td>Monetary and Fiscal Policies Affecting the Agricultural Sector</td>
<td>388</td>
<td></td>
</tr>
<tr>
<td>Monetary policies</td>
<td>390</td>
<td></td>
</tr>
<tr>
<td>Fiscal policies</td>
<td>393</td>
<td></td>
</tr>
<tr>
<td>Personal income tax</td>
<td>399</td>
<td></td>
</tr>
<tr>
<td>Property taxes</td>
<td>402</td>
<td></td>
</tr>
<tr>
<td>Turnover taxes</td>
<td>405</td>
<td></td>
</tr>
<tr>
<td>Tax on production inputs</td>
<td>407</td>
<td></td>
</tr>
<tr>
<td>Import and export taxes</td>
<td>408</td>
<td></td>
</tr>
<tr>
<td>Marketing boards</td>
<td>410</td>
<td></td>
</tr>
</tbody>
</table>
### CHAPTER VIII. VALUES, ATTITUDES AND OBJECTIVES OF AGRICULTURALISTS AS PRODUCERS AND CONSUMERS

<table>
<thead>
<tr>
<th>Religion</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinduism</td>
<td>433</td>
</tr>
<tr>
<td>Islam</td>
<td>436</td>
</tr>
<tr>
<td>Buddhism</td>
<td>438</td>
</tr>
<tr>
<td>Traditional African religion</td>
<td>440</td>
</tr>
<tr>
<td>Civil-religious hierarchy in Latin America</td>
<td>443</td>
</tr>
</tbody>
</table>

| Extended Family               | 445  |

### Other Values and Attitudes Influencing Individuals' Objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
<td>452</td>
</tr>
<tr>
<td>Savings</td>
<td>478</td>
</tr>
<tr>
<td>Investment</td>
<td>481</td>
</tr>
<tr>
<td>Nonproductive investment</td>
<td>483</td>
</tr>
<tr>
<td>Productive investment</td>
<td>485</td>
</tr>
</tbody>
</table>

### Literature Cited

### CHAPTER IX. INTEGRATIVE APPROACH TO AGRICULTURAL DEVELOPMENT

<table>
<thead>
<tr>
<th>Production</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs and valuations</td>
<td>498</td>
</tr>
<tr>
<td>Working capital constraint</td>
<td>498</td>
</tr>
<tr>
<td>Land constraint</td>
<td>501</td>
</tr>
</tbody>
</table>
Implicit production function 501
Marginal conditions for economic efficiency 502
Exchange Economy 505
Case 1: Planned Production Equals Planned Consumption 509
Case 2: Actual Production Exceeds Planned Production of $q_n$ 512
Case 3: Actual Production is Less Than Planned Production of $q_n$ 518
Case 4: Production in Terms of Exchange Values With "Surpluses" Generated by Several Producers 521
Larger quantity of goods available for consumption 531
Change in the terms of trade 532
Degree of exploitation by the merchant-trader 534
Case 5: Introduction of Government Programs 534
Public investment in the form of food assistance 536
Public investment in the infrastructure of the agricultural sector 540
Public pricing policies 543
Case 6: Economic Decisions in Terms of Market Conditions With Intertemporal Private Investment 545
Saving and lending decisions 549
Investment decisions 554
Partial Equilibrium in the Input Market 557
Net suppliers of $q_2$, $q_3$, and $q_4$ 563
Landless laborers and net suppliers of $q_1$ 563
Producers with positive excess demand for credit, $q_4$, for use in procuring $q_1$, $q_2$, and $q_3$  564

CHAPTER X. FRICTION POINTS OF AGRICULTURAL DEVELOPMENT: SUMMARY  566

Production  570

Working-capital constraint  574

Tenure Arrangement  576

Opportunity cost component, $\mu$  577

Consumption  578

Price elasticity of demand for direct consumption, $g$  578

Income elasticity of demand for direct consumption, $h$  580

Private Investment  582

Initial investment cost  582

Estimated net returns  583

Discount factor, $\rho$  583

Length of planning horizon, $n$  584

Summary  585

LITERATURE CITED  590

ACKNOWLEDGMENTS  605

APPENDIX A: TABLES  606

Literature Cited  614

APPENDIX B: KRISHNAN'S FORMULATION FOR PRICE ELASTICITY OF MARKETED SURPLUS  615

APPENDIX C: ALTERNATIVE FORMULATIONS FOR PRICE ELASTICITY OF QUANTITIES MARKETED  619

APPENDIX D: DERIVED SHORT-RUN DEMAND FOR LABOR AND CAPITAL  625
CHAPTER I. INTRODUCTION

As economic development proceeds, the agricultural sector typically declines in relative economic importance. But this does not imply that the agricultural sector is relatively unimportant in developmental processes. To the contrary: the starting point for economic development is man's use of land and its inherent resources. The application of labor and man's ingenuity to using these resources largely determines the product forthcoming and, in turn, the physical level of living. In the Malthusian state, this level of living is low and essentially constant. However, the Malthusian doctrine minimizes the importance of man's ingenuity in altering his environment. Man has not always made good use of his physical and human resources. Societies have advanced, economically and culturally, only later to decline and even disappear.

At the earliest stages of economic development\(^1\), the agricultural sector is the only sector in the "economy". Only after individuals have produced enough to exceed their own consumption requirements do exchange and trade become feasible. As exchange is accelerated, new wants and new trading opportunities are generated. In turn, production and consumption patterns are altered by varying degrees through points in time. Change has not been uniform. Those countries rather arbitrarily classified as "developing" are characterized by a good deal of heterogeneity in economic and social achievements, both within and among

\(^1\)Economic development is generally viewed as changes in the structure of the economy which lead to sustained increases in per capita real incomes. Of course, per capita incomes are only averages and give no indication as to the distribution of income or to the adequacy of such incomes for realizing desired levels of living.
countries, as well as in potentials for future advance. Differing resource endowments, climatic factors, and external contacts, whether the latter were through colonial conquest or trade, have constrained and facilitated developmental processes. When such processes must be integrated with or superimposed on existing cultural patterns, another dimension to the complexity of explaining or predicting economic change is introduced.

The focal point of interest is those countries which are termed "less-developed" on the basis of per capita incomes which are low relative to those in other countries. None is at the earliest stage of development in that the agricultural sector is the only sector. Rather, countries have varying levels of living and economies of varying diversity.

The desire to raise levels of living and the recognition that the various sectors of the economy are interrelated have increased the emphasis on formulating national plans to stimulate and guide economic activity. The orientation toward identifying and supplying the missing, causative input which would accelerate and sustain developmental processes has largely been unsuccessful. Infusing capital or developing entrepreneurial skills has not been sufficient. Rather, this orientation has shifted toward the need for simultaneous action at several, interrelated "friction points"; hence, the need for coordinated planning, both within and among sectors of the economy. This orientation need not imply a "balanced growth" approach to development, however.

National planning is fashionable in many less-developed countries and is necessary for most. The impetus for planning largely arose after World War II when economic disparities among nations were publicized,
and social and physical scientists were engaged to determine the causes of these phenomena and to construct programs for moving the less-developed areas toward the relatively more affluent-developed countries.

Planning is fashionable because it manifests a trend toward modernization, especially among those countries with a Socialistic bend. Often, national plans are a precondition to attracting external assistance. In addition, the developing and publicizing of national plans have connotations for political and social stability. But this also indicates a necessity for planning since such stability is desirable, if not necessary, for attaining developmental goals. Conversely, invariant social relationships may discourage private initiative and inhibit implementation of public policies which nearly always result in a differential distribution of costs and benefits among those affected. Neither is complete political stability conducive to developmental processes if corruption among public officials is widespread, if public policies are geared toward maintaining the economic and social status quo, and if the public does not have confidence in the prevailing political structure. Thus, too much stability or too much instability is inimical to economic and social change. The optimum balance is not only an elusive but tenuous phenomenon.

Increasingly, the desire for change has its own built-in momentum. Such a desire is one of degree and varies with regions within countries and among countries. The desire is stimulated and sustained through increased contact between rural and relatively urban areas resulting in more participation in the market economy and through increased communication via radios, movies, and word-of-mouth. Furthermore, the growth of
labor unions and other economic groups which generate or mobilize individuals' goals and, in turn, publicly articulate these ends is another actual and potential force for change. Also, public exhortations accompanying the implementation of developmental plans condition people to the desirability and necessity for change. But change is not unidirectional. Adverse experiences, whether actually or illusorily perceived, affect individuals' receptiveness to future change. The inability to achieve individual and collective goals likely affects the levels at which future goals are set. This need to attain stated public goals also usually generates the need for a coordinated, economic plan. Concomitantly, planning should facilitate the establishment of a configuration of goals which is economically, socially, and politically feasible.

As noted previously, at relatively early stages of economic development the agricultural sector is the predominant sector in the economy, both in terms of its contribution to national income and the proportion of the population living and working in this sector. According to the 1968 United Nations Yearbook of National Accounts Statistics (1.22), only 10 of 113 nations for which data were available for the mid-1960's were reported as having agricultural sectors which contributed 50 percent or more to the country's gross domestic product computed at factor cost.\(^1\)

\(^1\)These percentages underestimate the relative importance of the agricultural sector from other viewpoints. Food is the most fundamental commodity in the economy. Its availability makes other economic activities possible. Also, the agricultural sector and related marketing activities have the capacity to absorb much of the population increase and additions to the labor force who cannot find alternative employment. To some extent, the agricultural sector is a "holding" point for individuals waiting for an expansion of external employment opportunities.
Of the 10, only India with 52 percent and Nepal with 66 percent are non-African countries. Among the 8 African countries, the highest percentage attributable to the agricultural sector was 68 for Lesotho. Excepting Lesotho, these countries showed a downward trend in this percentage figure during the past five to ten years. For India, 51 percent of the GDP was attributable to the agricultural sector in 1950 while the corresponding figure for 1967 was 52 percent. The low point in this interim was 46 percent for 1965.

Although several African countries have relatively high percentages of GDP originating in the agricultural sector, a good deal of variability exists among them and among other geographical areas. The comparable 1967 figures for Morocco, Tunisia, and Zambia are 30, 16, and 9 percent, respectively. Similarly, for Latin America the figures range from 8 percent for Chile and Venezuela to 38 and 49 percent for Honduras and Haiti, respectively. Variability also exists among Asian countries. Yet, the prevailing tendency is to lump these countries into a quasi-homogenous category termed "developing countries".

Even in many countries where the agricultural sector is not the principal sector, the expansion of agricultural production is often viewed as being the mainspring or precondition to sustained, general

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1 The figures are not strictly comparable since the 1950 figure is in terms of the percent of national income at factor cost while the 1967 counterpart is in terms of gross domestic product at factor cost. Thus, the 1950 figure would tend to be understated.
economic growth in the economy. ¹ A number of phenomena tend to lend support to this proposition. Included in these would be the following:

(1) The high proportion of the population and the active labor force residing in the agricultural sector.² The economic considerations are quite apparent. This population represents a potentially expanding market for producer and consumer goods produced outside of the agricultural sector, both domestically and internationally. At the same time, these individuals represent an existing and potential demand for employment opportunities throughout the economy. Conversely, they represent a potential labor supply for economic expansion and diversification;

(2) The desirability of dampening current or potential inflationary tendencies so that consumers and users of agricultural raw materials have access to these commodities at relatively low prices. These low prices help keep the cost of living and unit production costs relatively low.³ The opportunities for expanding agricultural exports are also improved;

¹Kuznets states, "... an agricultural revolution -- a marked rise in productivity per worker in agriculture -- is a precondition of the industrial revolution for any sizeable region in the world" (1.8, pp. 59-60). Similarly, Nicholls writes, "... until underdeveloped countries succeed in achieving and sustaining (either through domestic production or imports) a reliable food surplus, they have not fulfilled the fundamental precondition for economic development" (1.14, pp. 366-367).

²See Appendix Table 1. This proportion is particularly high for the African countries where the majority have 70 percent or more in the agricultural sector. For Asia, the most populous countries of India, Pakistan and Indonesia also have about 70 percent of the population in agriculture. The figures are considerably lower for most South American countries.

³Low market prices for agricultural commodities need not be associated with low profits or a low motivation for private investment if production costs are also low.
(3) The need to increase the mobility of capital and labor, largely to the nonagricultural sectors of the economy, through the generation of "surpluses" in agriculture so as to sustain workers and capital investment in other sectors of the economy;

(4) To expand foreign exchange earnings through exports of agricultural products and a reduction of agricultural imports. The generation of foreign exchange represents the means for importing capital and consumer goods, both of which have a direct impact on developmental processes;¹

(5) To promote political and social stability which are influenced by economic conditions in the agricultural sector. The benefits of increased output and(or) agricultural income as a component of GNP are never equally distributed among agriculturalists. However, increased output and income represent a potential means whereby a system of taxation and transfer payments may be used to effect some considerations of economic equity; and

(6) To pursue nationalistic objectives of being self-sufficient in food production thereby lessening the need to import foodstuffs as production levels vary with environmental conditions.

Population growth and increases in per capita real incomes, both indigenously and internationally, affect the rate of growth in demand for agricultural commodities. Where the rate of growth in quantities

¹Appendix Table 2 provides data on average imports and exports for selected countries for the 1964-67 period. The contribution of agricultural exports to total exports exceeds 50 percent for all countries except India. In turn, the percent of all imports designated as manufactured goods and machinery ranges from around 40 percent to 65 percent. Thus, agricultural production and subsequent exports are major contributors to the country's capacity to import.
supplied does not keep pace with the growth in demand, inflationary tendencies are set in motion. An extremely simplified construct for representing the growth in demand is the following: \( d = p + \eta g \) where \( d \) = the rate of growth in demand for agricultural goods, primarily food items; \( p \) = the population growth rate; \( \eta \) = the income elasticity of demand for agricultural commodities; and \( g \) = the rate of growth of per capita real, disposable incomes.\(^1\)

The population growth rates are relatively high for most less-developed countries. Annual, average growth rates for population, per capita real gross domestic product, and agricultural output are presented in Appendix Table 3. For several countries, the growth rate of agricultural output does even not keep pace with the growth of population.\(^2\) For some Latin American countries, in particular, the population growth rates appear to be increasing substantially. Given the high income elasticity of demand for agricultural goods in these areas, any increases in per capita real income accentuate the race between the growth in demand relative to supply. The disparity between these growth rates is exacerbated during periods of adverse production conditions.

\(^1\)The construct can be disaggregated to reflect differential rates of population and per capita income growth among occupational groups, geographical areas and income levels. That is, \( p \) and \( g \) are weighted growth rates and \( \eta \) may be varied with the weighted components of \( g \).

\(^2\)The relationship is more involved. Agricultural output includes nonedible commodities. Several countries export a substantial portion of their agricultural output. Conversely, a part of export earnings is used to import food commodities. Furthermore, even if the growth rate of food production is equal to or exceeds the population growth rate, the distribution patterns determine whether individuals are better or worse off.
The upward pressure on prices does not benefit the majority of individuals in less-developed countries. Subsistence-oriented producers who account for a major proportion of the rural populations sell relatively little in the monetized market. All consumers see their cost of living rising. Wage earners, including agricultural workers, experience a reduction in their real incomes unless their monetary incomes are raised accordingly. Increases in the cost of agricultural raw materials and in labor wages tend to reduce the profit margins of manufacturers. If private investment is dampened, growth in consumer and producer goods industries is also retarded.

In several countries, notably India, Pakistan, and Israel, food imports from the United States under Public Law 480 were instrumental in increasing domestic quantities of available food and, in turn, reducing the upward trend on prices. Although this program has been operative for several years, it can usually only be a short-run alleviation of any food problem for recipient countries. The uncertainty of program continuation would be a sufficient reason for reducing or phasing out reliance on PL 480 shipments. More importantly, if a country is to be self-sufficient in any commodity, food would be the first choice. The large proportion of consumers' budgets expended on foods and the growth in food demand emphasize the importance of increasing agricultural productivity.

The development and gradual distribution of the improved wheat, rice, and corn varieties have been a bright light on the horizon. The successes of the new wheat varieties, for example, in Mexico and India, have been rather phenomenal. Since wheat and rice are the two most im-
important food grains in most less-developed areas, it is important to note that this technological advance is limited to only two or three crops but also the most important ones. The initial success of and the publicity given to the "Green Revolution" or the "Green Evolution" certainly have raised expectations of many from national planners all the way down to the peasants. A substantially-improved means for increasing agricultural productivity has been generated. However, several qualifications must be made. The improved seeds are primarily adaptable to irrigated land which, of course, limits the extensiveness of their adoption. Complementary inputs, in the form of fertilizers and irrigation water are necessary (1.11, 1.23). The rate of adoption is retarded by insufficient financial means to obtain these inputs, including the seeds, and by the need for some additional management inputs for determining the optimum mix of inputs.\footnote{Even if cultivators are relatively efficient in allocating the traditional production inputs, they are not likely equally adept in the use of nontraditional inputs such as the improved seed varieties and new fertilizer mixtures. Furthermore, a lag in adoption on the part of subsistence-oriented producers would be expected as a consequence of the uncertainty of response with an alternative production technique.} Because of the differential rate of adoption, the gains from the "Green Revolution", at least initially, go to the early adopters of the improved inputs. The majority of cultivators who have raised their expectations find them unfulfilled. While it is tempting to view this as the "social consequences" of economic change, such an interpretation appears to be misleading. The economic and, in turn, social consequences of an expanding population and increasing demand, whether demand is effective or not, against a relatively inelastic supply of food commodities were the important factors which stimulated both the need for and interest in developing improved
agricultural inputs. Thus, social instability appears to have been both the cause and consequence of the "Green Revolution." More correctly, the process of change involves nearly simultaneous change in social and economic relationships obscuring any specific cause and effect association.¹

Planning focuses on sectoral growth and the consequences for intersectoral relationships. The economy's infrastructure, physical and human resources, and individual attitudes and motivations form an integrative system of economic and essentially noneconomic factors which mutually constrain and sustain developmental processes. The early work of Rosenstein-Rodan (1.17) stressed the need for an integrative approach to development in the sense that "balanced growth" among the various sectors of the economy is necessary for reducing the possibility of shortages and surpluses among sectors. Nurkse (1.15) popularized the interrelationships among factors through the concept of the "vicious circles of poverty." Lewis (1.9) and Ranis and Fei (1.16) were primarily interested in agriculture's contribution to industrialization through labor transfers, and the capital embodied in labor, out of the agricultural sector.² Little attention was given to increasing agricultural productivity. By implication, the industrial sector would be the leading sector and the necessary adjustments in the agricultural

¹See Frankel (1.4) for an excellent discussion of technical change in association with social change.

²A later version by Fei and Ranis (1.3) acknowledged that investment in the agricultural sector may be necessary.
sector would follow.  

The Harrod-Domar models (1.1, 1.5) stress the role of capital investment in the economy. This is implicit in their emphasis on the use of capital/output ratios and levels of investment in largely determining the level of economic activity. By further implication, behavior patterns are assumed unchanged and no structural bottlenecks occur in the economy as the levels of investment are varied. The successes of capital transfers under the Marshall Plan to Western Europe after World War II and the remarkable growth of Israel, partly through capital inflows, have perhaps overemphasized the importance of capital, per se. In both of these situations, experienced, competent individuals were available for distributing and using the external assistance. In addition, the problem was to a large extent that of rebuilding or, in the case of Israel, building an infrastructure for the economy. This lessened some of the problems confronting countries currently attempting reform and transformation of existing structures, some of which have been institutionalized over time.

The inordinate emphasis on investment, per se, in constructing national developmental plans is criticized by Myrdal who stresses the complementary need for changes in attitudes and institutions. Myrdal writes:

"This narrow approach to planning in the underdeveloped countries of South Asia implies one or both of two assumptions:

1Some similarities exist between this proposition and Hirschman's (1.6) discussion of sectoral linkages in an "unbalanced" approach to economic growth.
(1) that development efforts directed at raising output by investment will induce changes favorable to development in all other conditions;

(2) that efforts to change the non-economic conditions directly are difficult, impossible, or ruled out" (1.12, p. 1905).

Such an approach minimizes the need for coordinated national planning and bypasses all of the ensuing problems. Reliance can be placed on traditional private enterprise with an occasional infusion of public funds where bottlenecks occur, externalities are widespread, and capacity for private investment is limited.

The models which have been noted are macro-economic in nature. The need for sectoral models giving more attention to individual producer and consumer behavior and the subsequent integration of these models for planning purposes is apparent. For example, the agricultural sector in less-developed countries embodies a continuum of landless laborers to subsistence-oriented producers to fully market-oriented, commercial producers. Such individuals, however, have different motivations and opportunities which affect individual economic activities and, in turn, aggregate outcomes.

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1 Myrdal adds, "The majority of contemporary Western economists, with a few notable exceptions, are planners, at least with regard to the underdeveloped countries. But influenced by Marx to a degree they are rarely aware of, they usually make the first assumption [(1) above] that economic advance will have strong and rapid repercussions on attitudes and institutions, especially on those important for development" (1.12, p. 1905).
Objective, Methods of Procedure, and Organization of the Study

Less-developed areas are characterized by their heterogeneity—variations in per capita resource endowments, in institutional structures conditioning economic activity, and in the attitudes and motivations of the economic agents participating in the economy. In terms of land availability and employment opportunities, some countries are essentially overpopulated while others tend toward underpopulation. Yet, for all this heterogeneity, a number of factors commonly operative in each less-developed area can be abstracted and synthesized into a generalized, conceptual model of agricultural development. The weights or importance attached to individual factors varies for particular countries and for stages of economic development. However, all factors are operative to some degree in all countries.

Several attempts have been made to describe the process of agricultural growth and development. Johnston and Mellor's paper (1.7) was an early contribution to discussing some of the interrelationships affecting agricultural growth. Mellor (1.10) and Schickele (1.18) have made rather extensive discussions. Schultz's _Transforming Traditional Agriculture_ (1.19) is important for his attempt to quantitatively test some of the hypotheses rather casually used by others. Several books have been edited which include papers often focusing on discussing rather specific components of the agricultural sector. These would include Eicher and Witt (1.2), Southworth and Johnston (1.20), and Thorbecke (1.21). A number of the papers edited by Wharton (1.24), primarily dealing with subsistence agriculture, are based on a more integrative
approach to understanding the interaction among economic and social factors. The paper by Nakajima (1.13) is particularly noteworthy.

The focal point of this study is the individual producer and the factors which influence his decision-making processes relative to resource allocation, private investment, and, to a lesser extent, consumption patterns. Two broad categories are employed: (1) subsistence-oriented producers; and (2) market-oriented producers. As the term suggests, subsistence-oriented producers gear production decisions to primarily accommodate consumption requirements. However, they do have limited contact with an exchange or money economy. Implicit in this study is a tracing of the evolution of a subsistence-oriented producer toward a market-oriented producer. The latter is presumed to be more economically-motivated and, hence, more responsive to economic pressures and incentives generated by developmental processes.

This evolution is facilitated or impeded by various economic and social factors. A laissez faire policy toward the agricultural sector is ruled out because of (1) the crucial need for increasing agricultural production quickly, (2) the desirability of involving the majority of cultivators in developmental processes rather than having any gains accrue to a relatively small proportion of highly commercialized producers, and (3) the need for structural adjustment in the agricultural sector rather than assuming that the institutional structure changes in the right direction and correct proportion so as to be always favorable.

This dichotomization is only for convenience. A continuum of firm sizes and degree of participation in the market economy exists.
to developmental processes, both exogenous and endogenous. Such is the basis for public intervention in the form of national planning whereby sectoral programs and policies are coordinated and reinforced so as to improve realization of developmental goals.

Following the Introduction, Chapter II focuses on a discussion of several basic theoretical concepts used in the study. Subsequent chapters deal with the principal factors affecting agricultural growth and development: (III) Land Tenure Systems and Firm Size; (IV) Infrastructure of the Agricultural Sector; (VII) Government Programs and Policies; and (VIII) Attitudes, Values, and Objectives of Agriculturalists as Producers and Consumers. Initially, each of these areas is essentially given a theoretical discussion. Following that and integrated with it are references to the literature; i.e., the documentation of the discussion. The implication that these are the modal or most prevalent types does not necessarily hold; the literature only provides a repository of information relative to those actually studied. Difficulties arise in segregating the discussion by chapters. For example, production techniques are not independent of land tenure systems and credit availability. The distribution of credit is conditioned by land tenure systems, government programs, and producers' objectives.

In Chapter IX, the individually-studied components are integrated into a micro-oriented conceptual model within which the influence of the individual factors can be qualitatively observed. By postulating a series of case situations confronting the producer, the conceptual model provides insights into the interrelationships among these factors as they affect agricultural productivity. From such a conceptual model
the "friction points" of agricultural development can be identified and discussed, as in Chapter X. These "friction points" represent the instrument variables and(or) parameters of such development.
Literature Cited


CHAPTER II. BASIC ECONOMIC CONCEPTS AND ADAPTATIONS TO LESS-DEVELOPED AREAS

The following question is posed: is there a separate body of theory dealing with the economics of less-developed areas or are the theoretical constructs primarily developed in and for economically-advanced countries applicable to all areas regardless of their stages of economic development? Subsequent to the discussion of some basic economic concepts, a tentative answer will be given.

Principal emphasis will be given to discussing the factors affecting the organization and operation of the agricultural firm. Initially, however, it may be appropriate to point out that the foundation of the theory of the firm; i.e., the firm operating under conditions of perfect competition, is based on certain assumptions some of which are not consistent with real-world conditions even in the economically-developed countries. For example, perfect knowledge and complete resource mobility do not exist. In addition, the assumption of profit maximization is conditioned by firm-household interrelationships, especially in the agricultural sector. Thus, for policy and predictive purposes, the assumptions and theoretical constructs, as have been evolved, must be subject to qualification. Tentatively, in light of the grossly different institutional structures in many less-developed areas, this process of qualification appears crucial to the determination of operational policy prescriptions for these countries.
Production Function

The production function represents the physical input-output relationships for the firm. It, together with the relevant price ratios or other choice indicators, provides the framework from which such phenomena as optimum resource use patterns, resource demand functions, and product supply functions can be derived. A generalized form of the production function is given in Equation 2.1.

\[ Y_i = [F] (X_1, ..., X_m : 0, E) \quad (i = 1, ..., n) \]  

(2.1)

\( Y_i \) denotes a vector of \( n \) outputs while \([F]\) represents the functional relationships between the \( m \) inputs and the \( n \) outputs. \([F]\) embodies the technical input-output relationships which are affected by factors such as the size and contiguity of the tracts of land. These factors, in turn, have implications for the production technique employed and for realization of any economies of size. In addition, \([F]\) is conditioned by \( O \equiv \) objectives of producers and \( E \equiv \) exogenous factors such as weather, availability of production techniques, and information concerning factor and product markets. The potential effect of the exogenous factors is quite apparent.\(^2\) Producers' objectives, on the other

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\(^1\)For a discussion of the formulation and appropriateness of alternative production functions for the firm see Heady and Dillon (2.1), Chapter 3.

\(^2\)The impact of exogenous factors need not result in producers operating at points interior to their production possibility frontier. For example, the lack of information regarding a superior alternative production technique which a producer could feasibly adopt simply results in the production possibility frontier being below a superior one but with the producer producing at points on the frontier of the curve relevant to his situation.
hand, may have the following effects which may be less apparent:

(1) Producers with insecure tenurial arrangements and those living near the margin of subsistence may be motivated to exploit available resources in the short-run with adverse consequences for resource productivity in the longer run;

(2) The conservatism or traditionalism of subsistence-oriented producers toward nontraditional production techniques and alternative cropping patterns, and the consequent uncertainty associated with these changes, affect $[F]$ currently and over time; and

(3) From a dynamic standpoint, objectives influence the disposition of any "surpluses" arising. In addition to hoarding and nonproductive investment, such "surpluses" may be productively invested in the firm and in individuals,\(^1\) both affecting the nature of $[F]$ over time. Conversely, a preference may exist for investing outside the agricultural sector which has little direct impact on indigenous resource productivity.

An additional comment on producers' objectives seems appropriate. Neoclassical theory of the firm operating under pure or perfect competition is based on producers' objectives of profit maximization or, rather, profit maximization constrained by resource availabilities. Pure profit maximizers rarely exist, if at all. In addition to resource availability, profit maximization is further constrained by firm-household interrelationships which affect both consumption expenditure and labor avail-

\(^1\)The investment in individuals may affect not only the quality but the quantity of labor inputs available. For example, $X_{m-1}^{m}$ = managerial inputs and $X_{m}^{m}$ = labor services of a particular laborer where the quantity of $X_{m}^{m}$ is increased through improved health and diet conditions. Similarly, investment in education may improve both the quantity and quality of managerial inputs.
ability and utilization patterns. Economists generally abstract from the impact of these noneconomic or social variables on the pretext that these phenomena are outside of the purview of economics and economists or that sufficiently little is known about the composition and behavior of these factors so as to preclude their incorporation into the theory of the firm. Yet, these social factors are often indistinguishable from producers' objectives in less-developed areas and, consequently, have a direct and important impact on resource allocation, private investment and production techniques employed, all of which interact to influence production patterns and quantities marketed.¹

Marginal Conditions for Economic Efficiency

The marginal conditions for economic efficiency vary with producers' objectives. For example, market-oriented producers whose objective is that of constrained profit maximization will be guided by market prices in making their production decisions. Subsistence-oriented producers, on the other hand, will primarily gear production decisions to consumption requirements and be less affected by changing market conditions. The marginal conditions for profit maximization will be outlined² with subsequent modification to represent those applicable to subsistence-oriented producers.

¹These social factors such as status associated with leisure and absentee landlordism, time devoted to ceremonial and local governmental operations, and the economic and social consequences of the extended family are discussed in Chapter VIII.

²As indicated previously, profit maximization is constrained by resource availabilities where such resource supplies may be considered as being net of expenditures and investment outside of the firm and net of leisure and social demands on time for capital and labor, respectively.
Least-cost combinations of resources

Taking the partial derivates of Equation 2.1 with respect to $X_i$ $(i = 1, \ldots, m)$, the marginal physical products of the respective $X_i$ in the production of $Y_i$ are obtained as follows:

\[
\frac{\partial Y_i}{\partial X_j} = F_i^j = \text{MPP}_j^i \quad (i = 1, \ldots, n) \quad (j = 1, \ldots, m)
\] (2.2)

Considering the allocation of resources, costs are minimized when the MPP per unit value of production input, the $p_{X_j}$, is equal in all alternative employments, the $Y_i$, as in Equation 2.3.

\[
\frac{\text{MPP}_1^i}{p_{X_1}} = \frac{\text{MPP}_2^i}{p_{X_2}} = \ldots = \frac{\text{MPP}_m^i}{p_{X_m}} = \frac{\text{MPP}_j^i}{p_{X_j}} \quad (i = 2, \ldots, n)
\] (2.3)

If this condition does not hold, resources can be reallocated so as to realize increased production with the same amount of expenditures for inputs utilized.

Optimal output configurations

An additional restriction is necessary. Employing inputs in least-cost combinations is not sufficient for determining the optimum levels of output. This optimum pattern of output for the individual $Y_i$ is obtained when each $Y_i$ is produced at the level where the price or marginal revenue received for that output is equated to its marginal cost of production, Equation 2.4.

\[
\frac{\text{MPP}_1^i}{p_{X_1}} = \ldots = \frac{\text{MPP}_m^i}{p_{X_m}} = \frac{1}{\text{MR}} = \frac{1}{\text{SMC}} \quad (i = 1, \ldots, n)
\] (2.4)
If \( MR^i = P^i \), as in the case of competitive producers, Equation 2.4 can be rewritten:

\[
\frac{\text{MPP}^i}{P_{X1}} = \ldots = \frac{\text{MPP}^m}{P_{Xm}} = \frac{P^i}{\text{SMC}^i} = 1.0 \quad (i = 1, \ldots, n) \quad (2.5)
\]

\[
\frac{\text{MVP}^i}{P_{X1}} = \ldots = \frac{\text{MVP}^m}{P_{Xm}} = 1.0 \quad (i = 1, \ldots, n) \quad (2.6)
\]

The first-order marginal conditions for economic efficiency in the short run are obtained when Equation 2.6 holds for all outputs produced. That is, the MVP per unit of input cost must be equal in all alternative uses. Inputs are now used in the correct proportions and correct amounts. From a long-term standpoint, the conditions in Equation 2.5 must hold but with the added restriction that \( \text{SMC}^i = \text{LRMC}^i \). Long-run equilibrium for the firm where perfect competition exists in both the resource and product markets is obtained when the conditions in Equations 2.7 and 2.8 are met.

\[
\frac{\text{MPP}^i}{P_{X1}} = \ldots = \frac{\text{MPP}^m}{P_{Xm}} = \frac{P^i}{\text{SMC}^i = \text{SAC}^i = \text{LRMC}^i = \text{LRAC}^i} \quad (i = 1, \ldots, n) \quad (2.7)
\]

\[
\frac{\text{MVP}^i}{P_{X1}} = \ldots = \frac{\text{MVP}^m}{P_{Xm}} = 1.0 \quad (i = 1, \ldots, n) \quad (2.8)
\]

Second-order conditions for profit maximization require that the marginal cost of each output must be increasing.

To demonstrate the derivation of the marginal conditions, a functional form using Lagrangean multipliers is postulated as in Equation 2.9.
The formulation is expressed in terms of a constrained revenue-maximization problem with the constraint being capital availability, \( K^0 \).

\[
R = \sum_{i=1}^{n} p_i q_i + \mu [ K^0 - \sum_{j=1}^{m} p_j q_j ] + \lambda [F](q_1, \ldots, q_s) \tag{2.9}
\]

The \( n \) outputs and \( m \) inputs are incorporated in the implicit production function \( F(q_1, \ldots, q_s) \) where \( n + m = s \). Upon taking the partial derivatives of Equation 2.9, the following \( n(m + 1) + 2 \) equations are derived:

\[
\frac{\partial R}{\partial q_i} = p_i + \lambda \frac{F_i}{F} = 0 \quad (i = 1, \ldots, n) \tag{2.10}
\]

\[
\frac{\partial R}{\partial q_j} = -\mu p_j + \lambda \frac{F_j}{F} = 0 \quad (j = 1, \ldots, m) \tag{2.11}
\]

\[
\frac{\partial R}{\partial \mu} = K^0 - \sum_{j=1}^{m} p_j q_j = 0 \tag{2.12}
\]

\[
\frac{\partial R}{\partial \lambda} = [F](q_1, \ldots, q_s) = 0 \tag{2.13}
\]

Selecting any two equations from Equation 2.11 and dividing the two, the least-cost combinations of using inputs are obtained, Equation 2.14. This result holds for any combination of inputs.

\[
\frac{p_i}{p_k} = \frac{F_i}{F_k} = \frac{\text{MPP}^i}{\text{MPP}^k} = \frac{\partial q_k}{\partial q_j} = \text{MRS}_{j-k} \quad (j, k = 1, \ldots, m) \tag{2.14}
\]

\[
\frac{\text{MPP}^i}{\text{MPP}^k} = \frac{\text{MPP}^j}{p} \quad (j, k = 1, \ldots, m) \quad (i = 1, \ldots, n) \tag{2.15}
\]

\(^1\)As constructed in Equation 2.9, the constrained revenue-maximization formulation is synonymous with a constrained profit-maximization formulation.
Similarly, selecting any two equations from Equation 2.10 and dividing, the optimal output configuration is obtained in Equation 2.16. That is, the rate of product transformation, the RPT, is equal to the corresponding inverse price ratio. This result holds for any combination of outputs.

\[
\frac{p_i}{p_h} = \frac{F_i}{F_h} = \frac{-\partial q_h}{\partial q_i} = \text{RPT} \quad (i, h = 1, \ldots, n) \quad (2.16)
\]

Finally, selecting any one equation from Equation 2.11 and dividing this by any equation selected from Equation 2.10 yields the familiar input-output relationships, as in Equations 2.17 and 2.18.

\[
\frac{-\mu p_j}{p_i} = \frac{F_j}{F_i} = \frac{-\partial q_j}{\partial q_i} \quad (i \neq j) \quad (2.17)
\]

\[
\frac{\text{MPP}_j \cdot p_i}{p_j} = \text{MVP}_j = \mu \quad (i = 1, \ldots, n) \quad (j = 1, \ldots, m) \quad (2.18)
\]

Since the constraint in Equation 2.9 is in terms of capital availability, the Lagrangean multiplier \( \mu \) can be interpreted as the marginal value product associated with an additional increment of capital.\(^1\) Alternatively, \( \mu \) can be viewed as the opportunity cost of using capital in the production of the \( n \) outputs. The form of Equation 2.18 is essentially identical to that of Equation 2.6 in that \( \mu = 1.0 \) under conditions of perfect competition. All of the assumptions associated with perfect competition have not necessarily been operative in deriving Equation 2.18.

\(^1\)See Equations 2.18 and 2.27. When Equations 2.10 to 2.13 are solved simultaneously and assuming that the second-order conditions for profit maximization are satisfied, equilibrium values for the \( q_i \), \( q_j \), \( \mu \) and \( \lambda \) are derived. Equation 2.9 is then rewritten as \( q_i \) and \( q_j \) (footnote continued on following page)
The equations outlined above specify the first-order conditions necessary for the maximization process. It has been implicitly assumed that all inputs, outputs, and prices have nonnegative values. Satisfaction of the second-order conditions is necessary to ensure that the levels of output reflect profit maximization rather than profit minimization. Satisfaction of the second-order conditions requires that the relevant bordered Hessian determinants alternate in sign beginning with a plus for all \((i = 1, \ldots, n)\). This is denoted in the following manner:

\[
\begin{vmatrix}
R_{11} & R_{12} & \lambda F^i_1 \\
R_{21} & R_{22} & \lambda F^i_2 \\
\lambda F^i_1 & \lambda F^i_2 & 0
\end{vmatrix}
\]

\(R_{11} > 0\) and \(\begin{vmatrix}
R_{11} & \cdots & R_{1s} & \lambda F^i_1 \\
\vdots & \ddots & \vdots & \vdots \\
R_{s1} & \cdots & R_{ss} & -\mu p_s + \lambda F^i_s \\
\lambda F^i_1 & \cdots & -\mu p_s + \lambda F^i_s & 0
\end{vmatrix}
< 0\)

(footnote continued from preceding page)

\[R = \sum_{i=1}^{n} p_i q_i \quad K = \sum_{j=1}^{m} p_j q_j + \lambda [F] (q_1, \ldots, q_s).\] The \(p_i\) and \(p_j\) are fixed. Taking the first partial derivative with respect to \(K\), \(\frac{\partial R}{\partial K} = \mu\). That is, \(\mu\) is interpreted as the marginal value product associated with an infinitesimal increment of \(K\).
An attempt will be made to adapt Equation 2.9 to situations within which subsistence-oriented producers operate. In this context, the producer's objective is viewed in terms of maximizing utility with an optimum output configuration constrained by the availability of "working capital". The terms in Equation 2.19 are interpreted in the following manner:

\[ J = \sum_{i=1}^{n} p_i q_i + \gamma [K^0 - \sum_{j=1}^{m} q_j] + \lambda [F] q_1, ..., q_s \]  

(2.19)

(1) The \( p_i \) (\( i = 1, ..., n \)) represent the utility coefficients associated with the respective \( q_i \). That is, they are the subjective values attached to the \( q_i \) in terms of consumption requirements. Figure 2.1 demonstrates the derivation of the \( p_i \). At the point of tangency, a price or utility coefficient ratio can be superimposed.\(^1\)

![Figure 2.1. Derivation of utility coefficients for \( q_1 \) and \( q_2 \)]

\(^1\)The geometric derivation of the \( p_i \) can also be easily effected for three commodities. Beyond that quantity, they can be given an intuitive interpretation where the \( p_i \) reflect consumption habits and requirements.
(2) $K^o$ is defined as a "wages fund" comprised of a carryover stock of commodities and (or) credit in kind used to sustain laborers and draft animals in the current production period. The commodities are, in principle, aggregated by a common denominator such as caloric content; and

(3) The $q_j$ ($j = 1, \ldots, m$) are the $m$ inputs in the production function. The corresponding $\pi_j$ represent the amount of $K$ required to support increments of the $q_j$. For example, $q_m$ is a work unit of adult labor; $\pi_m$ is the amount of $K$ which an adult laborer requires or consumes in expending one work unit of his labor.

The set of equations representing the first-order conditions for maximization are obtained in the usual manner:

\[
\frac{\partial J}{\partial q_i} = p_i + \lambda F^i = 0 \quad (i = 1, \ldots, n) \tag{2.20}
\]

\[
\frac{\partial J}{\partial q_j} = -\gamma \pi_j + \lambda F_j^i = 0 \quad (j = 1, \ldots, m) \tag{2.21}
\]

\[
\frac{\partial J}{\partial \gamma} = K^o - \sum_{j=1}^{m} \pi_j q_j = 0 \tag{2.22}
\]

\[
\frac{\partial J}{\partial \lambda} = [F] (q_1, \ldots, q_s) = 0 \tag{2.23}
\]

The marginal conditions formulated in Equations 2.14, 2.16, and 2.18 are satisfied here, although they assume slightly different forms. The MRS between any two inputs is denoted in Equation 2.24; the MPP of $K$ should be equal for all ($j = 1, \ldots, m$) in all ($i = 1, \ldots, n$) uses. Equation 2.25 reflects the condition that total utility cannot be augmented by any other output configuration. In Equation 2.27 the MVC
can be interpreted as the marginal utility of consumption while \( Y \) = the marginal utility associated with an increment of \( K \).

\[
\frac{\pi_j}{\pi_k} = \frac{F^i_j}{F^i_k} = \frac{MPP^i_j}{MPP^i_k} \quad \text{or} \quad \frac{MPP^i_j}{\pi_j} = \frac{MPP^i_{j+k}}{\pi_k} \quad (j, k=1, \ldots, m) \quad (i = 1, \ldots, n) \quad (2.24)
\]

\[
\frac{p_i}{p_h} = \frac{F^i_i}{F^i_h} = \frac{\partial q_h}{\partial q_i} \quad (i, h = 1, \ldots, n) \quad (2.25)
\]

\[
-\gamma \frac{\pi_j}{p_i} = \frac{F^i_j}{F^i_i} = -\frac{\partial q_i}{\partial q_j} \quad (2.26)
\]

\[
\frac{MPP^i_j}{\pi_j} = \frac{MVC^i_j}{\pi_j} = \gamma \quad (i = 1, \ldots, n) \quad (j = 1, \ldots, m) \quad (2.27)
\]

**Tenure arrangements and the marginal conditions**

To assess the impact of tenure arrangements for sharing costs and returns on the marginal conditions for economic efficiency, Equation 2.9 is rewritten as follows:

\[
R = \sum_{i=1}^{n} r_i p_i q_i + \mu [K^0 - \sum_{j=1}^{m} c_j p_j q_j] + \lambda [F] (q_1, \ldots, q_s) \quad (2.28)
\]

\[
\frac{\partial R}{\partial q_i} = r_i p_i + \lambda F^i_i = 0 \quad (i = 1, \ldots, n) \quad (2.29)
\]

\[
\frac{\partial R}{\partial q_j} = -\mu c_j p_j + \lambda F^j_j = 0 \quad (j = 1, \ldots, m) \quad (2.30)
\]

\[
\frac{\partial R}{\partial \mu} = K^0 - \sum_{j=1}^{m} c_j p_j q_j = 0 \quad (2.31)
\]
\[ \frac{\partial R}{\partial \lambda} = [F] (q_1, \ldots, q_s) = 0 \] (2.31)'

In Equation 2.28 \( r_i \) and \( c_i \) are the shares of the revenue received from the \( i \)-th output and costs of the \( j \)-th input paid by the tenant, respectively. Upon taking the partial derivatives, \( n(m+1)+2 \) equations with \( n(m+1)+2 \) unknowns are obtained; second-order conditions are assumed to exist.

Selecting any two equations from Equation 2.29 dividing one by the other, the following is obtained:

\[ \frac{r_i^i p_i}{r_h^h p_h} = \frac{F_i}{F_h} = \frac{\partial q_h}{\partial q_i} \] (i, h = 1, \ldots, n) (2.32)

Equation 2.32 stipulates that the RPT for any two outputs, ceteris paribus, must be equal to the inverse ratio of their prices, each weighted by the respective proportion of revenue to be received by the tenant.

If \( r_1 = \ldots = r_i = r_h = \ldots = r_n \), the marginal conditions for economic efficiency are undisturbed.

Similarly, selecting any two equations from Equation 2.30 and dividing:

\[ \frac{c_j^j p_j}{c_k^k p_k} = \frac{F_j}{F_k} = \frac{MPP_j^i}{MPP_k^i} = \frac{\partial q_k}{\partial q_j} = MRS_{j-k} \]

\( (j, k = 1, \ldots, m) \) (2.33)

If \( c_1 = \ldots = c_j = c_k = \ldots = c_m \), the marginal conditions are unaffected.

Conversely, if \( c_j = .3 \) and \( p_j = \text{price of fertilizer} \) and if \( c_k = .5 \) and \( p_k = \text{price of irrigation} \), then \( \frac{MPP_j}{.3p_j} = \frac{MPP_k}{.5p_k} \). But since \( c_j < c_k \), more fertilizer is utilized, relative to irrigation water, than would be consistent with the marginal conditions as specified.
Finally, in considering input-output relationships, dividing any equation in Equation 2.29 by any in Equation 2.30 results in the following:

\[
\frac{r_i p_i}{\mu c_j p_j} = \frac{\hat{F}_i}{\hat{F}_j} = \frac{-\partial q_j}{\partial q_i} = \frac{1}{\text{MPP}_j}
\]

\[
\frac{r_i p_i \text{MMP}_j}{c_j p_j} = \mu \quad (i = 1, \ldots, n) \quad (j = 1, \ldots, m) \quad (2.34)
\]

If \( r_i = c_j \), for example, if the tenant receives two-thirds of the output revenue and at the same time incurs two-thirds of the input cost, the marginal conditions remain intact and the MVP per unit of input cost is equal to \( \mu \), the opportunity cost or the MVP of an increment of \( K \).

In the case of cash rent, Equation 2.9 can be rewritten:

\[
S = \sum_{i=1}^{n} p_i q_i + \mu \left[ k^0 - \sum_{j=1}^{m} p_j q_j - R \right] + \lambda \left[ F \right](q_1, \ldots, q_s) \quad (2.35)
\]

where \( R = \text{total cash rent to be paid} \). Upon deriving the partial derivatives of Equation 2.35, the constant \( R \) disappears and the marginal conditions for economic efficiency are obtained. For a labor-share arrangement where the tenant provides labor inputs to the landlord in exchange for units of land, the MVP of the labor foregone by the tenant in exchange for the land represents the input cost of the land to the tenant. Thus, if the ratio \( \frac{\text{MVP}_{\text{land}}}{\text{MVP}_{\text{labor}}} = \frac{p_{\text{land}}}{p_{\text{labor}}} \) per unit of input cost for all other inputs, the marginal conditions for the labor-share tenant are satisfied. The above discussion applies to
Demand for Inputs of Production

Input or resource demand is influenced by a number of phenomena. As relative factor prices vary, the marginal conditions for economic efficiency require that the pattern of resource allocation be altered and, in turn, the relative demand for inputs is affected. Similarly, technological innovations affect the MPP of inputs and, hence, their contribution to the production process. In addition, changes in prices received for products produced affect the relative profitability of alternative outputs and, again, the demand for the corresponding inputs.

Restating Equation 2.18 in terms of two inputs used to produce one output:

\[
\frac{\text{MPP}_1 \cdot P_y}{P_{x_1}} = \frac{\text{MPP}_2 \cdot P_y}{P_{x_2}} = \mu
\]  

(2.18)'

As the phenomena identified above occur, the equalities in Equation 2.18' are disturbed. However, equality is restored by altering the values of the MPP through changes in the levels at which inputs are used. The variations in the levels of input utilization represent corresponding changes in resource demand. Of course, changes in the largely externally-determined \( \mu \) would also affect this demand.

Other sources of resource demand exist. In addition to the competitive demand from the nonagricultural sectors for capital and labor used in agriculture, agriculturalists demand and accumulate productive inputs for status or prestige and for security considerations. The principal example is the demand for land where social and political status are
associated with the size of landholdings and where land as an essentially indestructible resource provides a measure of security for small landholders and landless laborers. Cattle, viewed as breeding stock, is another example relevant to parts of Africa where cattle numbers are expanded not only for economic but also for social reasons. Thus, these social considerations condition optimum resource demand and subsequent resource allocation patterns.

**Single input, static demand**

Where all factors of production are invariant but one, the rule for maximizing behavior is that this variable factor should be employed up to the point at which its MVP is equal to its marginal factor cost, MFC; i.e., its acquisition cost to producers. If \( X_1 \) is the only variable factor in Equation 2.1, the rule is expressed as follows:

\[
\frac{\partial Y}{\partial X_1} = \frac{\partial Y}{\partial X_1}; \quad \text{MVP}_i = \frac{\partial Y}{\partial X_1} = \frac{\partial Y}{\partial X_1} (i = 1, \ldots, n) \tag{2.36}
\]

Postulating a specific production function, for example, one of the Cobb-Douglas form as in Equation 2.37, the corresponding factor demand function for \( X_1 \) can be derived.

\[
Y = a X_1^{b_1} X_2^{b_2} \tag{2.37}
\]

\[
\frac{\partial Y}{\partial X_1} = a b_1 X_1^{b_1-1} X_2^{b_2} = \text{MVP}_1 \tag{2.38}
\]

In order to obtain the MVP, the components of Equation 2.38 are multiplied by \( p_y \). Finally, the derived MVP is equated to the factor cost. Upon solving for \( X_1 \), the functional form for \( X_1 \) is determined, as in Equation 2.39.
Equation 2.39 reflects that $X_1$ varies inversely only with $p_{X_1}$. That is, if $p_{X_1}$ increases ceteris paribus, the quantity of $X_1$ demanded decreases. Conversely, if technological innovations increase the technical coefficients of the factors, if the output price increases, or if the use-level of $X_2$ increases, increased amounts of $X_1$ can be profitably used.

The price elasticity of resource demand for $X_1$ is a coefficient of the responsiveness in quantity demanded as the input price varies. This elasticity is designated in Equation 2.40. The negative sign denotes that prices and quantities demanded move in opposite directions provided that $b_1 < 1.0$. Conversely, the price elasticity of demand with respect to $p_y$ is positive assuming $b_1 < 1.0$; i.e., increases in $p_y$ stimulate demand for $X_1$. This formulation is given in Equation 2.41.

\[
\varepsilon_{1, X_1} = \frac{dX_1}{dp_{X_1}} \cdot \frac{p_{X_1}}{X_1} = -\frac{1}{(1-b_1)} \tag{2.40}
\]

\[
\varepsilon_{1, P_Y} = \frac{dX_1}{dp_Y} \cdot \frac{p_y}{X_1} = \frac{i}{(1-b_1)} \tag{2.41}
\]

**Two-factor static demand**

For a generalized production function, $Y = f(X_1, X_2)$, where both inputs are variable, the MVP of each input is no longer its demand curve. The interaction with the other input and consequent effect on the productivity of the first must be taken into account. Figure 2.2 and 2.3 will be used to derive, diagrammatically, a demand curve for labor. Let $X_1 = \text{capital, (K)}$, and $X_2 = \text{labor, (L)}$. In Figure 2.2 point A repre-
Figure 2.2. Change in input use-levels as the price of labor falls relative to capital

Figure 2.3. Derived demand for labor as relative prices and use-level of capital vary

sents the initial point where $OK_1$ and $OL_1$ of capital and labor, respectively, are used to produce $Y_1$. At point $A$, the wage rate; i.e., the price of labor, is $W_1$. These initial conditions are also represented in Figure 2.3 where the MVP curve for labor when capital is fixed at $OK_1$ is drawn. If the price of labor falls to $W_2$, ceteris paribus, the budget constraint in Figure 2.2 which is also the $P_L/P_K$ ratio becomes $BB_2$. The new budget constraint is tangent to a higher isoquant, $Y_2$. As a consequence of the lower wage rate, the amount of labor and capital used has increased by $L_1L_3$ and $K_1K_2$, respectively. It is this increase in capital which renders the MVP curve for labor as being an inappropriate demand curve for labor. That is, the lower wage rate and consequent lower production costs permit the producer to buy more of both inputs. The increased amount of capital makes it profit-
able to use an even greater amount of labor.

This phenomenon is demonstrated in Figure 2.2. If with \( W_2 \) and the consequent increased real value of the budget constraint the budget were taxed so as to restrict the producer to isoquant \( Y_1 \) and to a new equilibrium point at \( B \), \( L_1L_2 \) would represent the increase in labor utilized due to the substitution effect only; i.e., the increase due to the relatively lower price of labor. However, the higher real value of the budget constraint must be taken into account. This increased value permits the producer to purchase \( L_2L_3 \) and \( K_1K_2 \) of labor and capital, respectively. Alternatively, in order to produce \( Y_2 \), additional quantities of inputs in the amounts of \( L_2L_3 \) and \( K_1K_2 \) are necessary.

The increase in capital employed has also increased labor productivity. As arbitrarily drawn in Figure 2.3, the MVP for labor has shifted rightward to a new position, such as \( \text{MVP}_{(K_2)} \). Thus, through the combined effect of \( W_2 \) and increased employment of capital, the optimum level of labor use is now \( OL_3 \). In Figure 2.3, points \( A \) and \( A' \) represent equilibrium points through which a demand curve for labor can be drawn. Thus, by successively altering the wage rate and determining the corresponding MVP curve of labor, \( dd' \), the demand curve for labor, can be derived.

With a specified production function, using Equation 2.37 again, the factor demand functions can be more readily interpreted.¹

\[
y = a x_1^{b_1} x_2^{b_2}
\]

¹For the technique of deriving the factor demand functions see Heady and Tweeten (2.2), Chapter 3. The authors' example on pp. 50-51 will be used for this discussion.
Equation 2.42 represents the least-cost combinations of factors while Equation 2.43 expresses $X_1$ in terms of the input prices and the other components of Equation 2.37. Substituting Equation 2.43 into the production function, Equation 2.44, is the modified production function expressed in terms of $X_2$ given that Equation 2.42 holds.

$$Y = a b_1 b_2 b_1 b_2 b_1 + b_2$$

To derive the MVP to be equated to $p_2$, Equation 2.44 is multiplied by $\frac{p_2}{p_y}$ to represent the total value product from which the first derivative with respect to $X_2$ provides the MVP. See Equation 2.45.

$$\text{MVP}_{X_2} = \frac{d \text{TVP}}{d X_2} = (b_1 + b_2) a b_1 b_2 b_1 b_2 b_1 + b_2$$

If Equation 2.45 is solved for in terms of $X_2$, the static factor demand function for $X_2$, Equation 2.46, in terms of all prices and technical coefficients is obtained.

$$X_2 = \left[ (b_1 + b_2) a b_1 b_2 b_1 b_2 b_1 - b_1 b_1 b_1 - b_1 b_2 \cdot p_y \right]$$

The preceding discussion is primarily applicable to market-oriented producers; i.e., to producers who are responsive to changing price conditions. Figures 2.4 and 2.5 may be more representative of conditions determining resource use, and implied resource demand, for subsistence-

1A similar equation can be readily derived for $X_1$. 

\[
\begin{align*}
- \frac{dX_1}{dX_2} &= - \frac{b_2X_1}{b_1X_2} = - \frac{p_2}{p_1} \\
X_1 &= b_1 b_2^{-1} p_1^{-1} p_2 X_2
\end{align*}
\]
In Figure 2.4, the optimum output pattern is determined by the tangency of an indifference curve reflecting consumption preferences and a production possibility curve. OY₁ and OZ₁ of Y and Z, respectively, represent the optimum output configuration. In Figure 2.5 an isoquant representing the different combinations of resources which can be used to produce Y₁ is drawn. The two rays from the origin, OT₁ and OT₂, denote two alternative production techniques which can be employed in producing Y₁. If for the producer in question OT₁ represents the production technique he traditionally uses, he will "demand" and use OL₁ and OK₁ of labor and capital, respectively. A similar diagram can be drawn to determine the input-use pattern for producing OZ₁. Of course, the sum of inputs used to produce OY₁ and OZ₁ cannot exceed the respective quantities available.
Supply of Inputs of Production

The supply of inputs, both in terms of quantity and composition, varies with stages of economic development. At very low stages of development, land and particularly labor are usually in ample supply relative to inputs such as commercial fertilizers and mechanized power. At high levels of agricultural and general economic development, the converse is more nearly approximated. That is, commercial inputs are readily available while labor migration to nonagricultural sectors increasingly gives land and labor scarcity values. Such modifications in the input supply patterns affect not only the relative quantities available but also relative prices. Thus, the effects of economic development, or the lack of, and consequent structural readjustment of certain sectors of the economy affect the scope and efficiency of the marketing mechanism which, in turn, conditions resource mobility and individuals' objectives.

The recognition of marketing imperfections, both in terms of magnitude and permanence appears to be crucial to understanding the impediments and opportunities for using the marketing mechanism to direct or guide developmental processes. The simplifying assumptions incorporated in the neoclassical theory of the firm operating under competitive conditions are not appropriate to less-developed areas. Resource immobility, imperfection of knowledge and objectives other than profit maximization are widespread, especially at low stages of economic development. Further, the Marxist assumptions that as economic conditions change, the institutional framework adjusts in the correct manner and direction so as to be amenable to developmental pressures and incentives are not valid.
Few would not deny that these assumptions are applicable to any real-world situation. The point to be stressed here, however, is that such assumptions are much less applicable to areas where high rates of illiteracy, traditionalism, and low rates of real economic growth prevail.

The discussion of resource supply functions will be restricted to that of land, labor, and agricultural credit. The forces affecting the supply of other "commercial" inputs are primarily those reflected in the theory of the firm which interact to determine the output supply schedule, the latter now viewed as the resource supply function to the agricultural sector. That is, input suppliers gear resource allocation and output decisions to meet the marginal conditions for economic efficiency or to realize some objective other than profit maximization. The discussion of the supply of land, labor, and agricultural credit is complicated by the interaction among the social and economic factors. The introduction of the social factors admits a great amount of heterogeneity which makes modal or ideal types difficult to discern.

Agricultural labor

Initially, the labor supply schedule for an individual will be derived geometrically through the use of indifference-curve analysis. In Figure 2.6 the slopes of the rays from the origin represent \( r \), the wage rate per hour of labor. The indifference curves reflect the individuals's preference between income and hours worked, both on a per day basis. Alternatively, the curves are derived from preferences between income received and leisure. These are competitive "goods"; i.e., increases in leisure are associated with the foregoing of potential income.
In some areas, leisure is highly preferred because of the social status accruing to nonwork, especially on the part of agriculturalists. Leisure is also a proxy for time devoted to local governmental affairs and to social obligations. The upward curvature of the indifference curves denote a decreasing MRS of income for leisure; i.e., laborers require increasing amounts of income to induce them to supply incremental units of labor services.\(^1\) At higher levels of income, for example, \(I_3\) and \(I_4\), the MRS decreases at a faster rate. That is, the concavity from above

---

\(^1\)For laborers, other than self-employed individuals, in overpopulated less-developed areas, the indifference curve representing preferences between income and leisure may be reduced to a point in space or only the lower portion of the curve may be relevant. That is, the ceteris paribus assumptions on which the indifference curves are based tend to create an employment configuration which is essentially invariant. Thus, the choices between income and leisure are severely restricted if, in fact, a choice does exist.
is accentuated. In Figure 2.7 the points of tangency between \( r_i \) and \( I_i \) \((i = 1, \ldots, 4)\) are plotted to determine the individual labor supply function. In this example, a "backward-sloping" supply curve of labor has been derived. At some point, for example, point M in Figure 2.7, additional increase in \( r \) may induce higher levels of hours worked per day. Intuitively, rising incomes may be associated with increased contact with consumer goods markets. This increased awareness of goods previously not consumed, but assumed available either through domestic production or through imports may induce laborers to alter their preference patterns between income and leisure. Finally, increases in \( r \) above \( \Omega r_2 \) may be associated with hours worked \( > O H_2 \). Instead of moving along \( SS' \), hourly wage rate increases may be accompanied by a shift of \( SS' \) to the right because of factors such as changes in preferences and in costs of living. That is, for wages above \( \Omega r_2 \), the "backward sloping" supply curve may still be appropriate but it has shifted to the right rather than straightened out.

The labor supply function can also be expressed mathematically.\(^1\) In Equation 2.47 labor supplied is expressed as a function of income \((I)\), leisure \((L)\), and additional factors \((X)\) such as information, labor mobility, and physical capacity to work. The total time available for disposal is divided between work and leisure; i.e., \( T = W + L \).

\[
S_L = f(I, L, X) \quad (2.47)
\]

\[
U = g(I, L) \quad (2.48)
\]

\(^1\) This approach is that used by Henderson and Quandt (2.4), Chapter 2.
The utility function Equation 2.48 incorporates income and leisure and provides the foundation for deriving the indifference curves between these two components. If \( I = rW \) where \( r = \) the hourly wage rate, \( I = rW \) and \( L = T-W \) can be substituted into Equation 2.48.

\[
U = g [rW, (T-W)]
\]  

(2.50)

In order to maximize the laborer's utility, the first derivative of Equation 2.50 with respect to \( W \) is derived and set equal to zero; i.e., increments of labor are supplied until the value of Equation 2.50 is maximized.

\[
\frac{\partial U}{\partial W} = -g_L + g_I r = 0
\]  

(2.51)

\[
\therefore - \frac{\partial I}{\partial L} = \frac{g_L}{g_I} = r
\]  

(2.52)

According to Equation 2.52, the marginal rate of substitution of income for leisure equals the wage rate. This condition is identical to the points of tangency derived in Figure 2.6. Equation 2.52 embodies \( W \) and \( r \), and since the laborer is assumed to act so as to maximize Equation 2.50, Equation 2.52 represents the individual's labor supply curve from which wage and quantities of labor supplied can be derived. The second-order condition that

\[
\frac{\partial^2 U}{\partial W^2} = g_{LL} - 2g_{LI} r + g_{II} r^2 < 0
\]

is assumed to have been satisfied.
Agricultural credit

In most less-developed areas, agriculturalists obtain the major proportion of their credit from private sources such as landlords, professional moneylenders, merchants, and relatives. For the majority of the producers, the quantity of funds available from public sources is relatively small. The heterogeneity of sources and terms of credit complicates the analysis of a credit supply function. However, the factors conditioning access to credit by agriculturalists are likely the same as those confronting agriculturalists in the developed countries. Differences exist, however, in the values assigned to these factors and to the relative weights employed in determining the allocation of available funds to prospective borrowers. In addition, a general lack of public regulation of the lenders and the precarious economic position of many agriculturalists interact to bring about an extremely weak bargaining position on the part of prospective borrowers. This places the lender in an advantageous position to largely determine the amount, use, and terms of the loans. However, limited competition and considerations of goodwill in maintaining clients temper the lender's desire to exact the most demanding terms from borrowers.

An implicit credit supply function to individual borrowers is given in Equation 2.53. Credit is assumed to be available from both private and public sources. The public sources, denoted by G and F, represent governmental funds and foreign assistance channelled through governmental agencies, respectively. Because of the relatively small role of the public sector in meeting the credit needs of the majority of cultivators, the discussion will focus on the private sector.
In Equation 2.53, the amount of credit supplied to the j-th borrower is a function of the following:

1. $p_j^I$ represents the productivity of investment undertaken by the j-th individual and $p_k^I$ is the productivity of investments to be undertaken by the k competitors for the funds;

2. The term $i_j^I$ denotes the interest rate that the j-th borrower is willing to pay for a unit of credit. The ratio $\frac{i_j^I}{i_k^I}$ is an indicator of his relative willingness to pay;

3. The term $\mu$ represents the opportunity cost of providing funds to the agricultural sector. For example, $\mu$ is the expected rate of return on government bonds or investments in the nonagricultural sector;

4. $X$ is defined as a composite index of the j-th borrower's relative credit worthiness, of uncertainty or riskiness associated with the use to which credit is to be put, and of the lender's relationship to the j-th borrower. Two extremes of the relationship aspect can be demonstrated: (a) The borrower is a relative of the lender thereby perhaps enabling him to receive preferential treatment, or (b) The borrower is already heavily indebted to the lender and the additional burden of debt may force the borrower to default with the lender subsequently appropriating the borrower's collateral.

The complexity of Equation 2.53 rather defies the derivation of an explicit credit supply function to the individual borrower. The following
rule summarizes the factors taken into account by the lender, as in Equation 2.54, in determining the distribution of his funds available for credit financing.

\[
\frac{i^j}{(1 + d^j)^t} > \frac{i^k}{(1 + d^k)^t} > \frac{\mu}{(1 + d^\mu)^t} \tag{2.54}
\]

The terms \(i^j, i^k, \mu\) were previously defined. The denominators reflect a discounting process where \(t\) = length of time to repayment and the \(d\) = a discounting factor incorporating the size of the loan, the credit worthiness of the borrower, the use of the funds for productive or non-productive purposes, and the uncertainty of return associated with use. For example, if \(i^j > i^k > \mu\) after all have been appropriately discounted, then individual \(j\) represents the most attractive borrower. If the inequalities are all reversed, available funds are best allocated to the nonagricultural sector.

**Land**

Although the physical amount of land is essentially fixed, the amount of land available for productive purposes is affected by the land tenure and land-use patterns. Where land is used extensively and where a part of the potentially cultivable land is idled, land-use regulation and land redistribution would be effective in increasing the quantity of land available for intensive cultivation by smaller producers. Similarly, where conditions are favorable in terms of climatic conditions, availability of inputs, and access to marketing outlets, multiple-cropping in place of single-cropping effectively increases the supply of land in terms of production inputs.
In some areas the population pressure on available land can be mitigated if reclamation and resettlement programs are economically and socially feasible. Consolidation of fragmented land units is another means of increasing the quantity of land for production as many boundary lines and access roads are eliminated. Also, inheritance rights to land influence the patterns of land distribution and land use. These inheritance rights usually tend to accentuate the existence and continued expansion of large landholdings at the one extreme and increasingly small, fragmented production units at the other.

Product Supply

The quantity supplied to the market is dependent upon a number of factors. Production decisions are usually made on the basis of anticipated factor and output prices and on expected technical relationships. Both are subject to allowance for price uncertainty and operation of exogenous forces.

Profit maximizing producers gear production decisions so that the optimal output level is where the SMC of production is equal to the price expected to be received for the product, Equation 2.59.

\[ Y = f (X_1, X_2) \] (2.55)

\[ TC = P_x X_1 + P_y X_2 + F \] (2.56)

\[ TC = C(Y) + F \] (2.57)

\[ \text{Profit} = \pi = p_y Y - C(Y) - F \] (2.58)

1Price supports and controls reduce price uncertainty. For a discussion of price expectation models, see Heady (2.3), Chapter 16, pp. 475-496.
\[
\frac{dp}{dY} = p_y - C'(Y)
\]
\[= p_y = C'(Y) = MC_y
\]  
(2.59)

In Equation 2.56 the total cost of producing Y is the summation of the fixed and variable costs. The total variable cost has been rewritten as \(C(Y)\) in Equation 2.57; i.e., the least-cost combinations of \(X_1\) and \(X_2\) for various levels of \(Y\) can be translated into the corresponding quantities of \(X_1\) and \(X_2\) required to produce \(Y\). When multiplied by their respective prices, the total variable cost associated with various levels of \(Y\) is derived. Equation 2.58 represents profits realized. Equation 2.59 stipulates that output be altered until \(p_y = MC_y\). Second-order conditions require that \(\frac{d^2p}{dy^2} = - C''(Y) < 0\). That is, \(MC_y\) must be increasing at the profit-maximizing output.

A specific production supply function will be derived from Equation 2.37. Initially, a short-run supply function will be constructed. For example, \(ax_2^b = k\) and \(X_1\) is the only variable input. Equation 2.39 is substituted into Equation 2.37 in order to express output in terms of prices, technical coefficients, and the fixed resource. The resulting product supply function is given in Equation 2.60. The derived elasticities are given in Equations 2.61 and 2.62.

\[
Y = \left[ \frac{1}{b_1} \right] \left[ \begin{array}{c} \frac{b_1}{k} \ b_1 \ p_y \ p_x^{-1} \end{array} \right] \ b_1 \ \frac{1}{1 - b_1}
\]  
(2.60)

\[
\varepsilon_y, \ p_{x_1} = - \frac{b_1}{1 - b_1}
\]  
(2.61)
For a long-run product supply function, Equation 2.46 and a similarly derived equation for $X_1$ are substituted into Equation 2.37 in order to express output in terms of input and output prices and of the technical coefficients embodied in the production function, as in Equation 2.63.

\[
y = \left[ a b_1 b_2 (p_y p_{X_1}^{-1} b_1 + p_y p_{X_2}^{-1} b_2) \right]^{\frac{1}{1-b_1-b_2}}
\]  

(2.63)

The above supply function is homogenous of degree zero in prices. Output varies inversely with changes in the input prices. As input prices increase, ceteris paribus, the quantity produced and supplied decreases. Conversely, output varies directly with the price of the output. The elasticities of supply relative to $p_{X_1}$, $p_{X_2}$ and $p_y$ are easily derived with the following results:

\[
\varepsilon_y, p_{X_1} = - \frac{b_1}{1 - b_1 - b_2}
\]  

(2.64)

\[
\varepsilon_y, p_{X_2} = - \frac{b_2}{1 - b_1 - b_2}
\]  

(2.65)

\[
\varepsilon_y, p_y = \frac{b_1 + b_2}{1 - b_1 - b_2}
\]  

(2.66)

A comparison of the price elasticities of supply with respect to $p_{X_1}$ and $p_y$ shows that these elasticities are higher in the long-run product supply function than in the short-run formulation. 

To refer to Equation 2.63 as a product supply function is to implicitly assume that quantities produced and quantities marketed are identical under these conditions.
The actual quantity produced, in accordance with Equations 2.59, 2.60 or 2.63, is a function of expected or estimated values, especially prices. However, after inputs have been committed and the actual output realized, the producer is now confronted by the decision of when to market his produce and in what amounts. This decision is accentuated if market prices, rather, prices received by producers are highly variable. If storage facilities are not available, producers are likely forced to sell their output at prices prevailing at harvest time. Also, debtors and crop-share tenants release quantities to landlords and moneylenders who may be able to store these commodities in anticipation of higher prices. Some subsistence-oriented producers may respond inversely to prices. That is, as the price paid to them rises, producers may market less and consume more in their households. Finally, those with storage facilities are in a better position to market their output in anticipation of and in response to movements in the prices received by them. For these individuals, higher prices will likely induce increased marketings.

Investment Decisions

The potential productivity and the relative scarcity of capital in less-developed areas emphasize the importance of optimal distribution and utilization of available capital. The optimal patterns are likely never attained, but they represent goals which orient investment decision-making processes. The concept of optimality, however, is often-times peculiar to the investor. At early stages of development, government investment programs may be planned so as to maximize the rate at
which private capital is mobilized and channeled into productive investments. The individual investor, on the other hand, perceiving an environment of economic and political instability, may rationally choose to invest his funds in foreign securities or in valuable metals as in the form of jewelry. In the context of investment for economic growth, however, both must be considered as unproductive. Thus, if the government's objective of mobilizing private capital for productive investment is to be achieved, public investment programs and other policies must, at least partially, be directed toward creating a climate of stable, economic growth. Coupled with political stability, such an environment is amenable to domestic and foreign investment, both public and private.

In making both productive and unproductive investments, individuals either explicitly or implicitly attempt to evaluate the net returns from alternative uses of available funds. Such returns are usually expressed in economic terms; however, social and psychic considerations are important to some individuals. In addition, the distribution of these net returns over time affects the relative attractiveness of alternative investments.

The present value rule for determining the allocation of available investment funds which is given in Equation 2.67 can be given a sufficiently general interpretation so as to incorporate both the economic and social factors affecting investment behavior. The components are interpreted as follows:
\[ PV = -(I) + \sum_{t=0}^{n} [R(t) - E(t)](1 + \rho)^{-t} + I_n(1 + \rho)^{-n} \] (2.67)

(1) \(-I\) is the initial monetary cost of the investment;

(2) \(n\) is the final time period of the planning horizon or the length of time over which net returns accrue to the investment;

(3) \(R(t)\) and \(E(T)\) are the estimated returns and variable costs in \(0 \leq t \leq n\), respectively, associated with the particular investment program under consideration; and

(4) \(\rho\) is the subjective discount factor which reflects the opportunity cost of the investment funds plus allowance for uncertainty.

(5) \(I_n(1 + \rho)^{-n}\) is the discounted, capitalized value of \(I\) if the investment is not entirely used up by time period \(n\).

As indicated earlier, \(R(t)\) and \(E(t)\) are usually expressed in terms of economic costs and returns. Intuitively, these components can also reflect the utility and disutility associated with the investment in question. Disutility may be represented by negative values in the flow of \(R(t)\) or be a positive component of \(E(t)\). For example, the social status associated with land accumulation would have a positive value in the \(R(t)\) corresponding to investment in land. This would be in addition to the economic returns. Conversely, investment in a new firm enterprise may require more managerial inputs. This additional time requirement may be viewed as both an economic and social cost in \(E(t)\).

Quite obviously, pesos and utiles cannot be aggregated; however, the net economic returns can be subjectively qualified to reflect the preferences of the investor. Alternatively, such preferences may be embodied in \(\rho\), the discount factor. As \(\rho\) increases with higher degrees
of uncertainty, investors may also increase its value for those investment projects generating disutility. The converse is also true.

Data availability constrains the extent to which costs and returns can be determined. It is not suggested here that potential investors are actually able to quantify Equation 2.67 and calculate the PV of alternative investments. Rather, investors engage in computational and mental processes which tend toward or are systematized by a formulation such as the present value rule.

If Equation 2.67 is expressed strictly in economic terms and is quantifiable, the rule states that if the derived PV of the investment in question is greater than zero, the investment can be profitably undertaken. If the PV is equal to zero, the investor can be indifferent; if less than zero, the investment should not be made. The economic feasibility of alternative investments must then be conditioned by any social factors associated with these investments.

Uncertainty

Producers do not operate in a world of perfect knowledge. Rather, uncertainty is an ubiquitous phenomenon which affects producers' production, investment, and marketing decisions in all areas of the world, regardless of the stage of agricultural and economic development attained. However, the impact of uncertainty on economic activities in less-developed areas is relatively more widespread and more deleterious to growth and development of the agricultural sector. For example, in the developed countries, government intervention in the forms of price support and stabilization programs, and government-sponsored agronomic
research and agricultural extension programs have been instrumental in reducing price and technological uncertainty. In addition, government regulatory agencies and judicial systems interact to safeguard individual personal and property rights. These institutional factors are generally neither well developed nor effectively operative in less-developed areas.

Uncertainty takes many forms. The variance of market prices and of climatic conditions during the production period are perhaps the best examples. Individual sources of uncertainty have differential impacts on the decision-making processes of subsistence- versus market-oriented producers. Three broad categories of uncertainty are subsequently discussed.

**Price uncertainty**

Because producers' objectives are usually stated in economic terms rather than purely physical relationships, the impact of price uncertainty on decision-making processes is pervasive. In the absence of complete price controls, both input and output prices must be estimated if the marginal conditions for economic efficiency are to be approximated. In an environment of imperfect knowledge, these conditions would be realized only by coincidence. In addition, the values assigned to expected or estimated prices, both currently and over time, affect the values of income streams associated with alternative investment opportunities and, hence, investment decisions.

**Technical and technological uncertainty**

This form of uncertainty is an outgrowth of the imperfect knowledge regarding the technical coefficients of production; the avail-
ability and characteristics of technological innovations; and the nature of the impact of climatic conditions, insects, and diseases on input-output relationships. As is apparent in the marginal conditions for economic efficiency, these physical factors influence resource allocation decisions and, in turn, the output configuration realized. The impact of technological uncertainty is especially important for investment decisions in that once resources have been committed, a time interval exists before they can be recovered and invested in more attractive, alternative investment programs.

For producers living near the margin of subsistence, technical and technological uncertainty motivate producers to continue using traditional production techniques. A degree of certainty is associated with these practices which have been used historically. The precarious economic position of many of these producers does not permit or induce them to experiment with technological innovations unless the benefits of using such innovations have been amply demonstrated.

Institutional uncertainty

The institutional structure of an economy generates pressures and incentives which condition producers' decisions. Perhaps the best example is that of security of tenure and recourse of the tenant through legal proceedings. Tenurial insecurity often encourages exploitation of resources in order to maximize short-run gains and discourages private investment, especially if the tenant is unable to recover the value of such investment at the time the tenancy arrangement is terminated. The longer-term consequences are too often lower resource productivity and relatively low growth rates in the agricultural sector.
The prospects for the continuation of current and the implementation of new government programs are additional sources of uncertainty. If agrarian reform seems imminent, large landowners whose property may be expropriated are discouraged from undertaking private investments in their operations. Conversely, the prospect of land redistribution with secure titles should have a favorable impact on tenant production techniques and investment decisions. Similarly, the expected discontinuation or modification of price support policies, government subsidization of input costs, and foreign trade policies introduce additional price uncertainty. Government investment in social overhead capital facilities introduces both technological and price uncertainty.

The errors in resource allocation arising from the various types of uncertainty discussed above are costly to the individual and to society. The individual, other things being equal, foregoes profits and, in turn, capital surpluses for investment or additional consumption. Society loses too in that the potential "surpluses" which do not arise could be taxed for government revenues or could be privately invested by producers. Further, the output configuration realized is likely different from that represented by consumer preferences, and the relative price variability is accentuated. These factors likely interact to exert a depressing effect on private investment and on growth of the agricultural sector.
Circular Nature of Economic Activities

The inability of individuals and agricultural sectors in some less-developed areas to break out of essentially low levels of economic equilibrium is often interpreted as being the consequence of causative factors operating in a circular manner which bump against economic thresholds that prevent or impede cumulative, sustained growth. Nurkse popularized this phenomenon which he termed the "vicious circle of poverty", and his conception is as follows:¹

"It (the concept) implies a circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in a state of poverty. Particular instances of such circular constellations are not difficult to imagine. For example, a poor man may not have enough to eat; being under-fed, his health may be weak; being physically weak, his working capacity is low, which means that he is poor, which in turn means that he will not have enough to eat; and so on. A situation of this sort, relating to a country as a whole, can be summed up in the trite proposition: 'a country is poor because it is poor'" (2.6, p. 4).

The logical basis for such a "circle" also provides a framework for hypothesizing circular activities which are cumulative upward or downward. For example, low incomes lead to low levels of savings and investment which, in turn, result in low levels of resource productivity and hence, low incomes. The circle has been completed. However, if incomes are improved, either through favorable production or marketing conditions, the "circle" should, logically, move upward in a cumulative manner. That is, each component of the circular framework should have a favorable impact on the next activity in the sequence. If the system

¹A number of other formulations have been made. See, for example, Singer (2.7, pp. 1-11) and Higgins (2.5, p. 271).
operated this simply, agricultural planners would only have to devise some means for initiating an income increase and then the production and income of the individual would automatically grow. A number of factors operate to obstruct this facile solution to the production and income problems of agriculturalists in less-developed areas:

(1) Higher incomes, and presumably increased profits or surpluses, may be associated with higher savings. If so, a decision must be made regarding the disposition of these savings. Consumption may increase. For those living near the margin of subsistence, this increased consumption is tantamount to an investment in individuals providing a greater capacity to work and potentially higher labor productivity. Similarly, these savings may be invested in output-increasing inputs, if such are available to the producer. Conversely, savings may be hoarded or invested in unproductive ventures. In the latter cases, higher incomes do not initiate an upward circular movement of the system and the circle is broken;

(2) To the extent that Malthus' theory of population applies to less-developed areas, higher incomes and increased savings may be used to sustain larger families and to improve diets. The result would primarily be a potentially larger number of labor inputs but perhaps with little impact on resource productivity. The improved diets may have a beneficial effect, however;

(3) Even if savings are generated, the question arises as to whether or not productive outlets exist for these funds. Producers employing traditional inputs and production techniques may view investment in additional traditional inputs as being sufficiently productive
to justify the investment. Also, uncertainty associated with investment in the firm, for example, insecurity of tenure, dampens the incentives to invest so as to maintain or increase resource productivity;

(4) "Surpluses" or savings which accrue may be at least partially appropriated by taxes, higher rents, and unfavorable terms of trade to the agricultural sector. The secondary effects arising from the use of these appropriations may have a stimulating effect on agricultural growth; and

(5) The aggregative effect on the individual's capacity to generate savings for productive investment must be examined; i.e., the supply and demand conditions must be integrated. If the demand for agricultural commodities increases at a rate slower than the rate at which quantities are supplied, market prices and prices received by producers fall. Unless production costs are reduced proportionately, producers' savings will also fall. Thus, the capacity to invest is reduced and the profitability of investment may also be lowered. The interaction of these factors would tend to maintain the low level of equilibrium in many agricultural sectors.

Examples of circular forces causing a downward cumulative movement can also be postulated. Higher consumption requirements may be met by reducing the quantity of savings for maintaining or increasing resource productivity. The subsequently lower output and presumably reduced income levels place greater demands on savings and maintenance of resource productivity. Declining resource productivity encourages or requires increased rates of exploitation and, hence, lower productivity in the future. Similarly, tenurial insecurity may encourage resource ex-
exploitation and discourage private investment. Declining output levels may increase tenurial insecurity which, in turn, may motivate the tenant to extract even more from the land with little consideration of longer-term productivity. However, potentially offsetting forces also limit this downward movement. Declining net investment and net depreciation of resources may be offset by technological advances which result in maintenance of resource productivity and the capacity to meet increased consumption requirements through lower savings. In the absence of credit financing, lower output is associated with lower means of sustenance. Inadequate diets are associated with increased illness and higher mortality rates which reduce consumption requirements. The level of living can be reduced only down to the subsistence level, the new equilibrium level. The tenant who perceives that tenurial insecurity is positively correlated with resource productivity will likely be motivated to exploit resources only down to that tolerable by the landlord. At or near this level, the downward circular movement may be stopped.

These "vicious" and "beneficient" circles likely do operate within a constrained range of movement. Their existence is based on a number of implicit assumptions which must be acknowledged if these "circles" are to be used to explain or describe economic activities in less-developed areas. Of importance to individuals and to national planners is the determination of how and where to strategically break the "circle" and how to remove or alleviate the obstacles to self-sustained, cumulative growth.
Tentative Conclusion

An economic system is characterized by the nature and strength of its institutional attributes. An economic theory formulated to explain and predict the workings of this system must be based on the existence of these institutional phenomena. Thus, a theory based on assumptions inappropriate for economies of less-developed areas is invalid for either descriptive or prescriptive purposes. Consequently, neither classical nor neoclassical theory of the firm is valid, as constructed, for noncapitalist economies. However, this is not to say that these theories do not provide points of departure for modification to reflect the social and economic conditions existent in particular less-developed countries.

The basic economic concepts discussed above appear, in principle, to be adaptable for application to less-developed areas. Since these concepts were primarily developed for firms operating in economically-advanced countries, some of the behavioral and environmental assumptions need to be modified. Objectives other than profit maximization are widespread; resources in some areas are highly immobile. Knowledge of marketing conditions, resource availability, and alternative production techniques is imperfect. It is also imperfect in developed countries but to a lesser degree and with a less-deleterious impact on agricultural growth. In addition, the knowledge of these phenomena is not sufficient for stimulating agricultural growth. Individual producers must have the know-how to make productive use of this information in arriving at remunerative production and marketing decisions.
The uncertainty surrounding alternative production techniques and cropping patterns likely causes some producers to be unresponsive to the signals emitted through the marketing system, regardless of the efficiency of the marketing structure. The precarious economic position of many small producers motivates them to continue using traditional production methods. For those who are essentially survival-minded, changing conditions in the input and output markets are largely irrelevant. Production decisions are primarily geared toward consumption requirements. To the extent that these factors are operative, the marketing system and certain government policies cannot be relied upon to guide and develop all parts of the agricultural sector.

Despite the limitations and qualifications which have been suggested, the maximizing procedures for realizing objectives are likely applicable to all areas, regardless of their stage of agricultural and economic development.
Literature Cited


CHAPTER III. LAND TENURE SYSTEMS AND FIRM SIZE

Land tenure patterns are a part of the total agrarian structure. Agricultural growth and development are conditioned by the interaction of all components of this structure. For this study, land tenure is defined as the pattern of land distribution and of the rights and obligations of occupancy, ownership, and land use. Subsequent chapters will deal with rural credit institutions, social overhead capital facilities, and government policies, some of the other components of the agrarian structure.

The evolution of the tenure structure results from social and economic power, custom, and legislation, all tending to become institutionalized over time. Also, ecological factors affect land-use opportunities and production techniques. For example, shifting cultivation is not only an accommodation to or an outgrowth of climatic conditions and existing production techniques but also consistent with traditional social and economic relationships. The tendency for the population to concentrate in areas of highest land productivity and near growth centers of the economy affects the demand for land and, in turn, the landowners' degrees of freedom in formulating tenurial arrangements.

Reforms have been legislated. Too often, however, such reforms have been oriented more toward placation of agriculturalists rather than toward coordinated, structural readjustment. In addition, they were often not effectively and vigorously implemented. At times social

\[1\]

\[1\] For example, see Flores (3.9, p. 5), Madiman (3.21, p. 292), Dutta (3.8, pp. 80-85), Jacoby (3.14, p. 70), Myrdal (3.23, pp. 1303-4, 1324, 1330-34), and Kermani (3.16, p. 67).
gains have been at the expense of economic gains, especially from a longer-run viewpoint. The vested interests of the politically articulate and powerful; i.e., the landlords, large estate owners, and moneylenders, have motivated these individuals to champion for the status quo or for changes which primarily benefit them. A disproportionate amount of influence in the hands of large landowners coupled with a lack of organized political and economic power on the part of small-scale cultivators has tended to sustain traditional tenure patterns in many less-developed areas. At low stages of economic development, the distribution of income is highly influenced by the pattern of land distribution. This concentration of wealth and income has important implications for the strength of internal markets for all goods and, in turn, economic incentives for diversifying the economy. In addition, the high man/land ratios in some areas, for example, South Asia, combined with high growth rate of the agricultural population have enabled landlords to exact tenancy arrangements largely on their own terms. With nonfarm employment opportunities limited, the relatively more-disadvantaged are willing to work under the traditional tenancy arrangements or even more inequitable ones.

1 From the individual standpoint, redistribution of land to former tenants and landless laborers in the form of essentially unviable economic units generates both social and economic gains, at least initially. At the macro-economic level, such land reform may be associated with decreases in production and(or) quantity marketed and adverse prospects for improving future agricultural productivity.

2 See references given in preceding footnote. Several counter examples exist such as the influence of Ghandi in India, the proponents of collective farms in Eastern Europe and the organizers of cooperative farming units in Israel.
More important than the forms of tenure are the terms of tenure arrangements. Owner-operators are not necessarily in an advantageous position relative to crop-share and cash tenants. The tenant may have all the motivations and incentives of owner-operators. In addition, the former may have access to a larger resource base, part of which is supplied by landlords. Unfortunately, the situation in less-developed areas is too often that of economically unviable production units and tenancy arrangements inimical to private investment and alternative input-use patterns, both with adverse consequences for increasing agricultural productivity.

The trend toward a large number of economically unviable units is a consequence of many factors evolving through time. In times past, parts of the Near East and India, for example, were characterized by agricultural conditions supporting the indigenous populations at higher than current levels of living. During colonial rule, the implementation of improved health measures increased population growth rates and, in turn, the demand for employment opportunities. Previously viable production units were divided and fragmented according to customary inheritance patterns. The smaller, fragmented units became increasingly insufficient to sustain existing levels of living, particularly during

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1 Many agriculturalists in less-developed areas would discount this statement. Where status is associated with land accumulation, land ownership is much more important than tenure arrangements and(or) land utilization. In addition, for tenants, especially subsistence-oriented producers, tenancy arrangements are associated with insecurity and exploitation. Conversely, land ownership is synonymous with security.

2 See Tables 3.2, 3.3, 3.6, 3.7, and 3.8 for data on firm size in terms of land holdings.
periods of adverse environmental conditions. The inability of production units to satisfy consumption requirements, either directly or indirectly, and the limited off-farm employment opportunities induced or forced many agriculturalists to secure external financing from other landholders, moneylenders, and merchants. The continued pressure of population on land without a sufficient, offsetting improvement in production techniques tended to increase the demand for credit for both consumption and production needs. Such demand placed creditors in a powerful position. Whether the terms of credit reflected the risks associated with the lending or the noncompetitive positions of lenders, such terms tended to maintain borrowers in an indebted position. Eventually, some debtors lost their land to their creditors and assumed tenancy arrangements on their formerly-owned land. Others became landless laborers. Where the creditors also assumed marketing and retained functions, the potential existed for further worsening the borrower's well-being through influencing the prices paid him for his agricultural commodities and the prices charged for consumer goods he purchased. In the process, the bargaining power of the debtor was gradually eroded and economic and social power accrued to those in positions of relative wealth--the large landowners, the moneylenders, and the merchants.

---

1 Small, fragmented production units operated by tenants often result in misuse of the land. The land base is insufficient to support the double needs and(or) interest of the owner and tenant.

2 Grants of land to selected individuals were also given during colonial rule. This was also the case in parts of Latin America.
Since economic power is also associated with political power, the relatively disadvantaged have few alternatives for improving their well-being either through economic or political processes. Institutional credit, whether through the banking system or through credit and marketing cooperatives, usually requires land as collateral for loans--collateral to which tenants and landless laborers do not have access. They have to resort to noninstitutional lenders. Even if tenants and small landholders have the capacity for private investment in improved inputs, the proportion of net returns going to the landlord and(or) the proportion accruing to the marketing middlemen may tend to discourage such investment. The agriculturalist trying to eke out a living from a relatively small land base has few opportunities to improve his economic position, particularly when employment in the nonagricultural sectors is also limited.

The above discussion emphasizes the relative disadvantage of the small landholder, the tenant, and the landless laborer. While this group usually controls a relatively small proportion of available land, they account for a relatively large segment of the agricultural population. Plantations and large estates exist at the other end of the landholding continuum. Such firms of diverse size of operations coexist. Coexistence is possible where production conditions permit nearly constant returns to scale within a range of firm sizes. Furthermore, the small, labor-intensive units, primarily employing family labor, can reduce actual per unit production costs by paying or imputing to family labor wages below the prevailing wage rate for hired labor. Finally, incomes from relatively small production units are often supplemented
by income from hiring out labor and from engaging in petty processing and marketing activities.

Even if national planners could abstract from vested political and economic interests and from the costs of expropriation and redistribution of land units, they would be hard pressed to conceive of an optimum tenure system. Ownership would likely be favored by the cultivators. Yet, ownership and inheritance patterns have contributed to many of the existing tenure patterns. The optimum distribution of land, where land is only one input in the production system, would be affected by soil characteristics, climatic factors, and the distribution of complementary inputs. Furthermore, even if such an optimum distribution were determinable, the optimality would vary with changes in technology and the availability of complementary inputs. But so far such optimality has only an economic connotation such as optimality from the standpoint of economic efficiency. Economic efficiency, however, is only one component or objective in the national planners' framework. Economic efficiency is likely juxtaposed with considerations of economic and social equity affecting, in turn, the social and political stability necessary for implementing any optimum distribution of land.

In any case optimality is never achieved; the optimum is always changing. Once a distribution program has been devised and implemented, subsequent changes through the legislative, democratic process tend to be slow. This tardiness of legislative processes and the worsening of the economic position of the small landholder, the tenant, and the landless laborer tend to create an environment where revolution and all its
attendant consequences may appear to be an acceptable, feasible alternative to these individuals.

Tenure Systems--A Theoretical Examination

A variety of tenure arrangements exists within and among less-developed countries. The continuum extends from landless laborers and squatters who possess no legal rights to land to extensive plantations and state-owned and operated farm systems. Owner-operators, producers operating under tenancy arrangements of varying terms, tribal or communal holding and operation of land, and combinations of these types of tenure are typically found in differing geographical areas and in varying economic and social systems.

Owner-operator producers

Generally, most agriculturalists aspire to this form of tenure which provides a good deal of security and prestige.\(^1\) Furthermore, for those living close to the margin of subsistence, the security aspect is of crucial importance. For market-oriented producers, security has a positive impact on the length of planning horizons and on production and investment decisions. Conversely, investment in land accumulation, though enhancing the owner's prestige, may not augment resource productivity and agricultural output. That is, investment in expanding the land base may be unproductive in the aggregate relative to expenditures for irrigation wells and increased fertilizer applications. Consequently, security and productivity tend to reinforce each other while there may

\(^1\)In several less-developed countries, however, status is associated with land ownership but not with actual cultivation by the owner. He enhances his status by engaging tenants or landless laborers to perform the manual operations of the farm.
be a "trade-off" between prestige and land productivity, especially in parts of Asia and Latin America. The extensively-cultivated "latifundia" in the latter would be a prime example.

Ownership of land may be at the cost of operating with a smaller resource base. That is, investments in working capital may be more productive and profitable where the landlord provides the land and perhaps complementary inputs. A secure and equitable tenancy arrangement, avoiding the heavy investment in land, frees capital for productive investments. Unfortunately, insecurity and inequitable tenancy agreements are the rule rather than the exception in less-developed areas.

Since production and increments to production need not be shared with the landlord, the owner-operator reaps all the benefits of private investment and labor inputs used. He also must absorb all costs and any losses that are incurred. As mentioned previously, land ownership, ceteris paribus, reduces that amount of capital available for private investment. On the other hand, land provides the collateral for securing private and public credit for production and consumption purposes when the owner has a valid, secure title to the land. Such titles are usually prerequisite to the operation of a market for land. However, title ownership or secure tenancy arrangements cannot overcome problems of land fragmentation and production units of small size.

From the standpoint of economic efficiency, owner-operators are individually in a position to maximize the efficiency of achieving their objective, given the available quantity of resources. \(^1\) To the extent \(^1\)The marginal conditions for economic efficiency were specified in Chapter II.
that externalities are present and knowledge of prices, physical relationships, and maximizing techniques is imperfect, the marginal conditions characterizing economic efficiency will not be realized. These distortions to the pricing system and decision-making processes are ubiquitous in less-developed areas.

Landlord-tenant arrangement

As noted in the previous section, a secure, equitable tenancy arrangement may be preferable to actual ownership of land. However, land ownership per se may be an objective of economic activity. Leasing out or obtaining additional land under lease permits the aggregation of some land holdings which individually could not be economically viable. Ceteris paribus, the efficiency of land use should be improved.

The types of tenancy are varied; crop-share, labor-share, and cash rent are used most frequently with a good deal of variation of terms within each type of tenancy. Logic suggests a differential impact of alternative tenure arrangements on agricultural production. Economic principles, however, provide a basis for concluding that such a differential need not exist. This tentative conclusion pertains to economic well-being; social considerations will likely condition this conclusion.

The modification of a constrained revenue maximization formulation for application to tenancy arrangement was discussed in Chapter II, Equations 2.28 - 2.35. A simplification of the problem in geometric terms demonstrates the effect of cost and revenue sharing by the landlord on production decisions and on the marginal conditions of economic efficiency.
In Figure 3.1 if the tenant receives only one-half of the returns accruing to various levels of using input X, MVP/2, but pays the entire cost of X, MVC, the profit-maximizing level of using X is OX₁. At OX₁, MVP/2 = MVC. Conversely, if costs and returns are shared in the same proportions, OX₂ is profitably used. Quantity OX₂ is that quantity consistent with the marginal conditions for economic efficiency.

Figure 3.2 represents the optimum output level. Again, if the tenant receives only one-half of the returns, MR/2, but assumes all production costs, output is restricted to OQ₁ < OQ₄ where OQ₄ results if costs and returns are shared in the same proportions. Thus, to the extent r < c where r = tenant's share of total revenue and c = tenant's share of production costs, both input and output levels are below those that would
be realized if the marginal conditions were met.1

If \( r < c \), can the landlord be induced to absorb some of the costs or reduce his share of total returns so that \( r \rightarrow c \)? That is, if increased output results from \( r \rightarrow c \), is the landlord's return increased so that he is motivated to lower \( r^* \), his share, where \( r^* = (1 - r) \)? Figure 3.3 provides a partial answer to this question.

---

1The qualitative impact on output by varying \( r \) and \( c \) can be assessed in the following manner:

Profit = \( \pi = rR(q) - cC(q) \) where \( R(q) \) and \( C(q) \) are the total returns and costs, respectively, of producing an unspecified amount of \( q \).

\[
\frac{d\pi}{dq} = rR'(q) - cC'(q) = 0
\]

\[
= rMR = cMC
\]

Taking the total differential of (1) and assuming that \( r = c \):

\[
rR''(q) dq + drR'(q) = cC''(q) dq + dcC'(q)
\]

\[
dq = \frac{dcC'(q) - drR'(q)}{[rR''(q) - cC''(q)]}
\] (2)

In accordance with the marginal conditions for economic efficiency, the denominator is assumed to be negative. The following situations are considered:

(i) If \( dc = dr = 0 \) and they change in the same direction, the numerator is 0 \([C'(q) - R'(q)]\) which is equal to zero and \( dq = 0 \).

(ii) If \( dc < 0 \) and \( dr = 0 \), \( dq/dc > 0 \). Conversely, if \( dc > 0 \), \( dq/dc = C'(q)/( - ) \) which is < 0 and output falls.

(iii) Similarly, other combinations of \( dc \) and \( dr \) with alternative signs can be postulated and the qualitative impact on \( dq \) determined.
If \( r = .5 \) and \( c = 1.0 \) for the tenant, \( rMR = cMC \) at point \( Z \) where the slopes of TC and \( .5\text{TR} \) are equal. Output \( OQ_1 \) is produced. The area \( OAB \) is the amount which accrues to the landlord under this tenancy arrangement. If the landlord permits an increased share to the tenant, for example, \( r = .75 \), \( Z' \) is the point where \( .75\text{MR} = MC \) and \( OQ_2 \) is produced. With \( r^* \) reduced to .25 but output increasing by \( O_1 \), the landlord foregoes \( OCB \) of revenue but obtains area \( ACDE \). Since the latter is larger, the landlord realizes an increased amount of revenue by reducing \( r^* \). Similarly, the tenant has increased both his gross and net returns.
To what level can the landlord reduce \( r^* \) without also reducing his income from the tenancy arrangement? The answer is provided by a modified elasticity concept. If 

\[
\frac{\partial PQ}{PQ} = \frac{\partial r^*}{r^*} = \frac{dQ}{Q} = \frac{dr^*}{r^*} > 1.0,
\]

returns to the landlord are increased. They continue to increase to the point where \( e^* \) becomes equal to 1.0.

Table 3.1 is derived from approximate readings from Figure 3.3 as \( r^* \) is varied. From the landlord's standpoint, the optimum \( r^* \) is \( .15 \leq r^* \leq .25 \). Since the tenant assumes all costs, his position is successively improved as \( r^* \) is lowered; i.e., as \( r \) is increased. As indicated earlier, his optimal position is when \( r = 1.0 \), since \( c = 1.0 \), which is obtained at point \( Z'' \) where \( MC = MR \) and \( OQ_4 \) is produced. The following qualifications are necessary:

Table 3.1. Returns to the landlord and derived arc elasticities under alternative tenurial arrangements

<table>
<thead>
<tr>
<th>( r^* )</th>
<th>( Q )</th>
<th>( c^* TC )</th>
<th>( \frac{PQ}{(P = .9)} )</th>
<th>( r^* PQ )</th>
<th>( e^* )</th>
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<td>.5</td>
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<td>0</td>
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<td>48.6</td>
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</tbody>
</table>
(1) The cost curves have been arbitrarily drawn.\(^1\) As \(r^*\) is varied, the shape of \(TC\); i.e., the slopes associated with alternative \(Q\) which are also the respective MC of \(Q\), determines the \(Q\) and \(dQ\). If the TC curve were to rotate counter-clockwise at point \(Z\), the \(Q\) and \(e^*\) associated with alternative \(r^*\) in Table 3.1 would be reduced and, in turn, the landlord would be less motivated to reduce \(r^*\). Such a rotation would be tantamount to increasing the rate at which returns to variable inputs decrease. Conversely, a clock-wise rotation resulting from adoption of improved technology would tend to increase the landlord's motivation to reduce \(r^*\), ceteris paribus;

(2) The TVC and TC curves have, implicitly, been assumed invariant as \(r^*\) and \(r\) are varied. This invariance results from the usual assumption possibility curve; i.e., he does not employ production techniques resulting in production at interior points. In actuality, however, as \(r^*\) is reduced and \(c^*\) increased so that sharing of costs is more nearly equal, it is conceivable that the relatively improved position of the tenant induces him to engage in better cultivation practices and(or) to use labor inputs more efficiently resulting in a higher MPP per unit of input. If input costs remain invariant, the cost curves shift downward and output and net returns are increased;

(3) The market price has been assumed to be invariant as the quantity of output produced and, presumably marketed, is increased. As the market price or slope of TR is altered, a differential impact results on the quantity produced and, in turn, the landlord's motivation to adjust \(r^*\);

\(^1\)The relative numerical scales in Figure 3.3 have also been arbitrarily assigned.
(4) The landlords in less-developed areas have objectives other than revenue-maximization from their tenancy agreements. Conditions may exist such that both tenant and landlord are in improved absolute positions as \( r^* \) is lowered. However, landlords may have a rational interest in maintaining the economic and social status quo. If tenants are maintained in a low living level and highly dependent position, the power position of the landlord permits him to exact those terms of tenancy most favorable to him socially, politically, and economically, both in the short-run and from a longer-run point of view;

(5) Since the shape and position of the cost curves and revenue rays are affected by market and environmental conditions, landlords would rationally require assurances of substantial increases in revenue accruing to them before they would be induced to lower \( r^* \); and

(6) The revenue rays are based on market prices. Where the tenant is effectively forced to market his output to the landlord, the landlord is often able to set the price to be paid to his tenant. To the extent this price is below the prevailing market price, the landlord receives an additional differential. Tenants who obtain credit from the landlord are often required to pay higher interest charges relative to the owner-operator who has land as collateral and, in turn, has access to lower-cost, institutional credit. This can be reflected in a higher TFC in Figure 3.3 so that, ceteris paribus, the margin between TR and TC is lower at the profit-maximizing output. Where tenants are also required to provide labor inputs to the landlord, a reduction in \( r^* \) resulting in higher gross and net returns to the tenant; i.e., a relatively higher degree of financial independence, may make the tenant more re-
luctant to supply these labor inputs.

If the tenant pays a fixed cash rent rather than a share of the crop, the cash rent becomes a fixed cost and is included in the TFC. In this situation, still assuming that all costs are borne by the tenant, TR is the appropriate revenue ray in Figure 3.3. The tangency of TR, really (1.0)TR, and TC will be at point $Z''$. At this point $MC = MR$ and $OQ_4$ is the profit-maximizing output. This point corresponds to point A in Figure 3.2. Since the tenant is absorbing all production costs, the cost curves in Figures 3.2 and 3.3 will shift downward accordingly, and the profit-maximizing output levels will be altered.

Another factor that needs mentioning is the degree of the landlord's involvement in firm operations. Absentee landlords and (or) those concerned only with receiving rent payments have little or no interest in maintaining or improving the productivity of land and of complementary inputs. The tenant may have neither the financial capacity nor incentive to undertake these investments. Such an attitude by the landlord is tenable where the population pressure on land is severe and the demand for land, even of declining productivity, is high. This attitude is reinforced where landlords anticipate eventual public expropriation of their lands. Conversely, landlords providing inputs, including management inputs, are more directly involved in their tenant's operations. But, of course, this involvement may or may not be beneficial. Where the landlord's managerial approach is that of innovation and adaptation to changing economic conditions, the landlord's and tenant's inputs can complement each other, particularly since the primary tenant input is family labor. Conversely, where the landlord is tradition-oriented, his
involvement would tend to be an inhibiting factor in expanding firm productivity.

Even when costs and returns are not shared in equal proportions, share-cropping and communal types of tenure and cultivation have much appeal. For the share-cropper, the burden of paying a fixed cash rent, especially in poor production years, is avoided. On the other hand, the results of favorable growing conditions and (or) better cultivation practices must be shared with the landlord even if his only contribution to the production process is to provide the land. In contrast to cash-rent arrangements, landlords may supply some of the credit, implements, and draft animals. The landlord may also favor a share-cropping arrangement since it can permit him to be actively involved in the firm operations and provides him with some control over the tenant's use of the land. In addition, share rentals are easily collected, often after the crop has been harvested and just threshed, while cash rents are more difficult to collect, particularly during poor production years or when contingencies arise within the tenant's family. The tenant may simply not have the reserves or access to credit for payment of the rent.

Communal types of tenure may discourage individual initiative. However, the system provides a good deal of security to the members, particularly when ill health or some other personal misfortune strikes.

Security of tenure is of principal importance. Even where legislation or custom prescribes maximum rents or equitable cost-return sharing arrangements, such safeguards for the tenant are not operative if his lease can be terminated involuntarily at the will of the landlord. The converse also holds. A high degree of security but with inequitable
tenancy arrangements is not conducive to private incentive and initiative. Too much security, however, need not promote proper land use by the tenant, especially if there are few, enforceable penalties for improper cultivation practices. With an insecure tenancy arrangement, the tenant is often motivated to maximize present output without consideration of the future productivity of the soil. This example of a divergence between private and social costs and benefits can be reflected, ceteris paribus, by a downward shift of the MVP curve in Figure 3.1 in subsequent production periods. Alternatively, the AVC and ATC curves in Figure 3.2 shift upward, ceteris paribus.

The terms of tenancy affect decisions for private investment on the part of the producer. The decision rule, however, is unaffected.1 If the prospective investor uses a decision rule approximating in nature the present value rule, the following expression is appropriate:

\[
P V = -(c I) + \sum_{t=0}^{n} [r R(t) - c E(t)] (1 + \rho)^{-t} + r I_n (1 + \rho)^{-n} \quad (3.1)
\]

Upon quantification, if \( PV > 0 \), the investment can be profitably undertaken. How might the terms of tenancy affect the decision to invest or not to invest?2 First, tenure security or insecurity can affect two of the variables: (1) With insecurity, \( n \) is a point in time in the relatively near future. That is, the sum of the discounted net returns

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1 See Chapter VI for a discussion of public investment in the agricultural sector. Private investment is discussed in Chapter VIII.

2 The assumption is made that the \( R(t) \) and \( E(t) \) are invariant with respect to the tenancy arrangement; i.e., these returns and costs are the same whether the tenant pays cash rent or has a crop-share arrangement. To the extent the tenant does not have an equitable, secure tenancy arrangement, the \( R(t) \) and \( E(t) \) will be affected by cultivation practices and maintenance expenses.
must be positive over a relatively short period of time; and (2) With \( \rho = \text{opportunity cost plus allowance for uncertainty} \), the uncertainty component can be adjusted for exogenous factors including insecurity of tenancy. As \( \rho \) is increased, ceteris paribus, the derived PV is reduced. Thus, raising \( \rho \) and reducing \( n \) to tend to lower the derived PV and, in turn, the profitability of undertaking the investment. Second, the values assigned to the \( r \) and \( c \) coefficients have differential impacts on investment profitability. As \( r \) is raised and \( c \) lowered, ceteris paribus, the PV of the investment is increased.

Landless laborers

As the term connotes, these individuals have only their labor services to offer to those who have the complementary inputs. As such, they rank at or near the bottom of the ladder of economic and social status in the agricultural sectors of most less-developed areas. Obviously, some group must be at the bottom; however, the prospects for landless laborers improving their well-being both relatively and absolutely are especially limited. The size of this group together with the high rate of population increase complicates the problems of providing secure, productive employment for these individuals in all sectors of the economy.

The relatively low levels of living associated with landless laborers represent both symptoms and causations of their essentially low level, equilibrium position. This consequence is a manifestation of poor education, of resource immobility where alternative employment may
be available,¹ and of a highly inferior bargaining position vis-à-vis landlords and other employers. Also, low levels of living result in the inability to accumulate productive resources, poor nutritional and health conditions, risk aversion and low aspirational levels—all of which perpetuate low resource productivity and, in turn, low per capita incomes.

Because of their precarious economic position, landless laborers are extremely vulnerable to adverse economic and personal consequences. When unusual or unexpected expenditures are required, for example, weddings or illness, a general lack of reserves forces the laborer to secure credit usually from a landlord or moneylender. High interest rates and a low capacity to repay result in laborers assuming debtor status. This further weakens their bargaining position relative to their employers and creditors. Since they have essentially no collateral and some unpredictability as to sources of income, they are high credit risks.

In addition to the economic consequences referred to above, the social status of landless laborers is extremely low. When status is associated with land ownership and not with the manual operations of cultivating the soil, the social consequences are quite apparent. Because of illiteracy and immobility, the social gains accompanying education attainment and employment as noncultivators are outside the grasp of most landless laborers. Finally, because of all of these

¹Mobility is increased through improved communications systems as evidenced by substantial migrations to urban centers even though gainful employment is not available for many migrants.
factors, this group is one of the least politically articulate. Thus, "democratic processes", largely directed by the landowners, merchants and moneylenders, provide little hope as a means of improving the overall well-being of the landless laborers.

Firm Size and Tenure

The size of the individual agricultural firm has important implications for producers' economic and social well-being and for facilitating or inhibiting developmental processes. In addition, the terms of tenure condition producers' production and investment decisions and, in turn, the size of the firm at points in time. Furthermore, producers' attitudes toward income accumulation and investment in the firm must be evaluated. Also, the aggregative impact of firm growth on marketed supplies and prices received affect the growth potentials of individual firms.

For this study, firm size is defined as the quantity and quality of productive resources under the control of the manager; i.e., the decision-maker within the firm. This definition covers the continuum of subsistence plots to plantations producing export crops. The land base is often used as the indicator of firm size. However, this can only be a first approximation since no consideration is given to the intensity with which land is used.\(^1\) Intensity of land use is determined

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\(^1\)Several land reform programs have had limited success, at least from a standpoint of economic viability of the firm, because an inordinate amount of emphasis was placed on the number of acres to be distributed to individual producers without careful consideration of the availability and necessity of complementary resources needed to make the new land distribution pattern an economically viable one.
by the quantity of nonland inputs which are applied to the land. Firm size is affected not only by the quantity of resources, but by resource productivity and the organization of resources. First, land and labor may have low per unit productivities as a consequence of past production practices, use of traditional production techniques, and social factors influencing labor productivity. Second, the distribution of land, that is, the size and contiguity of land tracts, and the organization and intensity of work patterns are organizational factors affecting the opportunities for adopting improved technology and the timeliness of completing farm operations. Producers' objectives and the exogenous effect of government programs are elements which further complicate the determination of firm size.

Firm size must be viewed from both the micro- and macro-viewpoints. The former focuses on producers' capability and motivation to alter size throughout their planning horizons. At the macro or national planning level, firm size represents both a parameter and instrument variable for attaining national objectives. The former exists where price support programs are implemented with land tenure invariant. Firm size may be an instrument variable in a program of agrarian reform which incorporates land redistribution and provision for agricultural credit, provisions which are designed to increase agricultural productivity. Even when treating firm size as a parameter, the differential impact of governmental policies has indirect effects on firm size in subsequent periods.

In addition to the attitudinal considerations of prestige, security, and wealth accumulation, firm size determines and is determined by the
following economic factors:

(1) The capability to generate a surplus for saving, a part of which is available for private, productive investment where such remunerative opportunities exist;¹

(2) The capacity of the firm to profitably absorb additional increments of various forms of capital;

(3) The choice of production technique where alternative techniques are economically and socially feasible and are available;

(4) The opportunities for diversifying firm enterprises to increase the flexibility of response to changing conditions and as a hedge against adverse economic conditions for individual enterprises; and

(5) The ability to secure access to additional resources, including public and private credit and extension services.

At points in time, firm size is a consequence of evolutionary and traditional forces: of a fixed amount of physical land and of land reform; of an expanding population and of persistent traditional family systems and inheritance rights; and of the availability of inputs and techniques to augment resource productivity and of the inadequacy of credit institutions to provide necessary financing plus producers' inertia toward change.

In an attempt to systematize the discussion, the following formulation is employed:²

¹A theoretical discussion of imputing the product to the various production inputs is given in Chapter IV.

²The terms in (3.2) are defined in Chapter II as they apply to both subsistence- and market-oriented producers.
Equation 3.2 represents a constrained-revenue maximization formulation for the market-oriented producer. For the subsistence producer, it may be interpreted as a constrained utility maximization approach where the \( p_i (i = 1, \ldots, n) \) are utility coefficients.

For short-run decision-making, producers are restricted to their respective short-run average cost curves (SAC), as in Figure 3.4. These are the consequence of past investments in fixed assets, \(^1\) current technology employed, anticipated input prices, and producers' objectives. The SAC curves may be considered as indicators of firm size. In Figure 3.4, \( \text{SAC}^0 \) may represent the initial cost structure for a market-oriented producer.

\[
J = \sum_{i=1}^{n} p_i q_i + \mu \left\{ K^0 - \sum_{j=1}^{m} p_j q_j \right\} + \lambda \left\{ [F] (q_1, \ldots, q_s) \right\} \tag{3.2}
\]

\(^1\) Included would be investments in land, in the quantity and quality of family labor, in draft and mechanical power, and in farm buildings. In addition, public investment in social overhead capital facilities would affect the shape and position of some producers' SAC curves.
producer. Corresponding to $SAC^O$ is an equation similar to Equation 3.2
where only one commodity is represented; i.e., $n = 1$. Firm size is
affected by the following factors:

(1) The functional relationship $[F]$ which incorporates considera-
tion of the quantity and productivity of fixed inputs, including land;
the physical relationships between the variable and fixed inputs; the
production techniques employed; and the influence of exogenous factors.
This functional relationship, along with input prices, represents the
feasible points on $SAC^O$;

(2) The magnitude of $K^O$, the working capital constraint. The
amount of $K^O$, along with $[F]$ and input prices, determines the feasible
points on $SAC^O$ actually available to the producer;

(3) The $p_j$ ($j = 1, \ldots, m$) affect the number of $q_j$ ($j = 1, \ldots, m$)
that can be used since $\sum_{j=1}^{m} p_j q_j \leq K^O$. The $q_j$, in turn, affect the points
on $SAC^O$ that can be reached;

(4) Given $SAC^O$, the output price determines the profit-maximizing
level of output. At $p_2$ in Figure 3.4, $Oq_2$ is produced, assuming that
$K^O$ is sufficiently large to permit production of $Oq_2$. If the price falls
to $p_1$, the optimum, planned output level is $Oq_1$. Although the firm size
implicit in $SAC^O$ has remained invariant, the actual size in terms of
output varies with the point at which the output price equals $MC^O$; and

(5) The producer's objective whether it is to maximize Equation
3.2 or to pursue some other objective.

The usual theoretical assumption relative to long-run planning de-
cisions that all factors of production are variable may apply in individ-
ual cases but often not in those areas where man/land ratios are high. General economic expansion improves opportunities for resource availability and mobility. The rural-to-urban migration in relatively developed countries has facilitated the expansion of individual resource base, especially land, on the part of those remaining in agriculture. In much of the less-developed areas, additional land is available for cultivation, but the private costs of developing this land for commercial production are prohibitive. Further, the nature of rural credit institutions inhibits the profitability and feasibility of private investment and expansion of firm size. In Figure 3.4, a movement from $SAC^0$ to $SAC^1$ as a result of private investment in the firm is in increase in the firm size or, more correctly, in the output capacity of the firm. In the longer-run, exogenous factors such as technological advances, public investment, and government programs of agrarian reform have both direct and indirect effects on firm size and on producers' motivation and capability for private, productive investment. The impact of such factors varies with individual producers and with points in time; that is, with stages of economic development.

The 1960 world census of agriculture (3.27) provides data relative to farm size, expressed as size of land holding, for a few less-developed countries. To reiterate, however, farm size in terms of land area is only an approximation of firm size. Where traditional production techniques embodying labor as the primary variable input are used, farm size is a better indicator of the size of operations than where a large

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1 Estimates of the amount of land which is potentially cultivable in several developing countries are presented at a later point in this chapter.
number of nonland inputs, in addition to labor, are used. Quite apparently, farm size in terms of land area has no implication for land productivity and, in turn, the producer's capacity to produce for direct consumption and for the market. Where environmental conditions are favorable for multiple cropping, relatively small land holdings need not be associated with low levels of annual production. Furthermore, land area per farming unit does not reflect the problems of land fragmentation and costs incurred in traveling to and from land tracts. Some individuals are only part-time farmers who have additional sources of income. Finally, consumption requirements, as affected by family size, need not be associated with size of land holding. Taxes and rents may also be so burdensome that even though the land area appears to be adequate, the residual production or income is not sufficient to sustain traditional consumption patterns and even less the capacity for saving and private investment. All of the above qualifiers must be kept in mind when attempting to evaluate the size of land holding as the latter affects the producer's capacity to produce and contribute to general economic expansion.

Latin America

"In Latin America the growing manifestations of rural unrest, the unsatisfactory growth of agricultural production, the increasing importation of food-stuffs, the malnutrition of the majority of the people and the acrimonious debate on agrarian reform are proof that the agrarian question has gone beyond the realm of academic discussion" (3.4, p. 391).

1This section is, to a large extent, based on Barraclough and Domike (3.4). Argentina, Brazil, Colombia, Chile, Ecuador, Guatemala and Peru are the countries included in the study. The authors state that since none of these has experienced "... irreversible changes of a 'revolutionary' type in their land tenure systems, ... their agrarian structures as well as their re- (footnote continued on following page)
The pattern of land distribution tends toward large, extensively-cultivated estates at one extreme and a large number of extremely small production units at the other. The former, the "latifundia", are a few in number but include a major proportion of the total land. Conversely, the latter, the "minifundia", are numerous but have relatively small amounts of land under their control, both individually and collectively. The "minifundia" often coexist on the fringes of the "latifundia" and also comprise relatively separate communities of small landholders.¹

This concentration of land ownership is the consequence of several factors. First, foreign conquest, primarily by the Spanish and Portuguese, resulted in large appropriations of land by the conquerors with the distribution of large land units to relatively few individuals having associated rights of receiving payments and labor services from the indigenous inhabitants. The latter, in turn, were given small plots of land for their personal cultivation. Later land concessions by the governments tended to accentuate the ownership pattern.² Those individuals with access to foreign capital were in a favored position to purchase land and to add to their estates through time. This trend

¹These communities, while physically separate, are for a varying extent dependent upon the "latifundia" system for part-time employment, market outlets and sources of credit.

²In addition to outright concessions for land settlement and development, the Peruvian government used land grants as a means of redeeming outstanding government bonds (3.7).
was reinforced through landowners' credit-lending practices which tended to shift the economic power toward them. In other cases, individuals appropriated land illegally.\(^1\)

This concentration of landownership is synonymous with economic and political power and with social status. Such polarization of power sustains a constellation of forces pervading nearly all aspects of rural life which tends to perpetuate and to likely make more pronounced the economic, political and social inequalities currently existent.\(^2\) Tables 3.2 and 3.3 lend support to the commonly-held contention of grossly unequal patterns of land distribution.\(^3\)

\(^1\)Brodsky and Oser (3.7) comment that the Peruvian government's program to develop the Amazonian drainage basin in eastern Peru has resulted in land grabbers registering claims to ownership for lands which have been occupied by Indian families for thousands of years. The Indians, however, have had no written and registered titles to the land. While this behavior may not be strictly illegal, it emphasizes the disparity of political power and access to legal processes which are at least indirect functions of economic power. Finally, owners of "latifundia" situated in the coastal area and near the headwaters of rivers were able to illegally appropriate the irrigation water used by smaller, downstream landowners and the latter were effectively forced to sell their landholdings (3.7, p. 408).

\(^2\)Barraclough and Domike state, "... traditional class structure and income distribution patterns that have brought stagnation to the economies and perennial poverty to the 'campesinos' are now repudiated by all major political groups. Better living levels, education for all and the full participation of 'campesinos' in national society are the avowed goals of every Latin American government and of the Alliance for Progress" (3.4, p. 394).

\(^3\)The census data in these tables do not reflect land ownership. In general, the method of enumeration was as follows: when a large establishment was made up of several units operated by different individuals, each unit was counted as a holding if the unit was operated as a separate technical unit. To the extent that those operating small landholdings are also tenants, the power associated with land distribution patterns is understated. Some comments on the incidence of tenancy are made in subsequent subsections of this chapter.
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*Source: Food and Agriculture Organization of the United Nations' (3.27). Data for Peru from Brodsky and Oser (3.7, Table 2).
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<td>3.5</td>
<td>0.9</td>
<td>0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>12.4</td>
<td>14.1</td>
<td>17.6</td>
<td>10.7</td>
<td>30.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2 (continued)

All sizes of land holdings, in hectares

<table>
<thead>
<tr>
<th></th>
<th>0 &lt; 2</th>
<th>2 &lt; 5</th>
<th>5 &lt; 10</th>
<th>10 &lt; 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>15.2</td>
<td></td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>% distribution of area</td>
<td>0.1</td>
<td></td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Colombia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>40.4</td>
<td>22.1</td>
<td>14.0</td>
<td>9.5a</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>1.4</td>
<td>3.0</td>
<td>4.2</td>
<td>5.8a</td>
</tr>
<tr>
<td>Mexico:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>65.9</td>
<td></td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>% distribution of area</td>
<td>0.8</td>
<td></td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Peru:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>83.3</td>
<td></td>
<td>12.5c</td>
<td></td>
</tr>
<tr>
<td>% distribution of area</td>
<td>6.1</td>
<td></td>
<td>5.0c</td>
<td></td>
</tr>
<tr>
<td>Uruguay:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>14.7</td>
<td></td>
<td>15.0</td>
<td>16.1a</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>0.2</td>
<td></td>
<td>0.5</td>
<td>1.2a</td>
</tr>
<tr>
<td>Percent distribution of holdings (1950 census)</td>
<td>12.8</td>
<td>13.0</td>
<td>16.2a</td>
<td></td>
</tr>
<tr>
<td>Percent distribution of area (1950 census)</td>
<td>0.2</td>
<td>0.5</td>
<td>1.1a</td>
<td></td>
</tr>
</tbody>
</table>

The data are for 10 < 20 and 20 < 50 hectare groupings rather than those in the table heading.

Only holdings greater than 1 hectare were enumerated. Area includes arable land, pastures, and woodlands.

The data are for 5 < 20 and 20 < 100 hectare groupings.
<table>
<thead>
<tr>
<th></th>
<th>25 &lt; 50</th>
<th>50 &lt; 100</th>
<th>100 &lt; 200</th>
<th>200 &lt; 500</th>
<th>500 &lt; 1000</th>
<th>1000 &lt; 2500</th>
<th>2500 &lt; 5000</th>
<th>&gt; 5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4</td>
<td>27.0</td>
<td>12.5</td>
<td>13.4</td>
<td>3.2</td>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.7</td>
<td>9.8</td>
<td>11.0</td>
<td>14.6</td>
<td>10.0</td>
<td>10.3</td>
<td></td>
<td></td>
<td>20.2</td>
</tr>
<tr>
<td>5.1</td>
<td>4.3</td>
<td>3.1</td>
<td>2.2</td>
<td>1.1</td>
<td>1.3</td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>2.5</td>
<td>3.4</td>
<td>5.6</td>
<td>6.2</td>
<td>23.6</td>
<td>54.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td>10.9</td>
<td>8.5</td>
<td>8.0</td>
<td>4.3</td>
<td>3.0</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>6.1</td>
<td>12.8</td>
<td>15.4</td>
<td>23.5</td>
<td></td>
<td>33.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.2</td>
<td>9.2</td>
<td>8.5</td>
<td>4.1</td>
<td>2.9</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>6.5</td>
<td>13.4</td>
<td>14.4</td>
<td>22.4</td>
<td>34.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For those countries listed in Table 3.2, excepting Panama, 5 percent or fewer of the landholders control at least 50 percent of the land area. In Mexico, for example, 5 percent of the landholders control 90.2 percent of the land; in Colombia, 3.5 percent control 66.1 percent of the total land area and 28.6 percent of the arable land plus land in permanent crops. In Peru, 1.3 percent of the holdings account for 83.3 percent of the land. At the other end of the landholding spectrum, landholders in Mexico having 5 hectares or less of land constitute about 66 percent of the landholders but account for only 0.8 percent of the total land area. Similarly, in Colombia landholders having 5 hectares or less represent 62.6 percent of all landholders and are associated with 4.4 and 17.3 percent of the total land and total arable land plus land is less inequitable than the distribution of total land.\(^1\) In terms of crop production for direct consumption and for marketing, arable land is the important category. Where livestock production is an important activity, both arable land and pasture acreage are important.

Table 3.3 provides another viewpoint for investigating land distribution patterns. Farm sizes are delimited according to the capacity to provide permanent employment opportunities consistent with earning some income level.\(^2\) Land concentration at the extremities is most pronounced.

\(^1\)The data on the distribution of arable land are not given in Table 3.2.

\(^2\)Barraclough and Domike (3.4) do not specify or describe the income levels implicit in the size groupings. Presumably, the income level is sufficient to cover at least the basic needs, including taxes and any rent obligations, of the permanent workers plus their dependents.
Table 3.3. Relative number and area of farm units by size groups in ICAD study countries

<table>
<thead>
<tr>
<th>Countries</th>
<th>Percentage of country total in each size class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sub-family(^a)</td>
</tr>
<tr>
<td>Argentina:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>43.2</td>
</tr>
<tr>
<td>Area in farms</td>
<td>3.4</td>
</tr>
<tr>
<td>Brazil:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>22.5</td>
</tr>
<tr>
<td>Area in farms</td>
<td>0.5</td>
</tr>
<tr>
<td>Chile:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>36.9</td>
</tr>
<tr>
<td>Area in farms</td>
<td>0.2</td>
</tr>
<tr>
<td>Colombia:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>64.0</td>
</tr>
<tr>
<td>Area in farms</td>
<td>4.9</td>
</tr>
<tr>
<td>Ecuador:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>89.9</td>
</tr>
<tr>
<td>Area in farms</td>
<td>16.6</td>
</tr>
<tr>
<td>Guatemala:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>88.4</td>
</tr>
<tr>
<td>Area in farms</td>
<td>14.3</td>
</tr>
<tr>
<td>Peru:</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>No. of farm units</td>
<td>88.0</td>
</tr>
<tr>
<td>Area in farms</td>
<td>7.4</td>
</tr>
</tbody>
</table>

\(^a\)Farms large enough to provide employment for less than two people with the typical incomes, markets and levels of technology and capital now prevailing in each region.

\(^b\)Farms large enough to provide employment for 2 to 3.9 people on the assumption that most of the farm work is being carried out by the members of the farm family.

\(^c\)Farms large enough to provide employment for 4 to 12 people.

\(^d\)Farms large enough to provide employment for over 12 people.

\(^e\)Inter-American Committee for Agricultural Development.

*Source: Barraclough and Domike (3.4, Table I).
nounced in Chile, Guatemala, and Peru. Barraclough and Domike cite additional factors which tend to accentuate the inequitable holding patterns implicit in the data of Table 3.3:

(1) With the exception of Colombia, small tenants and sharecroppers were seldom enumerated as farm operators. For census purposes, they were listed as laborers;

(2) Based on field studies, up to half of the family-sized units were actually found to the "minifundia" because of "disguised under-employment" on the smaller farms, and

(3) Large landowners frequently own or control several large production units either through family members or business connections. The authors also indicate that people living on "minifundia" and landless laborers comprise nearly nine-tenths of the farm population in Ecuador, Guatemala, and Peru and over two-thirds of the rural people in all countries studied, except Argentina.

Although most countries have legislation to promote agrarian reform and land redistribution, only Mexico, Bolivia, and Cuba have initiated major programs. The trend toward improving the lot of the majority of agriculturalists in the other countries is considerably slower. Contrary to the substantial increase in agricultural production in Mexico, the "latifundia" - "minifundia" problem prevails. The problem is becoming more serious even in the ejidal system of communal tenure. Ac-

\[1\text{In the ICAD study, the "minifundio" are defined as "... units which are too small to provide enough employment to enable a family to obtain an income which, by prevailing local standards, is large enough to satisfy its basic needs. The concept of 'sub-family scale farm', employed in the present analysis is substantially equivalent to 'minifundio'" (3.4, p. 395, footnote 3).} \]
according to Tello (3.25), the initial distribution of land was in parcels too small for economic viability. The government's objectives were likely a combination of economic and social considerations. Even though the minimum size of an individual ejido holding is determined by law\(^1\) and this minimum has been increased through time, those receiving earliest distributions of land now have holdings below the minimum size. Population growth and a breaking up of ejido units, though illegal under existing legislation, have tended to accentuate the problem of small landholdings unable to economically support their cultivators. In an attempt to obtain sustenance from these units, intensive cultivation with productivity-extracting techniques has reduced land productivity and, in turn, the cultivator's capability to produce enough to meet his consumption requirements. In contrast, the relatively large landholders have access to productivity-increasing techniques, to adequate marketing outlets and are the primary beneficiaries of public policies to stimulate agricultural productivity.

As mentioned earlier, the concentration of land ownership in the hands of relatively few individuals generates an inordinate amount of economic and political power (3.4, 3.20, 3.25). This power tends to take the following forms:

1. The resource base, land in particular, is severely constricted for the majority of agriculturalists. Juxtaposed with the large and rapidly growing rural population, labor productivity and gross returns to labor are low and, in turn, per capita incomes rise very slowly, if at all;  

\(^1\)The current minimum size of ejido holding is 10 hectares of irrigated land or 20 hectares of non-irrigated, cultivable land (3.25, p. 24).
(2) Low per capita incomes, together with the size of the rural population relative to farming opportunities, permit landlords to impose tenancy arrangements which primarily benefit them;

(3) Tenants are often dependent upon or obliged to work for large landowners on a part-time basis with little or no compensation being paid. Further, tenants are required to market their output at a low price and secure credit at relatively high costs from landowners where these are terms of the tenancy arrangement, where alternative markets do not exist, and where tenants are further exploited because of low education levels;

(4) The institutional structure is geared to the needs of the landowners. Marketing outlets and financing on favorable terms are readily available to them. This is further facilitated by their investment and consequent influence on the operations of some of these institutions. Landowners frequently ignore the constitutional requirement that they provide schools at the centers of work (3.4, 3.7). At the same time, education is one of the most effective means of improving labor mobility and of increasing cultivators' awareness of their rights, in contrast to existing situations, and of the means available for attempting to remedy economic and political inequities; and

(5) Landowners generally place low priorities on investment in agriculture and on their own production units. In the case of Peru, Whyte and Williams (3.29) note that among the coastal haciendas, new technology is rapidly adopted and a strong concern for economic efficiency prevails. Workers are paid wages and often represented by labor unions. Conversely, hacienda owners in the mountainous areas are more concerned with minimizing investments rather than maximizing net returns. (Footnote continued on following page)
levels. Further, the net outflow of capital, which should be conducive to expansion of the nonagricultural sector if channelled in the right directions, is too often used for unproductive purposes and for investment in other countries. Consequently, employment opportunities and demand expansion associated with industrialization do not materialize and underemployment in agriculture and low internal, effective demand continue.

Abstracting from the social and political ramifications of this power configuration, while recognizing that social aspects condition producers' attitudes and motivations, the consequences for economic efficiency and agricultural output can be qualitatively assessed. To the extent that inputs employed are indivisible, particularly machinery inputs, large landholders are in a position to realize economies of size and lower unit production costs. Conversely, small landholders would not have these opportunities. However, since family labor is the principal input, fewer indivisibilities need arise. According to Table 3.4, "minifundia" consistently show much higher average returns per hectare than the "latifundia", both from the standpoint of total farmland and area cultivated. This occurs despite the fact that the "minifundia" lands are the least suited for agricultural purposes, for example, located on hillsides. Conversely, the latifundia are generally comprised of the most productive soils and favorably situated relative to transportation facilities, marketing outlets and water supplies.

However, based on the study results, only one-sixth of the land in the (footnote continued from preceding page) As to support their existing level of living, and the attendant social and political power, they are satisfied.
Table 3.4. Relationships between the value of agricultural production, agricultural land, cultivated land and the agricultural work-force by farm size-class in selected ICAD study countries^a

<table>
<thead>
<tr>
<th>Country and size groups</th>
<th>Percent of total in each country</th>
<th>Relative value of production as percent of that of sub-family farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agricultural land</td>
<td>Agricultural work</td>
</tr>
<tr>
<td>Argentina: (1960)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Family</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Brazil: (1950)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>0^b</td>
<td>11</td>
</tr>
<tr>
<td>Family</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>60</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Colombia (1960)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>5</td>
<td>58</td>
</tr>
<tr>
<td>Family</td>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>45</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Chile: (1955)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>0^2</td>
<td>13</td>
</tr>
<tr>
<td>Family</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>79</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

^aGross value of agricultural production in all countries except Argentina where the estimates are of added value. Comparable data are not available for Peru.

^bLess than one percent.

*Source: Barraclough and Domike (3.4, Table III).
### Table 3.4 (continued)

<table>
<thead>
<tr>
<th>Country and size groups</th>
<th>Percent of total in each country</th>
<th>Relative value of production as percent of that of sub-family farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agricultural land</td>
<td>Value of productive force</td>
</tr>
<tr>
<td>Ecuador: (1954)^c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Family</td>
<td>19</td>
<td>33</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>42</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Guatemala: (1950)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-family</td>
<td>15</td>
<td>68</td>
</tr>
<tr>
<td>Family</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Multi-family medium</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>Multi-family large</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

^cThe dashes (-) indicate that no data are available.

"latifundia" of the seven countries studied is or has been under cultivation (3.4). The rest remains in native vegetation. These factors, by themselves, suggest a great potential for expanding physical output through a redistribution of some of the land resources. If the quantity and productivity of nonland inputs were increased, agricultural output could be further augmented.
Producers living in "minifundia" communities, even when not directly dependent upon large landowners, are dependent upon the landowner's counterparts living in nearby towns. These are the people who determine the prices producers pay and receive, determine the cost and availability of credit and production inputs, and essentially control the institutional structure within which producers operate. This control over the educational, health, and resource allocation systems; i.e., the routes through which subsistence producers can conceivably improve their relative position, tends to perpetuate that status quo favored by those in power positions at the expense of producers.

**Fragmentation of holdings** The information on the degree of fragmentation among producing units is fragmentary. However, the 1960 world census of agriculture provides some insights. For Columbia, the average number of parcels per holding ranges from 1.0 to 1.6 for the various sizes of holdings. In the Dominican Republic, nearly 99 percent of all holdings consisted of a single, contiguous unit of land. In Panama, nearly 60 percent of all holdings are single units while 35 percent are comprised of 2-3 parcels of land. The average number of units of land per holding varies from 1.2 to 2.9 with fragmentation generally increasing with the size of holding. Finally, in Costa Rica 63 percent of the holdings are represented by single parcels of land; nearly 30 percent consist of 2-3 parcels. Fragmentation is most prevalent in the 4 to 50 hectare size groupings. The distribution of size holdings according to degree of fragmentation is skewed towards the smaller producing units.
The terms of the tenancy arrangement affect the potential for growth within the existing institutional framework and with structural change. The following quote perhaps places in perspective the general nature of current tenancy systems:

"Wage and rental agreements can be adjusted to suit the landowner's convenience so that all productivity increases and windfall gains accrue to him. Permanent improvements such as buildings or fruit trees belong to the estate even when all costs are borne by the tenant. On many large plantations residents are strictly forbidden to make improvements without permission for fear they would acquire vested interests in the land or take resources away from the production of the cash plantation crop. Residents of the large estates can be expelled at will in traditional areas where there is neither a strong central government nor a labor union to defend them . . . Tenants and workers depend on the 'patron' for credit, for marketing their products and even for medical aid in emergencies. Food and clothing are frequently obtained through the estate's commissary and charged against wages or crops" (3.4, p. 399).

According to a 1957 study by the International Labor Office (3.13), only three countries, Argentina, Cuba, and Uruguay, had legislation requiring a formal contract guaranteeing a minimum degree of tenurial security for tenant farmers. Legislation in the remaining countries tends to be vague or ineffective and, in turn, the relative bargaining power is on the side of the landlord. Furthermore, the tenant has little legal recourse, assuming he has the financial capacity to initiate legal pro-

1Also see Adams (3.2, pp. 49-50) for a related discussion of tenancy arrangements in Colombia.

2The study briefly reviews individual country legislation prior to 1957 covering tenurial regulations such as tenurial security, compensation for land improvements, payment for land use, and settlement of tenure disputes. Relatively little analysis of the degree to which this legislation is effectively implemented and the impact on actual tenancy systems is provided.
Tenure systems based on custom tend to be for short periods of time, ranging from a single cropping period to a few years (3.2, 3.4, 3.13). The tenant is often given a small parcel of land for his own cultivation. In turn, he is obligated to work for the landlord for a low salary, if any, or to "market" his production to the latter at a relatively low price. The general lack of written contracts makes most arrangements tenuous. As noted before, such insecurity has adverse consequences for private, productive investment and for use of nonexploiting cultivation practices. The relatively low returns to family labor, even prior to rent payments, provide few opportunities for the majority of tenants to improve their economic position, absolutely or relatively.

Landless laborers and "squatters" are in even more vulnerable positions. The former have no home base, no matter how small. The latter have little, if any, legal status to the land they occupy and cultivate. Table 3.5 gives the distribution of holdings and land area by class of tenure for countries for which data are available. In

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1 See Whyte and Williams (3.29, pp. 8-18) for a discussion of the costs and problems associated with legal proceedings for establishing rights to land in Peru.

2 Barraclough and Domike (3.4) note that almost all land is owned and when new areas are opened to cultivation for previous landless laborers, owners often reclaim the land after it has been cleared and has acquired commercial value. The person clearing the land becomes a member of a new "latifundia" system or moves on to another uncleared area. "The temporary right to the use of land in exchange for clearing it is an established custom. Many campesinos spend their whole lives clearing small areas of bush or jungle, obtaining only a passing benefit because they have no permanent rights to the land" (3.4, p. 408).

3 The percentage distribution of land by size of holding with each class of tenure is not available.
Table 3.5. Percentage distribution of number of holdings and(or) land area, by class of tenure, and landless laborers as a percent of total economic units in agriculture for selected Latin American countries

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Time period</th>
<th>Owners</th>
<th>Tenant</th>
<th>Squatters</th>
<th>Other</th>
<th>Landless laborers</th>
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<td></td>
<td></td>
<td></td>
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<tr>
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<tr>
<td>% area</td>
<td>1960</td>
<td>58.9</td>
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<tr>
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<tr>
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<td>10.1</td>
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<td>59.8</td>
</tr>
<tr>
<td>% area</td>
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<td>90.1</td>
<td>5.6</td>
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<td><strong>Costa Rica:</strong></td>
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<td></td>
</tr>
<tr>
<td>% holdings</td>
<td>1950</td>
<td>81.1</td>
<td>3.6</td>
<td>--</td>
<td>15.3</td>
<td></td>
</tr>
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<td>% area</td>
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<tr>
<td>% area</td>
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<td>86.6</td>
<td>0.9</td>
<td>1.3</td>
<td>11.4</td>
<td></td>
</tr>
</tbody>
</table>

*a* In Brazil and Guatemala this category includes estate managers.

*b* Includes tenants under cash, share, and services-supplied arrangements and combinations of these.

*c* Includes mixed systems of tenure. In Costa Rica, squatters are included.

*d* Source: International Labor Office (3.13, Table I.). Area represents area under cultivation.

*e* Source: Food and Agriculture Organization of the United Nations (3.27). Area represents total land area in holdings.

*f* Source: Barraclough and Domike (3.4, Table II.).
Table 3.5 (continued)

<table>
<thead>
<tr>
<th>Parameter period</th>
<th>Owners&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Tenant&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Squatters</th>
<th>Other&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Landless laborers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colombia:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>% holdings&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1960</td>
<td>62.4</td>
<td>23.3&lt;sup&gt;h&lt;/sup&gt;</td>
<td>3.9</td>
<td>10.3</td>
</tr>
<tr>
<td>% area&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1960</td>
<td>72.4</td>
<td>7.3&lt;sup&gt;h&lt;/sup&gt;</td>
<td>12.1</td>
<td>8.2</td>
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<td>16.4</td>
<td>3.9</td>
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<tr>
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<tr>
<td>% holdings&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1960</td>
<td>94.5</td>
<td>2.5</td>
<td>-</td>
<td>3.0 (1.4)&lt;sup&gt;g&lt;/sup&gt;</td>
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<td>38.2 (26.3)&lt;sup&gt;g&lt;/sup&gt;</td>
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<td>69.2</td>
<td>2.6</td>
<td>19.2</td>
<td>9.0</td>
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</tr>
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<td>67.3</td>
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<td>7.4</td>
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<tr>
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<td>24.6</td>
<td>6.0&lt;sup&gt;h&lt;/sup&gt;</td>
<td>50.4</td>
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<tr>
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<td>37.1</td>
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<td></td>
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<tr>
<td>% holdings&lt;sup&gt;d&lt;/sup&gt;</td>
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<td>50.2</td>
<td>34.7</td>
<td>3.1</td>
<td>11.4</td>
</tr>
<tr>
<td>% area&lt;sup&gt;d&lt;/sup&gt;</td>
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<td>40.3</td>
<td>33.0</td>
<td>0.6</td>
<td>26.1</td>
</tr>
<tr>
<td>% holdings&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1960</td>
<td>49.9</td>
<td>33.3&lt;sup&gt;h&lt;/sup&gt;</td>
<td>-</td>
<td>16.8</td>
</tr>
<tr>
<td>% area&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1960</td>
<td>44.5</td>
<td>28.5&lt;sup&gt;h&lt;/sup&gt;</td>
<td>-</td>
<td>26.7</td>
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<td><strong>Venezuela:</strong></td>
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<td>1950</td>
<td>41.3</td>
<td>20.6</td>
<td>35.8</td>
<td>2.3</td>
</tr>
</tbody>
</table>

<sup>g</sup>Holdings operated under ejidal form of tenure.

<sup>h</sup>When total area is classed according to tenure, 8.9 percent of the land in Columbia, 1.6 percent in Costa Rica, 5.0 percent in Panama, and 40.5 percent in Uruguay is operated under tenancy arrangements. That is, the area included under the "Other" category includes both owned and rented land.
addition, the percentage magnitudes of landless laborers are given for a few countries. The importance of class of tenure varies with countries. With the exception of Panama, holdings enumerated as being operated by "owners" is the most important class, both in terms of number of holdings and land area. Tenancy is highest in Uruguay and Argentina where this tenurial class accounts for about one-third of the agricultural units. The importance of "squatters" is most pronounced in Panama, Venezuela, and Nicaragua. This tenure class is most exposed to change and to the continued favor of their "patron" whether he be an individual owner or the State. Of course, the group in the most precarious position among all economic units in the agricultural sector is the landless laborers. Landless laborers have little bargaining with their employers. What power exists is diluted by high population growth rates in rural areas, by evolutionary forces which tend to accentuate the concentration of land holdings, and by the limited availability of nonagricultural employment opportunities which tends to minimize labor mobility in response to economic opportunities. Out-migration to relatively urban areas is strong even though gainful employment is not available for many migrants. The implications for social and political stability are quite apparent. The figures are extremely high for Brazil and Chile where nearly 50 percent of the agricultural families are classified as being headed by landless farm workers.

1 The comparable figures for Chile and Ecuador are 47.6 and 34.5 percent, respectively, as of 1950 for Chile and 1960 for Ecuador (3.4).

2 The area operated by squatters includes those areas the holder (squatter) operates without a legal title but which are owned by private persons or the state. Occupancy occurs without consent of the owner even though it may sometimes be tolerated by him.
For the three countries for which 1960 census data can be loosely compared to the 1950 figures, only in Panama has the tenurial situation improved in the sense that the classes of "owners" and "other" have gained relative to "tenants" and "squatters". In Costa Rica the percent of holdings and area associated with "owners" declined slightly. In Uruguay, the distribution by tenancy was essentially unchanged with the exception that no "squatters" were reported in the 1960 census.

Finally, landlord absenteeism often results in poor management practices (3.2). However, if these landlords are not familiar with nor have a strong interest in agricultural operations, the managerial functions can best be exercised by others. Thus, the combination of absentee landlords and competent, trusted managers should, ceteris paribus, be beneficial to agricultural growth. This presupposes that the landlord's objective is that of increasing the net monetary returns from his production units; this is a question of fact.

Africa

In addition to plantations producing export crops and relatively small subsistence- and market-orientated freehold units found throughout less-developed areas, a communal or tribal form of agrarian structure whose members engage in shifting cultivation is indigenous to many parts of Africa.¹ Shifting cultivation is an outgrowth of both tribal cohesiveness and of economic necessity. The latter is largely the consequence of tropical climatic conditions on soil productivity. Shifting

¹Only fragmentary information from the 1960 world census of agriculture is available. Tribal or communal forms of tenure account for 35 percent of the land in Libya, 35 percent in South West Africa, and 13 percent in South Africa. La Anyane (3.18) discusses the widespread incidence of communal ownership in countries of Western Africa.
cultivation practices result in the "bush"\(^1\) protecting the soil from the tropical heat, eventually restoring and preserving its capacity to yield crops and lessening soil and mineral erosion.

The implications of this tenure structure for resource use and productivity are several in nature. In general, the following would be included:

1. A large amount of land is necessary to sustain traditional cropping practices. Restoration of soil fertility may require that the fallow land remain idle for thirty years or more (3.15).\(^2\) Where demographic pressure emerges and rights cannot be secured to additional land, a combination of reducing the length of the cropping cycle, partial member emigration or modification of traditional production techniques are necessary (3.6, 3.18). Emigration results in the severence of tribal ties while accelerated cropping under traditional techniques facilitates soil erosion and subsequent loss of fertility;

2. The concentration of property rights in the hands of the tribal chief or a governing unit affects the pattern of land distribution for cultivation and, in turn, cultivators' attitudes toward cultivation practices and private investment in the production unit. Externalities arise where cultivators are not able to realize all the benefits from permanent improvements, planting tree cash crops, or superior production.

\(^1\)The "bush" is the natural vegetation that covers the soil after cultivation has been stopped due to decline in soil productivity. In addition to reducing the danger of erosion, the vegetative growth which is subsequently cut and burned provides the "fertilizer" for the subsequent cropping period.

\(^2\)In Western Africa, sufficient vegetative growth takes place so that cultivation can be resumed after a fallow period of three to seven years (3.18).
techniques since a portion of the land currently assigned to him may be reassigned to another member in subsequent production periods. That is, land assignments are often based on the producers' need and their socio-political position in the community. Thus, to the extent that individual cultivators exhibit the capacity to generate a "surplus" relative to their needs and the needs of others, their land base may be reduced to bring about a more egalitarian economic structure;

(3) The group-focused emphasis on economic equality, at least equality among the majority of the tribal members, results in land distribution patterns emphasizing individual land assignments of nearly equal quality with little attention given to the size of individual tracts of land or to the spatial distribution of this land. For example, if the communal property includes a hillside, an alluvial plain, and a grazing area and if there are \( n \) producers each having equal rights to the land area, the three classes of relatively, individually homogeneous land would each be divided into \( n \) tracts. Therefore, if the land is qualitatively heterogenous, producers likely operate with a large number of small, noncontiguous tracts of land. Even after allowing for the "insurance" aspect of land dispersion, the implications for labor efficiency and production control are apparent;

(4) The tribal chief or governing unit usually has the authority to prescribe the production techniques to be employed and to evaluate producers' compliance with these policy prescriptions.\(^1\) Producers'\(^1\) Among indigenous peoples in Sierra Leone, a vertical structure of land management results in a centralization of powers which largely determines the distribution of land, farming practices, and even the timing for completing farm operations (3.18). Also, in the Congo, traditional tenure arrangements (footnote continued on following page)
continuing rights of cultivation and inheritance are conditioned by their demonstration of using the "proper" cultivation methods. Although the insecurity aspect implicit in this system is a conditioning factor, the dictation of production techniques appears to be of real significance especially in terms of the prescriber's competence and receptiveness to altering traditional production methods when superior alternatives may be made available;

(5) The mobility associated with this semi-nomadic way of life coupled with the constriction of internal markets and relative isolation from other sectors of the economy interact to essentially preclude the inflow of private capital. In addition, the zero price of land and the absence of a land market tend to maintain productivity at the subsistence level and to reinforce the perpetuation of this semi-nomadism; and

(6) Government investment in social overhead capital facilities and implementation of government programs, such as providing extension services, are hampered by the mobility and traditionalism which characterizes communities engaged in shifting cultivation.¹

Population growth relative to a fixed supply of cultivable or potentially cultivable land has reduced the incidence of shifting (footnote continued from preceding page) are characterized by communal ownership of the land with the elder or headman responsible for administering land use and granting rights of usufruct to the members. Ownership remains with the members but they are required to pay taxes and occasionally provide labor services to the headman or chief (3.18).

¹La Anyane (3.18) comments that while shifting cultivation is common in all parts of West Africa, the cultivator considers himself to be as settled as his counterpart who engages in sedentary cultivation. Many shifting cultivators do not change their residences as they move from one tract of land to another.
cultivation. Also, the spread of cultivation of cash and permanent crops, largely due to an increased demand for income as additional consumer goods become available, has increased the trend toward rewarding private initiative and the demand for private ownership of land to ensure that cultivators receive the gains. Furthermore, land titles are usually needed to obtain the institutional credit necessary for growing these crops. The relatively recent emergency of land scarcity is cited in the following:

"In many parts of Africa, the question of land scarcity is a very acute and difficult one. It is tied up with a great many factors: demographic, technological, ecological, economic and social; it is also linked with the alienation of lands in favour of strangers and with the organized displacement or migration of groups. The fundamental problems involved seem to be the adequate redistribution of the population and the transformation of agricultural methods. . . . In many cases, scarcity of land or the feeling of such scarcity are due to extensive agricultural methods, to particular values attached to the land, to the great poverty of the soils and to the general level of economic development" (3.6, p. 58).

Problems arise, however, in the involuntary redistribution of the population. The economic potential of colonization schemes in previously unsettled areas is one inhibiting factor. A historic gravitation towards settlement on the most productive lands results in population redistribution taking place on less-productive lands. However, the human factor and social considerations appear to be the determining factors affecting the success of population redistributions. The nature of these factors as affecting resettlement programs is summarized as follows:
"... particularly since the human factors involved--such as feelings of insecurity and frustration, attachment to the ancestral land, unadaptability of immigrants to the new social environment, structure of the family and lineage groupings, principles of inheritance, etc.—had been underestimated or were thought to be easily malleable" (3.6, p. 63).

In addition, population relocation has often been looked on by those involved with suspicion because of the belief that there were and are pre-existing rights in these lands; and consequently, their claims to ownership and cultivation rights are dubious (3.5, 3.6).¹

The consequent stationarity associated with continued population growth and gradual disappearance of shifting cultivation presents both opportunities for agricultural growth and problems of structural adjustment. Social interactions can continue to operate within the tribal organization with the tribal or communal tenurial arrangements persisting. The principal problem which arises, however, is that the traditional cultivation practices are not appropriate to sedentary farming.² To the extent that soil productivity is rapidly reduced by continuous cultivation coupled with tropical climatic conditions, fertilizer applications and alternative cultivation procedures are necessary. This, in turn, necessitates the application of additional working capital and new managerial techniques on the part of cultivators, both

¹ Bascom (3.5) makes the following undocumented comment: "For example, one French anthropologist working in French West Africa emphasized in his writings that there was no acre of land in Africa which was not owned by someone, no palm tree which was not the private property of some person. Africa is not a vacuum which can be occupied and developed" (3.5, p. 240).

² In the Congo, traditional practices were maintained with settled farming, at least for a period of time. "The paysannat was a system of farming under which farmers were settled along a road on plots laid out adjacent to one another in strips perpendicular to the road. These strips were subdivided into (footnote continued on following page)
being in relatively short supply. However, these phenomena also repre-
sent opportunities for some governing entity to offer programs of
assistance to stimulate and direct agricultural growth.

The attributes of communal cooperation and assistance associated
with tribal organizations provide a potential foundation for establish-
ing multi-purpose cooperative structures (3.12, 3.22). Cooperatives
appear to have been successful in the selling, grading, storing and
simple processing of members' output. However, evidence pointing to the
success of cooperative farms; i.e., farms where the land is farmed
collectively and the output shared, is not available (3.15).

Even with additional land available for cultivation (3.19, 3.30)
and distribution to tribal groups to offset the pressure of an expanding
population, the continuance, and implied encouragement, of shifting
cultivation is not coterminous with increased agricultural productivity
as a precondition to general economic expansion. The likely consequence
is that of a greater number of rural people continuing to live at a low
equilibrium level of subsistence.

Increased resource productivity is an outgrowth of a change in pro-
duction techniques, private investment in the production unit, and pro-

(footnote continued from preceding page) fifteen or twenty sections.
The farmers were to practice a kind of rolling rotation, moving down the
strips with particular crops . . . leaving the sections behind in bush
fallow. As various sections would be growing identical crops at the
same time, it was possible to experiment with mechanical cultivation
or harvesting going across the strips at right angles . . . the schemes
collapsed due to the chaos that accompanied independence in 1960" (3.6,
p. 112).

1 In a few cases, due to exogenous forces, people had to establish
permanent farming even though the soil was not amenable to permanent
cultivation with traditional practices. The people had to invent a
system of permanent agriculture to survive, and they were successful
(3.6).
ducer motivations geared to participating in an exchange economy. But the emergence of these preconditions is related to the anticipation or guarantee of use and occupancy rights on a continuing basis or of compensation for private investment from which all of the benefits have not been realized by the producer at the termination of his cultivation rights. This establishment and guarantee of rights appear to severely restrict agricultural growth and development.

The adjudication of rights in land is costly and controversial. Surveying and judicial fees are obstacles. But as pointed out earlier, Africans attach strong significance to particular lands, especially those associated with ancestral occupancy. This, coupled with the contention that pre-existing rights are claimed to essentially all land, demonstrates the complexity of apportioning land with secure rights.

Another manifestation of the problems associated with the traditional tribal rights in land is the absence of a land market. Historically, tribal lands have had no scarcity or monetary value. The abundance of land relative to undifferentiated cultivation practices for subsistence consumption requirements resulted in the land having no market or exchange value. Some writers have asserted that the absence of a land market and consequent exchange value have perpetuated the continuance of low resource productivity and general lack of a marketable surplus (3.1, 3.30). Before a land market can be established, unambiguous rights to units of land must be established. The assertion that land values will have a stimulating effect on resource productivity and marketable surpluses is based on the premise that the newly-created opportunity cost for land will cause producers to alter cultivation
and investment practices. Previously, no cost was incurred with soil depletion. Now, such practices would reduce the capitalized value of the land. Thus, a mechanism would exist for rewarding superior managerial ability and saving leading to investment in the production unit. The operation of a land market following distribution of titles to land may generate a trend towards monopolization of land holdings by the relatively few individuals who have the financial means to purchase large tracts of land (3.10). If the small cultivator is to purchase his land, provision for long-term agricultural credit must also be made.

In addition to the effect of tenure rights on agricultural productivity, the migratory labor system associated with stationary communal and freehold farming has positive and negative impacts on agricultural production. From a positive standpoint, migrant workers accumulate savings for potential productive investment upon return to their home community. In addition, for those employed on nontraditional, market-oriented operations, they acquire skills and insights which can be applied to their own operations. The acquisition of managerial skills or observation of its workings is extremely important in light of the scarcity of this attribute among traditional producers. Finally, the migration to areas of higher levels of living and the observation of or increased participation in the exchange economy should conceivably have a positive impact on producers' motivations toward generating an agricultural surplus for investment or exchange. Some negative repercussions are also present, however. The emigration of males leaves the cultivation decisions and operations to women and children. Heavy-labor operations such as land clearing would likely be reduced. In
addition, a traditional ban on women handling cattle, which would include draft animals, has had adverse consequences for completion of farm operations and diversification of enterprises (3.15). This taboo is gradually being relaxed, however. Further, the relative conservatism of the women together with their limited participation in the exchange economy may adversely affect their motivations and receptiveness to technical change (3.30).

Firms of all sizes coexist. As indicated earlier, firm size within the communal structure is a function of the producer's need and his status in the tribal organization. Among the freehold units, the firm size in terms of area under cultivation is largely restricted by labor requirements for one or two crucial operations. This constraint is often in the form of labor available for the weeding of crops, an operation which must be completed within a relatively short period of time (3.3, 3.19). Labor requirements for harvesting is also a limiting factor. In addition, firm size is further constrained by the extent to which the males participate in other employment and in tribal or local government affairs. As noted before, under communal or tribal systems little flexibility in farm sizes, especially in response to personal initiative, is evident. Again, firm sizes do not reflect problems of fragmentation, security of tenure, and access to agricultural credit necessary for developing the land. Neither do they represent land productivity and the economic capacity for supporting the cultivator.

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1 In the Niger Development Scheme, households were given twenty-four acres to farm. Because of the short weeding period, land units of this magnitude required the labor input of ten men. This exceeded the labor available from the household (3.19).
Data from the 1960 world census of agriculture on the distribution of land area by size of holding are given in Table 3.6. Little information is available on the degree of fragmentation. Both Godart (3.10) and La Anyane (3.18) state that the fragmentation of landholdings represents a serious obstacle to altering production techniques and improving agricultural productivity in several West African countries. Fragmentation is accelerated by traditional inheritance patterns.

Population pressure coupled with family immobility and restricted growth of nonagricultural employment opportunities results in small individual land bases and increased fragmentation of holdings. Concomitantly, land holdings by nonAfricans are often extensively cultivated and partially unutilized (3.28, 3.30). Thus, the configuration of rights in land and the consequent distribution of land-use patterns tend to be inimical to general, sustained agricultural expansion.

Asia

To attempt a discussion of firm size and land tenure systems for a continent of immense heterogeneity such as Asia is pretentious. The problems and opportunities affecting landholding systems vary from countries of the Near East where water availability is the principal limiting factor to India and Pakistan where large rural populations characterized by high population growth rates press against a cultivable area with relatively few opportunities for expansion to parts of Southeast Asia where man/land ratios are not high, excepting Japan and Java, and land availability and climatic conditions are conducive to expanding the cultivated area and restructuring the landholding systems if favorable economic and political conditions prevail. Many of the
Table 3.6. Percentage distributions of agricultural holdings and total land area according to size of land holding for specified African countries*

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<td>5.7</td>
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<tbody>
<tr>
<td>% distribution of holdings</td>
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<table>
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<tbody>
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<td>% distribution of holdings</td>
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</tbody>
</table>

\(^{a}\)Non-Bantu holdings including pasture, land under permanent crops, and forest land.

*Source: Food and Agricultural Organization of the United Nations (3.27).
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<th></th>
<th>3 → 4</th>
<th>4 → 5</th>
<th>5 → 10</th>
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<th>100 → 200</th>
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<td>16.4</td>
<td>15.4</td>
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<td>&lt;→ 30.8</td>
<td>&lt;→ 30.8</td>
<td>&lt;→ 30.8</td>
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<td>12.5</td>
<td>9.1</td>
<td>18.6</td>
<td>6.8</td>
<td>1.8</td>
<td>&lt;→ 1.8</td>
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<td>12.1</td>
<td>12.1</td>
<td>9.8</td>
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<td>9.8</td>
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<td>29.3</td>
<td>20.8</td>
<td>&lt;→ 12.1</td>
<td>&lt;→ 12.1</td>
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<td>12.1</td>
<td>12.1</td>
<td>12.1</td>
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<td>0.1</td>
<td>94.0</td>
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Table 3.6 (continued)

<table>
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<th>All sizes of land holdings, in hectares</th>
<th>&lt; 4.3</th>
<th>4.3</th>
<th>8.6</th>
<th>17.1</th>
<th>&lt; 42.8</th>
</tr>
</thead>
</table>

South Africa:
% distribution of holdings | 4.6 | 5.4 | 5.7 | 7.9 |
% distribution of area | -   | -   | 0.1 | 0.2 |

<table>
<thead>
<tr>
<th>All sizes of land holdings, in hectares</th>
<th>&lt; 20.6</th>
<th>&lt; 40.9</th>
<th>&lt; 101.6</th>
<th>&lt; 202.7</th>
</tr>
</thead>
</table>

Northern Rhodesia:
% distribution of holdings | 7.4 | 5.3 | 7.1 | 8.9 |
% distribution of area | 0.1 | 0.2 | 0.4 | 1.1 |

Southern Rhodesia:
% distribution of holdings | 2.4 | 4.7 | 8.0 | 6.5 |
% distribution of area | -   | 0.1 | 0.3 | 0.5 |

b European holdings only.
problems afflicting agriculturalists in Latin America are also operative here: the patterns of land distribution so that relatively few people control substantial land areas, terms of tenancy inhibiting tenants' capacity to improve their absolute and relative economic position, the generally inferior bargaining position of tenants and small owner-operators when securing credit and marketing their produce, and insufficient growth in the nonagricultural sectors to provide alternative employment opportunities and to increase resource mobility throughout the economy. In addition, fragmentation of production units is an important factor affecting choice of production technique and the capacity for increasing output levels. In the absence of improved technology, successive fragmentation tends to force producers to secure financial assistance from moneylenders and larger, owner-operator cultivators in order to meet their consumption and production expenditures. The onerous terms of credit reduce the debtor's capacity for removing his indebtedness. Particularly during poor production seasons and(or) unanticipated family expenditures, the debtor may be forced to sell his assets or have the creditor assume ownership rights with the previous owner now becoming a tenant. Alternatively, the debtor may rent his land to a share-cropper while the former supplements his income through off-farm work. The power of the creditors tends to further concentrate land ownership in their favor and(or) increase the incidence of tenancy and the usually unfavorable consequences attendant to this tenure arrangement.

\[1\]For example, Myrdal (3.23) comments that while income-generating potential is reduced through fragmentation, individuals do not adjust downward their customary levels of expenditures for social events and ceremonial functions. External financial assistance is one alternative.
While land ownership accords economic power and social prestige, as in most parts of the world, additional social status accrues to those who are not directly involved in the operation of their land, either in terms of supplying management inputs or making private investment in their land holdings.\(^1\) The landowner is often content with the rents being received and has little inducement to increase land productivity through investment (3.14, 3.16, 3.17, 3.23)\(^2\) His negative attitude toward involvement in agricultural operations, even in a supervisory capacity, motivates him to rent his land to tenants.\(^3\) The combination of the tenant having neither the incentive or capacity to improve land productivity and the landowner's attitude toward such private investment interact to inhibit agricultural growth. The problem is exacerbated when land productivity is not maintained but diminishes through improper cultivation practices.

---

\(^1\) According to Myrdal, in rural South Asia, "To own land is the highest mark of social esteem; to perform manual labor, the lowest. Considerable social status is attached to supervisory work, but the prestige enjoyed by people who abstain from work altogether is greater ... Small peasants also own land, but the fact that they do much of their own work debarrs them from the high social status enjoyed by other landowners" (3.23, p. 1057). A similar attitude is noted by M. H. Sufi, "Conditions of Farming in Pakistan" in Parsons, et al. (3.24, pp. 123-125). Also see Klat (3.17, pp. 50-1).

\(^2\) Klat (3.17) adds that most of the large landholdings belong to a family or group of families rather than to one individual. The owners, often numerous and each with small, individual claims, find little mutual interest in developing the land. Only a minority of enterprising landlords have developed their estates.

\(^3\) Dutta (3.8) takes at least a partially contrary position by stating that with the exception of absentee landlords and small landowners, landlords in India usually share the costs of farming and take an active interest in decision-making and managing their lands.
The distribution of land by size of holdings is given in Tables 3.7 and 3.8. The concentration of a large proportion of the land in the hands of relatively few land owners is not as pronounced as in Latin America. The exceptions are Iraq where less than 3.5 percent of the landholders control slightly over 70 percent of the total land and in India where slightly less than 7 percent of the landholders are associated with about 45 percent of the total area. Nearly all countries for which data are available are characterized by a large proportion of landholders operating relatively small units of land where the aggregate area of these small units accounts for a relatively small proportion of the total land area. As noted previously, land area, per se, is only an approximation of firm size and of the capacity to generate output. In Southeast Asia where climatic factors are favorable for multiple cropping, relatively small landholdings are often associated with comparatively large annual output levels. About 9 percent of the agricultural holdings in Pakistan and Turkey and nearly 12 percent in India are without land or with an extremely small land base. About 4 percent of the holdings in Taiwan are in a similar situation. For nearly all countries, the percentage distribution of arable land plus land in permanent crop closely approximates the percentage distribution of total land area.

**Fragmentation of holdings** The degree of fragmentation varies among countries. In India, the average size of agricultural holding was found to be about 6.5 acres and on the average, each holding was
Table 3.7. Percentage distributions of agricultural holdings and total land area according to size of landholding for specified Asian countries

<table>
<thead>
<tr>
<th>Size of land holdings, in hectares</th>
<th>Holdings without land</th>
<th>.01 &lt; .5</th>
<th>.5 &lt; 1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iraq:</strong></td>
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<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>28.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of area</td>
<td>0.3</td>
<td></td>
<td></td>
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<tr>
<td>(1950 census)</td>
<td>19.4</td>
<td></td>
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<td><strong>Iran:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>16.7</td>
<td></td>
<td>9.6</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>0.6</td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Pakistan:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>9.5</td>
<td>18.4</td>
<td>20.8</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>-</td>
<td>1.5</td>
<td>5.9</td>
</tr>
</tbody>
</table>

*a These are primarily livestock or poultry units of a minimum size, kept for agricultural purposes, but without accompanying cultivable agricultural land or with an extremely small tract of land.

*b Includes fall on land. Areas double cropped or planted to inter-tilled crops were only counted once.

*c Excludes 11,139,815 hectares of "agricultural land" outside of agricultural holdings: 272,616 hectares of land under temporary fallow; 6,740,675 hectares of permanent meadows and pastures, and 4,126,524 hectares of cultivable land requiring minor improvements.

*d The actual size groupings reported were < .4, .4 < 1.01, 1.01 < 2.02, 2.02 < 3.04, 3.04 < 5.06, 5.06 < 10.12, and > 12.12 hectares.

*Source: Food and Agriculture Organization of the United Nations (3.27).
<table>
<thead>
<tr>
<th>1→2</th>
<th>2→3</th>
<th>3→4</th>
<th>4→5</th>
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<th>10→20</th>
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<tr>
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<td>12.2</td>
<td>12.2</td>
<td>11.7</td>
<td>3.6</td>
<td>2.4</td>
<td>0.9</td>
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<td>2.6</td>
<td>5.4</td>
<td>11.0</td>
<td>7.3</td>
<td>16.2</td>
<td>55.2</td>
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<td>19.2</td>
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<td>1.5</td>
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<td>13.7</td>
<td>11.1</td>
<td>7.7</td>
<td>6.5</td>
<td>18.1</td>
<td>11.9</td>
<td>4.1</td>
<td>0.4</td>
<td>0.2</td>
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<td>3.3</td>
<td>4.5</td>
<td>4.4</td>
<td>4.8</td>
<td>21.2</td>
<td>26.9</td>
<td>19.5</td>
<td>5.0</td>
<td>6.0</td>
<td>2.7</td>
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<tr>
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<td>10.5</td>
<td>9.9</td>
<td>7.6</td>
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<tr>
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<td>10.9</td>
<td>16.3</td>
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</table>
Table 3.7 (continued)

<table>
<thead>
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<th>Size of land holdings, in hectares</th>
<th>Holdings without land</th>
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<th>.5 &lt; 1.0</th>
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<td>Turkey:</td>
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<tr>
<td>% distribution of holdings</td>
<td>9.1</td>
<td>11.7</td>
<td>11.0</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>-</td>
<td>0.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Republic of Korea:</td>
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<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>35.0</td>
<td></td>
<td>36.0</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>11.6</td>
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<td>30.4</td>
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<tr>
<td>% distribution of holdings</td>
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<td>35.0</td>
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<td>% distribution of area</td>
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<td></td>
<td>13.7</td>
</tr>
<tr>
<td>Thailand:</td>
<td></td>
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<tr>
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<tr>
<td>% distribution of area</td>
<td>2.5</td>
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<tr>
<td>China (Taiwan):</td>
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<tr>
<td>% distribution of holdings</td>
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<td>27.9</td>
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<td>Republic of Viet-Nam:</td>
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<tr>
<td>% distribution of holdings</td>
<td>1.1</td>
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<td>18.8</td>
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<tr>
<td>% distribution of area</td>
<td>-</td>
<td>4.9</td>
<td>9.5</td>
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</table>

a The actual size groups reported were 0.1 < 0.6, 0.6 < 1.1, 1.1 < 1.2 hectares, etc.

b The actual size groups reported were < 0.4, 0.4 < 0.8, 0.8 < 1.2, 1.2 < 1.6, 1.6 < 2.0, 2.0 < 3.0 hectares, etc.

g The actual size groupings reported were < .96, 0.96 < 2.4, 2.4 < 4.8, 4.8 < 9.6, 9.6 < 22.4, > 22.4 hectares.

h Government farms and estates.
<table>
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<td>2.3</td>
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<td>17.6</td>
<td>9.4</td>
<td>0.7</td>
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</table>
Table 3.8. Percentage distribution of agricultural holdings and total land area according to size of land holding for India, based on the 1961-62 and 1953-54 National Sample Surveys*

<table>
<thead>
<tr>
<th>All sizes of land holdings, in hectares</th>
<th>Holdings without land</th>
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<th>2.5 - 5.0</th>
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<tbody>
<tr>
<td>1961-62:</td>
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</tr>
<tr>
<td>% distribution of holdings</td>
<td>11.7</td>
<td>32.5</td>
<td>15.8</td>
<td>15.2</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>-</td>
<td>1.6</td>
<td>6.0</td>
<td>12.4</td>
</tr>
<tr>
<td>1953-54:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% distribution of holdings</td>
<td>23.1</td>
<td>24.2</td>
<td>14.0</td>
<td>13.5</td>
</tr>
<tr>
<td>% distribution of area</td>
<td>-</td>
<td>1.4</td>
<td>4.9</td>
<td>10.1</td>
</tr>
</tbody>
</table>

*Source: The Cabinet Secretariat: Government of India (3.11, Table 3.2).
<table>
<thead>
<tr>
<th></th>
<th>5.0 - 7.5</th>
<th>7.5 - 10</th>
<th>10 - 15</th>
<th>15 - 20</th>
<th>20 - 25</th>
<th>25 - 30</th>
<th>30 - 50</th>
<th>&gt; 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3</td>
<td>11.6</td>
<td>4.6</td>
<td>5.1</td>
<td>2.5</td>
<td>1.5</td>
<td>0.9</td>
<td>1.4</td>
<td>0.6</td>
</tr>
<tr>
<td>7.8</td>
<td>10.0</td>
<td>4.7</td>
<td>5.0</td>
<td>2.7</td>
<td>1.5</td>
<td>1.0</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>11.6</td>
<td>9.0</td>
<td>14.0</td>
<td>9.7</td>
<td>7.6</td>
<td>5.3</td>
<td>11.8</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>12.8</td>
<td>9.6</td>
<td>6.8</td>
<td>5.7</td>
<td>12.9</td>
<td>17.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
comprised of 5.7 fragments or noncontiguous land units (3.11, p. 8)\(^1\)

In Turkey, less than 10 percent of all holdings were single units of land. Nearly one-fourth consisted of 6-9 parcels of land and one-fourth consisted of 10 or more units of land. In addition, fragmentation was most prevalent in holdings of 10 or fewer hectares. In contrast, 46 percent of the holdings in Malaysia are nonfragmented and about 87 percent are comprised of 3 or fewer parcels of land. Fragmentation is most prevalent among holdings of 2-3 hectares in size.

The average number of land parcels in Iran is 6.1. For holdings of less than one hectare, the average number of parcels ranges from 2.5 to 3.7. The degree of fragmentation is positively correlated with the size of the landholding. In the case of Pakistan, only 23 percent of all holdings are single-unit holdings. Nearly 20 percent consist of 10 or more parcels of land. For this latter group, the degree of fragmentation is highest in the 1-2 hectare size of holding.

**Tenancy conditions**

As in other areas of the world, the two principal problems faced by tenants are insecurity of tenure and the cost-return sharing agreements with landlords. Both inhibit the tenant's incentive and capacity to improve agricultural productivity.\(^2\) Both also

\(^1\)Fragmentation has been furthered by inheritance patterns based on Hindu and Moslem law. Neither provides for primogeniture; i.e., an exclusive right of inheritance belonging to the first-born, nor is such provision made in the Buddhist countries of Southeast Asia (3.23, p. 1048; 3.17, p. 55-6). Rather, inheritances are to be equally divided among all heirs, at least all male heirs. The emphasis on equity promotes parcelization of land units. Rapid population increase and relatively short life spans accentuate the rate at which land units are subdivided into small, noncontiguous units.

\(^2\)Relative to tenants in India, Madiman writes, "The small tenant is gradually disappearing from the scene, not by moving up the ladder to become an owner-cultivator but by being dispossessed of land by the bigger cultivator and the rural non- (footnote continued on the following page)
tend to promote misuse of land resources. Myrdal states that all of the South Asian countries, except Indonesia, have enacted legislation to provide greater security and more equitable sharing arrangements with landlords (3.23, p. 1323). The emphasis on implementation and relative success have already been noted at the beginning of this chapter. Legislation varies among countries. Landlords are often permitted to evict tenants for nonpayment of rent and/or improper cultivation practices. Provisions for compensating tenants who make improvements, establishing minimum periods for leasing, and placing ceilings on rents vary among areas. Myrdal further comments that some countries also observe the practice in India of permitting landlords to terminate leases prior to expiration if the landlord indicates that the land is going to be used for his own personal cultivation. Myrdal cites three reasons why the legislation designed to promote tenants' well-being is not fully realized. First, effective rents higher than those legally prescribed can be realized when landlords provide credit at high interest rates and tenants are required to sell any surpluses to the landlord at prices set by the latter. Furthermore, tenants may be required to make gifts to the landlord which are essentially a more cultivating landowner. Tenants of yesterday are today's agricultural laborers" (3.21, p. 283).

1 Also see Kermani (3.16, pp. 148-53) for land reform legislation in Iran, Iraq, and Jordan.

2 According to Myrdal, "One of the great weaknesses of tenancy legislation in India and Pakistan and the countries of Southeast Asia is that its administration has been left to civil servants who often lack both the qualifications and the integrity necessary for the job, and are overburdened with responsibilities" (3.23, p. 1330).
subtle form of rent. Second, tenurial security can be bypassed if the landlord reassumes, pretends or even threatens to reassume, the land originally leased to the tenant. Third, local officials may be bribed to support the landlord's contention that the tenant had no valid lease to use the land. Also, pressure may be exerted on the tenant so that he releases any rights the lease may have conferred to him.

In nearly all states of India and Pakistan, tenancy legislation has provided the minority of tenants who pay fixed rentals benefits which are not available to the remaining majority, primarily sharecroppers, because of the latter's inferior social position (3.23). Higher rents are paid by sharecroppers than by the privileged tenant. The absence of legal recourse by sharecroppers and (or) low financial capacity and lack of familiarity with legal proceedings where some legislative protection is operative promotes tenurial insecurity and manipulation of the rent structure by landlords. Under these conditions, landlords are often motivated to abandon fixed-rent arrangements and increase the incidence of sharecropping.

Similar problems arise with tenancy systems in the Middle East. Tenurial insecurity is high. Tenancies are terminable at any time without compensation for abrupt severance of tenancy arrangement or for any improvements in the land made by the tenant (3.16, 3.17). Even with some

1 Sharecroppers generally pay half or more of their gross output. Their net earnings are probably below those of most wage laborers (3.23, p. 1326, 1929). Dutta concurs and adds that the sharecropper often absorbs all production costs (3.8, pp. 80-81).

2 According to Dutta, "It is a common experience all over the country that the landlords, taking advantage of the limited supply of land and weak bargaining capacity of the share-croppers, realize exorbitant rent and evict the share-croppers under different pretexts" (3.8, p. 80).
assurance of continuation of tenure, the tenant usually has neither the capacity nor incentive to increase his output through private investment. He does not have the capacity since after payment of rent his share of the output is only sufficient to cover his subsistence needs. During lean times, he borrows; during favorable production periods, he must repay his previous borrowings. If he is able to invest privately, he is not able to realize the full benefits of his investment. Under crop-share arrangements, a portion goes to the landlord simply because he owns the land. Consequently, the tenant's incentive is to get as much as possible from the land without consideration of future productivity. Larger outputs through exploitative cultivation also mean higher absolute shares to the tenant.

Klat (3.17) describes a communal type of tenure operating in parts of Iraq and Syria which is similar to that found in some African countries. The land is held collectively with the cultivator receiving only a right to a share of the land and not to a particular tract of land which he can cultivate year after year. Initially, equal parcels of land were allocated to the male members usually for a full crop rotation period. At the end of this time, the initial distributions were voided and a new distribution was made. The right of heirs to inherit shares led to a great number of small claims complicating the distribution process and resulting in a system of large number of small land units. The economic unviability of these units coupled with the eventual redistribution process dampened both the capacity and incentive to increase agricultural productivity.
According to the 1960 world census of agriculture, about 19 percent of all agricultural holdings in Pakistan are rented from others; 29 percent are operated under more than one from of tenure. Nearly 40 percent of all land in holdings is rented. Of the rented area, slightly over 90 percent is operated on a crop-share basis. In India, 23.5 of all operational holdings sampled reported leasing at least a portion of their land. Of the total land area in the survey, about 11 percent was under leasing arrangements (3.11, Table 3.3)\(^1\) Among smaller production units, crop-share arrangements were the most prevalent form of tenancy. As the size of holding increased, the importance of crop share decreased and tenancy systems based on fixed money or produce payments became relatively more important. The data available for Pakistan and other countries are presented in Table 3.9. Tenancy is extremely high in Iran, both in terms of number of holdings and land area. Tenancy is also relatively important in Vietnam. As noted in footnote e to Table 3.9, the mixed systems of tenure reflected by the "Other" category complicate the evaluation of the distribution of area in holdings as to whether the land is owned, rented, held in communal type arrangements, or operated by squatters.

Potential for Increasing Land Under Cultivation

The high rates of population growth, especially in rural areas, in conjunction with the existing availability of cultivable land and prevailing landholding patterns accentuate the problems of creating additional employment opportunities in the agricultural sector and of in-

\(^1\) Dutta adds, however, that "It is well-known that a sizeable area which is claimed under 'personal cultivation' is actually through informal share tenancies which are neither recognized nor recorded" (3.8, p. 82).
Table 3.9. Percentage distribution of number of holdings and(or) land area, by class of tenure, for selected Asian countries*

<table>
<thead>
<tr>
<th>Country</th>
<th>Parameter</th>
<th>Time period</th>
<th>Owners</th>
<th>Tenants</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>% holdings</td>
<td>1960</td>
<td>33.3</td>
<td>55.9</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>26.2</td>
<td>62.2</td>
<td>11.6</td>
</tr>
<tr>
<td>Iraq:</td>
<td>% area</td>
<td>1960</td>
<td>72.5</td>
<td>&lt; 27.5</td>
<td>&gt;</td>
</tr>
<tr>
<td>Korea, Republic of:</td>
<td>% holdings</td>
<td>1960</td>
<td>73.6</td>
<td>14.2</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td></td>
<td>5.4</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Malaysia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>% holdings</td>
<td>1960</td>
<td>62.7</td>
<td>10.0</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>62.6</td>
<td>5.7</td>
<td>31.7</td>
</tr>
<tr>
<td>Pakistan:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>% holdings</td>
<td>1960</td>
<td>52.1</td>
<td>19.3</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>43.0</td>
<td>27.5</td>
<td>29.5</td>
</tr>
<tr>
<td>Taiwan:</td>
<td>% holdings</td>
<td>1960</td>
<td>64.5</td>
<td>14.1</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>72.5</td>
<td>18.0</td>
<td>9.5</td>
</tr>
<tr>
<td>Thailand:</td>
<td>% holdings</td>
<td>1960</td>
<td>81.9</td>
<td>4.1</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>85.1</td>
<td>3.8</td>
<td>11.1</td>
</tr>
<tr>
<td>Vietnam, Republic of:</td>
<td>% holdings</td>
<td>1960</td>
<td>23.7</td>
<td>31.5</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>% area</td>
<td>1960</td>
<td>22.2</td>
<td>30.5</td>
<td>47.3</td>
</tr>
</tbody>
</table>

*Includes mixed systems of tenure, including holdings on which land is both owned and rented.

b More than 50 percent owned by the holder.

c Less than 50 percent owned by the holder.

d Data for farm households only. Estates and government farms are excluded.

e When total area is classed according to tenure, 39.5 percent of land in Pakistan and 58.2 percent in Vietnam is operated under tenancy arrangements. That is, the area included under the "Other" category includes both owned and rented land.

*Source: Food and Agriculture Organization of the United Nations (3.27). Area represents total land area in holdings.
creasing the individual producer's capacity to generate an output level sufficient to sustain at least a minimum consumption level. Such a consumption level would include a consideration of payments for rent, taxes, and purchased consumer goods. The adoption of improved technologies and land redistribution programs provide opportunities for increasing the intensity of land use. Multiple cropping and higher use-levels\(^1\) for land increase output levels. The concentration of a disproportionately large number of people controlling only a relatively small amount of total land was noted earlier. The converse also holds true. In addition, the limited data on landless laborers and underemployment in the agricultural sector suggest the need for increasing the cultivable land area and(or) redistributing the existing area. Alternatively, employment in other areas of the economy must be created. Not only are economic considerations important, but the security and output derivable from land have direct implications for social and political stability. Finally, some forms of improved technology are adoptable only on contiguous land units and where such landholdings are of a minimum size. Expansion of the cultivable area potentially provides such opportunities.

Estimates of the land area which is potentially cultivable have been derived for several less-developed countries.\(^2\) (See Table 3.10.).

\(^1\)Higher use-levels implies a shift in cropping patterns and(or) intensity of production so that per unit resource productivity and total output, in terms of calorie or consumption equivalents, are increased.

\(^2\)The estimates were derived by Mr. William G. Harper and are based on unpublished materials on world soil resources and library reference materials of the Soil Conservation Service, U.S. Department of Agriculture. The study was completed through the cooperation of Charles E. Kellogg, Deputy Administrator (footnote continued on the following page)
Table 3.10. Estimates of potential cropland expansion under two assumption levels and percent increases relative to existing cultivable area for developing countries grouped according to percent increases

<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(thousand hectares)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GROUP 1 (0-25 percent)

**Asia:**

<table>
<thead>
<tr>
<th>Country</th>
<th>Low</th>
<th>High</th>
<th>FAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>129</td>
<td>129</td>
<td>432</td>
</tr>
<tr>
<td>Iran</td>
<td>8,490</td>
<td>8,626</td>
<td>11,593</td>
</tr>
<tr>
<td>Iraq</td>
<td>4,826</td>
<td>6,545</td>
<td>7,496</td>
</tr>
<tr>
<td>Jordan</td>
<td>176</td>
<td>231</td>
<td>1,140</td>
</tr>
<tr>
<td>Syria</td>
<td>1,379</td>
<td>1,960</td>
<td>6,130</td>
</tr>
<tr>
<td>Pakistan</td>
<td>28,725</td>
<td>35,102</td>
<td>36,577</td>
</tr>
</tbody>
</table>

*Excluding Kashmir-Jammu; 1964 data relate to the reporting area of 67,136,000 hectares.*
Table 3.10 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Low</td>
<td>1,287</td>
<td>1,461</td>
<td>-</td>
<td>2,748</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>1,287</td>
<td>1,461</td>
<td>-</td>
<td>2,748</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>7,844</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>Single</td>
<td>5,620</td>
<td>12,706</td>
<td>806</td>
<td>19,132</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>26,834</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Low</td>
<td>50,774</td>
<td>114,558</td>
<td>28,118</td>
<td>193,450</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>55,488</td>
<td>114,558</td>
<td>28,118</td>
<td>198,165</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>162,434</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>Single</td>
<td>303</td>
<td>2,032</td>
<td>-</td>
<td>2,335</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>2,266</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>Low</td>
<td>3,071</td>
<td>6,386</td>
<td>3,824</td>
<td>13,281</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>3,457</td>
<td>6,950</td>
<td>4,006</td>
<td>14,413</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>11,415</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>Low</td>
<td>6,109</td>
<td>8,182</td>
<td>5,143</td>
<td>19,434</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>8,115</td>
<td>9,883</td>
<td>5,797</td>
<td>23,795</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>17,681</td>
<td></td>
</tr>
<tr>
<td>Africa:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>Low</td>
<td>597</td>
<td>7,681</td>
<td>42</td>
<td>8,320</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>844</td>
<td>7,681</td>
<td>42</td>
<td>8,567</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>6,867</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td>Low</td>
<td>1,113</td>
<td>4,382</td>
<td>2,187</td>
<td>7,682</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>1,334</td>
<td>4,382</td>
<td>2,187</td>
<td>7,903</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>7,858</td>
<td></td>
</tr>
<tr>
<td>Central African Republic</td>
<td>Single</td>
<td>16</td>
<td>5,048</td>
<td>161</td>
<td>5,225</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>4,400</td>
<td></td>
</tr>
</tbody>
</table>

8 Including Kashmir-Jammu; 1965 data relate to the reporting area of 305,947,000 hectares.

9 1954 data; total agricultural area excluding West Irian.

i The FAO estimate of 5,900,000 hectares of arable land of which 3,000,000 hectares are fallow has been reduced by 1,500,000 hectares to adjust for an assumed two-year fallow program.
Table 3.10 (continued)

<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chad</td>
<td>Single</td>
<td>376</td>
<td>1,690</td>
<td>164</td>
<td>2,230</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>7,000</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Single</td>
<td>1,116</td>
<td>3,903</td>
<td>3,661</td>
<td>8,680</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>12,525</td>
</tr>
<tr>
<td>Mauritania</td>
<td>Single</td>
<td>97</td>
<td>-</td>
<td>93</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>263</td>
</tr>
<tr>
<td>Senegal</td>
<td>Single</td>
<td>129</td>
<td>4,323</td>
<td>200</td>
<td>4,652</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>5,500</td>
</tr>
<tr>
<td>Somalia</td>
<td>Single</td>
<td>152</td>
<td>64</td>
<td>129</td>
<td>345</td>
</tr>
<tr>
<td></td>
<td>FAO</td>
<td></td>
<td></td>
<td></td>
<td>957</td>
</tr>
<tr>
<td>South Africa</td>
<td>Single</td>
<td>690</td>
<td>11,261</td>
<td>1,352</td>
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<td>4,334</td>
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</table>

GROUP 2 (25-50 percent)

Asia:

| Israel       | Low       | 408        | 123        | 71    | 602           |
|              | High      | 516        | 123        | 71    | 710           |
|              | FAO       |            |            |       | 411           |

1967 data; unofficial estimate.

k1960 data. The FAO estimate of 5,500,000 hectares of arable land of which 3,300,000 hectares are fallow has been reduced by 1,650,000 to adjust for an assumed two-year fallow program.

l1956 data for former British Somaliland and 1960 data for former Italian Somaliland.

mIn agricultural holdings, as from 1960 Agricultural Census, including the territory of Walvis Bay.
### Table 3.10 (continued)

<table>
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<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
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<tr>
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<td>460</td>
<td>150</td>
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<td>742</td>
<td>177</td>
<td>1,242</td>
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</table>

*n* Arable land used for more than one crop during the year has been counted twice.

°1954 unofficial data for East Cameroon of which 5,410,000 hectares of the 8,298,000 reported by FAO are fallow. The FAO figure has been reduced by 2,705,000 to adjust for an assumed two-year fallow program.

^p^In agricultural holdings and based on 1961 Agricultural Census.
Table 3.10 (continued)

<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
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<td>161</td>
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<td>7,803</td>
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</tbody>
</table>

GROUP 4 (Over 100 percent)

**Asia:**

| Cambodia     |            |             |             |       |               |
| Low          | 4,194      | 1,987       | 1,548       | 7,729 | 259           |
| High         | 5,355      | 2,870       | 1,577       | 9,802 | 328           |
| FAO<sup>e</sup> |           |             |             | 2,984 |               |

| Republic of Vietnam |            |             |             |       |               |
| Low                  | 4,919      | 1,952       | 2,200       | 9,071 | 329           |
| High                 | 5,794      | 2,342       | 2,239       | 10,375| 376           |
| FAO<sup>e</sup> |           |             |             | 2,760 |               |

| Laos          |            |             |             |       |               |
| Low          | 1,458      | 2,045       | 2,800       | 6,303 | 788           |
| High         | 1,813      | 2,045       | 2,800       | 6,658 | 832           |
| FAO<sup>c</sup> |           |             |             | 800   |               |

| Ceylon        |            |             |             |       |               |
| Low          | 813        | 1,868       | 1,359       | 4,040 | 215           |
| High         | 942        | 1,868       | 1,359       | 4,169 | 222           |
| FAO<sup>e</sup> |           |             |             | 1,875 |               |

| Taiwan        |            |             |             |       |               |
| Low          | 1,464      | 455         | -           | 1,919 | 213           |
| High         | 1,559      | 583         | -           | 2,142 | 238           |
| FAO<sup>e</sup> |           |             |             | 902   |               |

**Africa:**

| Angola        |            |             |             |       |               |
| Single       | 597        | 10,587      | 13,783      | 24,967| 2,774         |
| FAO<sup>e</sup> |           |             |             | 900   |               |

| Dahomey      |            |             |             |       |               |
| Single       | 87         | 2,639       | 1,132       | 3,858 | 360           |
| FAO<sup>s</sup> |           |             |             | 1,071 |               |

| Gabon        |            |             |             |       |               |
| Single       | 129        | -           | 7,871       | 8,000 | 6,299         |
| FAO<sup>e</sup> |           |             |             | 127   |               |

<sup>q</sup>In agricultural holdings and based on 1965 Agricultural Census.

<sup>r</sup>1953 unofficial estimate.

<sup>s</sup>1963 data. The FAO estimate of 1,546,000 hectares of arable land of which 950,000 hectares are in fallow has been reduced by 450,000 to adjust for an assumed two-year fallow program.

<sup>t</sup>1962 data.
<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
</thead>
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<tr>
<td>Gambia</td>
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<td>403</td>
<td>67</td>
<td>570</td>
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<td>6,447</td>
<td>3,064</td>
<td>9,634</td>
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<td>Single FAO&lt;sup&gt;w&lt;/sup&gt;</td>
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<td>3,548</td>
<td>8,329</td>
<td>12,341</td>
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<tr>
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<td>3,707</td>
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<td>Liberia</td>
<td>Single FAO&lt;sup&gt;y&lt;/sup&gt;</td>
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<td>1,806</td>
<td>4,355</td>
<td>6,290</td>
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<tr>
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<td>Single FAO&lt;sup&gt;z&lt;/sup&gt;</td>
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<td>161</td>
<td>2,403</td>
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<tr>
<td>Mozambique</td>
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<td>18,968</td>
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<sup>u</sup>The 200,000 hectares reported by FAO is designated as the estimated area of shifting cultivation and of bush fallow. The estimate has been reduced by 100,000 to adjust for an assumed two-year fallow program.

<sup>v</sup>Excluding fallow and temporary meadows.

<sup>w</sup>1965 unofficial estimate.

<sup>x</sup>1961 data.

<sup>y</sup>1964 unofficial estimate.

<sup>z</sup>The FAO estimate of 3,664,000 hectares includes 3,612,000 hectares of fallow. The FAO estimate is reduced by 1,806,000 to adjust for an assumed two-year fallow program.
Table 3.10 (continued)

<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
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</thead>
<tbody>
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<td>495</td>
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</table>

*aa* 1956 data, excluding fallow in villages.

*bb* In agricultural holdings, as from 1960 Agricultural Census, including the territory of Walvis Bay.

*cc* 1966 data for Tanganyika and 1963 data for Zanzibar.

*dd* 1954 data.

*ee* The FAO estimate of 2,160,000 hectares includes 1,290,000 hectares of fallow. The FAO estimate is reduced by 645,000 to adjust for an assumed two-year fallow program.
Table 3.10 (continued)

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<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
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</tr>
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</table>

ff 1963 data, excluding fallow.

gg 1963 Agricultural Census.

hh 1950 Agricultural Census.

ii 1963 data.

jj 1950 Agricultural Census which covered 32,750,000 hectares out of total area of 109,858,000 hectares.
Table 3.10 (continued)

<table>
<thead>
<tr>
<th>Land variant</th>
<th>Irrigation</th>
<th>Major crops</th>
<th>Minor crops</th>
<th>Total</th>
<th>Percent of FAO</th>
</tr>
</thead>
<tbody>
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<td>990</td>
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<td>3,099</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>645</td>
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<td>65</td>
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<td>97</td>
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</tr>
<tr>
<td>High FAO</td>
<td>2,530</td>
<td>23,710</td>
<td>32,254</td>
<td>58,494</td>
<td>1,121</td>
</tr>
</tbody>
</table>

*kk.* 1964 data, excluding temporary meadows and pastures.
In the derived estimates, land for use in growing crops is classified according to suitability under either dry fallow, irrigated or rain-fed conditions. In many, but not all cases, it is possible to distinguish between presently irrigated and potentially irrigable land. The crops included in the "major crops" category vary with individual countries. These are generally the crops that have been historically and recently important. Cereals and other staples such as potatoes and cassava are the principal "major" crops. However, where industrial and(or) export crops account for a major proportion of the cropland area, such crops are also designated as "major" crops. The category of "minor" crops includes areas suitable for producing nonstaple crops presently grown on a relatively small proportion of the cropland area. The category also includes areas suitable for growing industrial and(or) export crops whose economic significance may far exceed their importance in terms of relative acreage. Where soil characteristics and climatic factors are amenable to producing both "major" and "minor" crops, the land was classified and evaluated only for use in producing "major" crops.

In deriving the low and high land estimates in Table 3.10, physical and topological soil characteristics, climatic factors, availability of irrigation water, possibilities of land reclamation, and distance from transportation facilities were all taken into account. The climatic factors reflected length of growing season, annual rainfall, and the distribution of rain throughout the production period. The distance criterion was used to distinguish between those lands more than and less than about 50 miles from land and water transportation facilities. When (footnote continued from the preceding page) for Soil Survey and Arnold C. Orvedal, Chief, World Soil Geography Unit, Soil Conservation Service, U.S. Department of Agriculture.
possible, regions within countries were evaluated. These were aggregated for the country cropland estimates.

The estimates implicit in the three categories of land also reflect the potential for multiple cropping. Soil characteristics, water availability, rainfall, and length of growing season are all taken into account. A hectare of land designated as suitable for multiple cropping is counted as two hectares of cropland. Conversely, a hectare of cropland suitable for dry fallow rotation is included as only one-half hectare of cropland. That is, a two-year fallow program is assumed. Where cropland is designated as suitable for long-term crops, such as sugarcane and tree crops, no multiple cropping is considered.

Underlying all classification decisions is a relatively high management assumption. Management and cultivation practices similar to those on commercial North American and West European farms are assumed. Consideration is given to the potential productivity of soils relative to costs of required practices. Implied in this assumption is development of a locally-adapted technology, and in many cases, the lowering of farm input prices relative to farm product prices so that economic incentives for adopting this technology approach those in North America and Western Europe. Implicit in the management assumption is the assumption that those inputs complementary to land are available and that producers have the financial means to obtain such inputs. Alternatively, inputs are supplied by public agencies with only a minimal cost outlay by producers.

The basis for establishing low and high variant upper bounds differs between Latin America and countries of the Near and Far East. For Latin
American countries, the low variant is derived as the sum of all cropland located within fifty miles of rail, water or road transportation. Since relatively little of the cropland is presently planted more than once annually, the low variant includes no multiple cropping. The high variant reflects all cropland, regardless of location. In addition, multiple cropping is assumed possible on all irrigated land where sufficient water is available, and in upland areas having favorable soil characteristics and favorable temperature and moisture for eight months or longer annually.

For the countries of the Near East, multiple cropping is assumed possible only on presently or potentially irrigable land. No potential cropland is identified at distances greater than fifty miles from transportation facilities. The low variant reflects all cropland identified in upland areas, and irrigated land presently in use. Multiple cropping is assumed to be at estimated present levels on irrigated land. Under the high assumption, potentially irrigable land is added, and multiple cropping is increased to reflect potential increases in supplies of irrigation water and better management of existing and future flows.

Beginning with the eastern part of India and moving eastward, annual precipitation, in some cases, is judged sufficient to permit multiple cropping on upland soils. In these areas, the basis for differentiating between low and high variant estimates is the same as for the Near East with the exception of the assumed multiple cropping on non-irrigated cropland and the restriction of the distance criterion which is operative in parts of Indonesia. Under the high variant, multiple cropping is assumed possible on nonirrigated cropland having favorable
soil characteristics, favorable temperature, and sufficient precipitation for an eight-month or longer annual growing season. Under the low variant, a minimum growing season of ten months is assumed to be needed. The relatively limited climatological and topological data for Africa precluded making estimates under the high and low assumptions. The single variant estimates would tend to represent the low assumption since multiple cropping on at least some irrigated land has not been admitted.

Two other considerations must be kept in mind. First, the costs of clearing and developing the land must be evaluated. Transportation and marketing facilities, provision for credit so that the land can be purchased and necessary complementary inputs can be obtained, and establishing education and local government systems likely represent substantial demands on public resources, both financial and administrative. The costs and returns, both economic and social, of land development must be weighed against alternative uses of public resources which can be used at other growth points within the economy. Second, ownership rights exist to nearly all land in these countries. Where the land is privately owned, expropriation with or without compensation is necessary when the owner is not willing or able to develop the land himself. When landowners are able to legally set land values at relatively high levels, compensation to acquire land represents another demand on

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1For brief discussions of the problems of land development and resettlement see Myrdal (3.23, pp. 1266-72) and Barraclough and Domike (3.4, pp. 410-12).
available government funds.¹ Adjudication of land rights is usually costly and time-consuming. Until valid titles are obtained, private investors would tend to be reluctant to develop the land to which they expect to receive titles. Furthermore, in parts of Africa and South-east Asia, people attach strong importance to ancestral rights in land which make them reluctant to transfer land titles and to physically relocate themselves.

The derived estimates are summarized in Table 3.10. To provide a basis for evaluating the relative, potential cropland area, the existing levels of cropland, as reported by FAO (3.26), are also presented. The FAO data are designated as arable land plus land under permanent crops. The year of reference varies with individual countries as does the treatment of including fallow land. In some cases, for example, Syria, the total fallow land has apparently been included in contrast to counting one-half of the fallow land if a two-year fallow program is operative. Consequently, the potential cultivable area as a percent of the FAO figure is less than 100 percent. This also appears to be the case for several African countries.

The countries are grouped into four classifications according to the total area derived for the low land variant as a percent of the FAO figure. The countries included in Group 1 (0 - 25 percent) are pre-

¹Flores (3.9) maintains that Latin American landlords are not entitled to any compensation. Implicitly, they have already acquired substantial wealth and political and social influence from the land. Compensation need not be immediate. Rather, long-term bonds may be used which become due when, hopefully, the financial position of the economy is improved and the government has a greater capacity to make compensation through redemption of these bonds.
dominantly countries of the Near East where climatic factors are often limiting and the population density is relatively high. The group 4 category ( > 100 percent) includes countries of the Far East and also several African and most Latin American countries. The potentials for cropland expansion in Latin America are exceptionally high.
Literature Cited


CHAPTER IV. PRODUCTION TECHNIQUE

To an observer from an economically-developed country, the use of traditional production techniques characterized by combining simple tools with relatively-large quantities of labor may be viewed as the major factor contributing to the economic predicament in which the majority of cultivators in less-developed areas find themselves. This low state of the technical arts can be seemingly upgraded by a transfer of modern technology to these areas so that production is increased and economic efficiency improved. Higher outputs should result in higher per capita incomes and the processes for agricultural development are set into motion.

Technology is not that easily transferred and that readily adopted, however. The seeds, fertilizers and cultivation practices which are productive in temperate climates of the developed countries are not equally productive or nearly as productive under different soil and climatic conditions and with different managerial inputs. Although machinery, especially tractors, is becoming increasingly available in smaller power units, mechanization is not an economically-feasible, alternative production technique for the majority of cultivators operating on relatively small land units, often fragmented into a number of individual parcels. In addition to the physical adaptability of these technologically-improved inputs, price relationships among inputs and outputs, tenurial arrangements and producers' objectives affect the rate at which these inputs are adopted.
The uncertainty of production response associated with new production techniques is of particular importance to those cultivators living near the margin of subsistence. For those who are essentially "survival-oriented", the potential costs of reduced production are apparent. True, these cultivators would not adopt such technology if they thought it was not to their advantage. But, this is a dimension of the problem of changing production practices even when superior inputs are available. Producers must be convinced that a shift to the new inputs is their best alternative. Furthermore, cultivators' capacity for acquiring improved inputs, either through accumulated reserves or external financing, is another limiting factor. Finally, transportation and marketing facilities condition net returns realized by adopting cultivators.

The term production technique refers to the manner in which inputs are combined and employed for productive purposes. Subsistence producers growing wheat on small plots of land, relying heavily on draft power and family labor, employ a production technique vastly different from that of highly-mechanized, extensive operations of Great Plains wheat producers in the United States.

Two questions arise: (1) Under varying economic and social conditions, what is the optimal production technique for the firm? and (2) With existing and alternative production techniques, what are the implications for growth of the firm and for developmental processes, in general? The first question is primarily concerned with economic efficiency, or more generally, the efficiency with which producers' objectives are met. The second includes a consideration of the impact of
production techniques on capital accumulation within the firm for private investment or for saving. Private investment increases the productive capacity of the firm. Savings transferred to other parts of the economy represent the means to further expansion and diversification of the economy, including the agricultural sector.

From a national planning viewpoint, production and investment decisions can be conditioned by government policies affecting the nature and rate of availability of technological innovations and by public pricing policies. These, in turn, interact to influence the range of economically-feasible techniques open to the producer and the optimal technique for his firm.

Technological Change Versus Change in Production Technique

To clarify the terminology used, the difference between technological change and a change in technique is examined. Technological change usually results in a change in production technique. In Figure 4.1, the rays emanating from the origin represent alternative production techniques. These are alternative combinations of the two variable inputs which generate the same output level, ceteris paribus. For example, 40 units of output can be produced using OT₁, OT₂, or OT₃. In fact, with isoquant B, implicitly reflecting that inputs are perfectly

1In Figure 4.1, the axes have been labeled labor and capital. This is done for heuristic purposes rather than for reflecting reality. That is, an unambiguous distinction between capital and labor does not exist. If capital is defined as anything that yields a flow of services over time, labor is certainly included in this categorization. Furthermore, the aggregation of nonhomogenous capital and labor inputs into their respective components is assumed possible by summing according to services supplied.
divisible, an infinite number of alternative production techniques theoretically exist.\textsuperscript{1} If OT\textsubscript{1} is used in period one and OT\textsubscript{2} in period two to produce 100 units of output as the result of, for example, the price of labor increasing relative to the price of capital, a change in production technique has taken place. Since isoquant B is assumed unchanged from period one to two, no technological change affecting the productivity of labor, L, and capital, K, at some given K/L ratio has taken place.

Technological change is associated with the development of improved techniques—improved in the sense that the same quantity of inputs can be used to produce a larger output or the initial output can be produced with fewer inputs.\textsuperscript{2} See Figure 4.2. If the input-output relationship is unchanged quantitatively but if an improved produce is produced or if the uncertainty of production response is reduced, the new production technique is also an improved technique.

\textsuperscript{1}Even with isoquant A in Figure 4.1, combinations of production techniques OT\textsubscript{1}, OT\textsubscript{2} and OT\textsubscript{3} can be used to produce 40 units of output.

\textsuperscript{2}In Equation 2.37 where \( Y = aX_1^{b_1}X_2^{b_2} \), technological change may be represented by an increase in the value of \( a, b_1, b_2 \) or some combination of these. Because of differential rates of adoption, technological change affects the relative distribution of economic returns. In addition, and partially an outgrowth of this changing pattern of income distribution, the social structure is affected. Thus, technological change may have a number of seemingly negative side effects which producers and national planners do or should take into account.
Embodied and disembodied technological change

Technological change may be of an embodied or disembodied nature. Briefly, embodied technological change arises when inputs are modified so as to increase their productivity. For example, a more productive variety of seed or fertilizer mixture, a new tool or implement which permits better and more timely cultivation practices or a new feed additive is developed. In these situations, technological change is embodied in the new inputs. Disembodied technological change, on the other hand, is characterized by recombining existing inputs which are unchanged both quantitatively and qualitatively so as to increase the

\[1\text{See Griliches (4.7) and Jorgenson (4.9).}\]
level of output. An example of this phenomenon is extension personnel recommending the same collection of inputs. Quite apparently, such information can be considered to be eventually embodied in improved management inputs provided by the producer. Consequently, the distinction between embodied and disembodied technological change is blurred, and it becomes primarily academic in nature. Most technological change will incorporate both features. The impact on producers is likely different, however. Disembodied technological change may be essentially costless to the individual producer in that he is not required to make additional investment or working capital outlays. Indirectly, cost accrues to him in that public research and dissemination facilities must be supported by government revenues or deficit financing. In addition, some producers may associate social costs with changes in traditional work patterns. To the extent that disembodied technological advances are available, the rate of adoption is primarily constrained by producers' awareness and their estimates of uncertainty associated with these new practices.

Technologically-improved inputs would at least initially be available in relatively-limited quantities and at generally higher costs to producers. Under these conditions, the rate of adoption would be further constrained by the availability of cash reserves and external financing to obtain these inputs and by the nature of the "rationing" process through which the relatively-scarce quantities of these inputs are allocated to producers.
Effect on input demand

The static factor demand function for the two-factor case was given in Equation 2.46. Such demand is a function of input and output prices and of the technical coefficients of production. If no technological change takes place and the output level is invariant, factor demand varies only with changes in the price relationships. These changing price ratios usually induce market-oriented producers to alter production techniques and their relative demand for inputs. If the isoquant is segmented as is isoquant A in Figure 4.1, a change in the price ratio need not induce a change in production technique. Considering point b, relative input prices can change without inducing a shift from production technique OT₂ as long as the slopes of the \( \frac{p_K}{p_L} \) ratios are less than the slope of ab and greater than the slope of bc. This unresponsiveness to changing economic conditions is also consistent with meeting the marginal conditions for economic efficiency. Only if the isoquant is smooth and continuous will changes in the input-price ratio always necessitate a change in the optimal production technique used by profit-maximizing producers. This statement, of course, holds only

1Using the constrained revenue maximization formulation employing Lagrangean multipliers, as in Equation 2.9, aggregate factor demand also varies with \( K^0 \), capital availability, and \( \mu \), the opportunity cost associated with capital use in the firm.

2The evidence of economic efficiency among agriculturalists in less-developed areas is not abundant. The studies of Agarwal and Pathak (4.1), Chennareddy (4.2), Daniel (4.3), Desai (4.4), Hooper (4.8), Sahota (4.10), and Tax (4.12) provide contrasting views relative to the economic efficiency of producers. The question of the generalizability of these individual studies to conditions existent in other less-developed areas remains unanswered.

The selection of an optimum technique and the factors affecting this determination are discussed at a later point in this chapter.
under conditions of perfect certainty; that is, certainty of knowledge relative to costs and returns conditions, including the impact of exogenous factors. Such certainty never exists. In the absence of fixed input and product prices, these prices must be estimated. In addition, the marginal conditions require that producers be able to estimate the relative MPP's of the inputs at different input combinations and levels of use, again taking into account the influence of exogenous factors. However, it is not suggested that producers are actually able to quantify, for example, Equation 2.4. Rather, on the basis of past experience, the "demonstration" effect of neighbors' experiences, and any other possible sources of information, producers synthesize this information and select that combination of inputs and, hence, production technique, which they subjectively estimate to be optimal.

With technological change, the technical coefficients of production are altered. Consequently, the production function and corresponding isoquants assume different positions and generally, different forms. In Equation 2.46, for example, technological change can affect \( a, b_1 \) and \( b_2 \) and, in turn, the level of input demand. Considering only labor and capital, technological progress can be classified as capital-using, labor-using, or neutral depending on whether the marginal rate of technical substitution of capital for labor increases, decreases, or remains unchanged, respectively, along a given labor-capital ratio. These consequences of technological progress, whether of an embodied or disembodied nature, are depicted in Figure 4.3. In Panel a, technological change is capital-using in nature because the slopes at points B and C along ray OR are successively higher than at point A, the initial
Figure 4.3. Three types of technological change

a. Capital-using technological progress

b. Labor-using technological progress

c. Neutral technological progress
point. These higher slopes indicate that MPP$^K$ has increased relative to MPP$^L$. Consequently, the marginal rate of technical substitution of capital for labor increases along OR at points closer to the origin.$^1$

With prices invariant, producers find it profitable to use relatively more capital. The converse is true with labor-using technological progress. If the technological progress is neutral, as in Panel c, the MPP$^K$ / MPP$^L$ ratio is invariant at all points. If prices are unchanged, the relative demand for labor and capital does not change; only the aggregate demand may vary.$^2$

$^1$Using a production function, $Y = a L^\alpha K^\beta$, the marginal rate of technical substitution of capital for labor is the following:

$$\text{MRS}_{K-L} = \frac{\text{MPP}_K}{\text{MPP}_L} = \frac{a L^\alpha K^\beta \cdot \alpha L^\alpha - 1}{a L^\alpha - 1 K^\beta} = \frac{\beta}{\alpha} \cdot \frac{L}{K}$$

If technological progress raises $\beta$ to $\beta^*$, ceteris paribus, or alternatively raises $\beta$ relative to $\alpha$, both MPP$^K$ and MPP$^L$ increase when $L/K$ is invariant. However, MPP$^K$ increases relatively more; i.e.,

$$\frac{\beta^*}{\alpha} \cdot \frac{L}{K} > \frac{\beta}{\alpha} \cdot \frac{L}{K}.$$  According to Equation 2.18, if prices are unchanged, relatively more capital can now be profitably used. If $\alpha$ and $\beta$ increase by the same proportion, ceteris paribus, the MRS$_{K-L}$ is unchanged, and the technological progress has been neutral in effect.

$^2$This is true only if one product is produced. Technological progress, whether neutral or otherwise, will affect the relative profitability of alternative crops. Consequently, technological progress is expected to affect both the relative and aggregate demand for inputs in the production of all outputs.
Factors Affecting Change in Production Technique and Rate of Adoption of New Technology

A number of factors affect the choice of production techniques. Initially, producers' awareness of better techniques and of improved inputs is the primary constraining factor. Then, considerations of availability, adoptability and profitability must be weighed. Finally, any considerations of social acceptability must be taken into account. Some of these factors are examined below. The relative importance of each likely varies with the stage of economic development and attendant features such as levels and distribution of agricultural incomes, literacy rates, and attitudes toward change.

Awareness

The precondition to selecting an alternative production technique, either as the result of a change in price relationships or technological progress, is the awareness that a "better" means of production exists—"better" generally implying a more profitable technique. The routes of increasing producers' awareness of alternative production techniques vary with individual situations. With high rates of illiteracy, printed information is intelligible only to a small proportion of the rural population. Under these conditions, such information is communicated more effectively by the "demonstration" effects of some producers adopting new techniques and by government programs of "demonstration" farms.

"Better" has connotations other than increased profitability. Profitability considerations aside, techniques which reduce the physical strain of work and(or) permit increased amounts of leisure time are preferred, especially in those areas where social status is highly influenced by the amount of leisure and time devoted to social and local government functions as, for example, in parts of Southeast Asia and Africa. "Better" from a macro standpoint will be discussed in a later subsection dealing with optimal production techniques.
These phenomena are complemented when extension service personnel work with individual producers and farm organizations. The local merchant or trader, both as the supplier of inputs and purchaser of agricultural commodities, is in a position to provide information on market conditions for various commodities and on the availability of improved inputs. Conversely, he is also in a position to exploit producers through misinformation regarding prevailing and anticipated market price relationships. Cooperatives engaging in marketing and input-supplying activities provide another mechanism for transmitting information, at least to cooperative members.

But awareness is only a necessary, not a sufficient condition for producers switching to a "better" technique. The improved technique, in its present form, may not be adaptable to particular areas. For example, seed variety highly successful in one region of the world may not be productive in another area. Thus, the awareness and availability of alternative techniques are beneficial only if techniques are adoptable or adaptable by potential users. Communications media, especially radio, have an increasing impact on individuals' awareness and expectations. Awareness and expectations not matched by achievement are conducive to social and political instability with important consequences for stimulating and sustaining developmental processes. Thus, producers must also have the capacity, i.e., the financial resources and managerial talents to procure and successfully adopt technological innovations suited to their farming operations.
Adaptability and adoptability

Changes in technique and technological change both involve considerations of adaptability. Let adaptability refer to the producers' capacity to adjust farm operations by altering the proportions in which inputs are used in response to, for example, a change in relative prices. Referring to Figure 4.1, it was pointed out earlier that producers operating along isoquant A are not restricted to producing at points a, b, and c. They can combine processes \( OT_1 \) and \( OT_2 \), for example, to operate at points on segment bc. Since alternative techniques in Figure 4.1 represent combinations of existing, known inputs, producers can adapt relatively easily as economic conditions change, at least adapt within a range of input combinations. With technological change, however, this familiarity no longer exists. However, adaptability also refers to the capacity for modifying improved inputs which could not be profitably adopted in their current form. Fertilizer mixtures, cultivation practices, and feed rations suited to one region of a country may not be economically feasible in another area until some modifications have been made. The problems associated with international transfers of technology are more numerous and quite apparent.

Adoptability, on the other hand, denotes producers' capacity to profitably assimilate technologically-improved inputs in their present form into the firm. Locally-developed seed varieties, artificial insemination techniques, and irrigation pumps would be examples of this phenomenon.

In Figure 4.1, capital and labor are denoted as the variable inputs applied to some unspecified aggregation of fixed inputs. But what
type of capital is being represented in this diagram? K represents working capital such as production-period expenditures for seed, fertilizer, and irrigation water inputs to be combined with a collection of fixed inputs. The problems of adaptability and adoptability, assuming these working capital inputs are employable in their current form, are relatively small in contrast to changes in capital-use levels involving both working and fixed capital inputs. A number of reasons are applicable:

1. The working capital inputs are largely used up during each production period even though some fertilizer and irrigation water residuals remain. Since producers must purchase these inputs for each production period, they have a good deal of flexibility in altering quantities used in response to anticipated changes in economic conditions and any technological innovations that may be available. Investment in fixed capital inputs provides a flow of returns over a longer period of time which generally reduces the rate and scope at which producers can adjust their operations to changing economic conditions;

2. In addition to the shorter life of working capital inputs, expenditures are usually small relative to those for fixed capital. Expenses can be at least partially financed out of current income; credit can usually be obtained since financing is ostensibly for productive purposes, the returns of which will be realized within a relatively short period of time. Longer-term credit obligations associated with investments in the structure of the firm restrict producers' activities, especially during unfavorable production periods when additional financing is often necessary; and
(3) Working capital inputs place fewer demands on the need for complementary inputs to maximize returns. For producers accustomed to using a seed-fertilizer-irrigation water configuration, the availability of an improved seed variety requiring a different application of fertilizer and water does not always tax the producers' managerial abilities since such adjustments have usually been made in the past. Conversely, the substitution of mechanical power for draft animals and human labor does present a situation where new managerial inputs are required to operate and maintain the machinery. In addition, a different complement of implements is often necessary. That is, a plow suitable for use with draft power may not be equally suitable for mechanical power.

Technological change can originate exogenously or endogenously. The longer-term consequences for additional technological progress and for the rate of adoption are important, however. Technological change developed by indigenous institutions may have two beneficial aspects: (1) Technological development will be oriented toward local situations so that the ease and rate of adoption is facilitated; and (2) A more favorable attitude toward technological change, especially if endogenous efforts are highly successful, may develop and, in turn, an increased receptiveness and capacity for adopting exogenously-generated technological change. Conversely, technological progress is cumulative in nature which suggests that successful technological progress requires or is facilitated by earlier progress in this field. The major problem in generating internal technological advances is that most less-developed areas do not have that constellation of research facilities, experienced
researchers, and monetary and political support conducive to making technological progress. This is not to say that individual producers do not attempt to improve the efficiency of their operations through devising their own production and management techniques. Rather, the major technological breakthroughs that significantly stimulate developmental processes are likely made in established research centers; these are not widespread in less-developed areas. Exogenously-developed change will usually not promote endogenous technological advances unless there has been a fundamental modification of the indigenous social structure (4.6). Generally speaking, such a modification involves a change of attitude toward agricultural production, particularly by those elites who view agriculture and agriculturalists with relative distaste. Such a shift would include a different attitude toward workers engaged in manual operations, a reorientation of the educational system and the attitudes it generates toward physical sciences and away from the relatively strong emphasis on aesthetic studies, and a reduction in the incidence of absentee landlordism.

Producers' objectives

Only a few, general comments about producers' objectives as affecting choice of production technique are intended here. It is perhaps almost axiomatic that the majority of individuals in any society are "economic men". That is, even though they act under social and cultural

1The successes of agronomic research in Mexico, the Philippines and Nigeria cannot be considered as primarily indigenous in nature, but rather cooperative undertakings with researchers from developed areas.

2Producers' objectives are discussed more comprehensively in Chapter VIII.
restraints, both self- and externally-imposed, most individuals can be assumed to prefer more economic goods to less, subject to these constraints. As long as the net gain from procurement and consumption of goods is positive, utility is increased.

Utility is a function of factors other than profits and consumer goods purchasable with these profits. Consequently, the rate at which producers adjust their operations to changing environmental conditions is affected. Referring again to Figure 4.1, even though the $p_K / p_L$ ratio indicates that $O_T^2$ is economically efficient rather than $O_T^1$, some producers may rationally choose to maintain $O_T^1$ since using $O_T^2$ results in a substitution of capital for labor, thereby releasing a quantity of labor for which alternative productive employment within the firm is not available. Similarly, in certain societies individuals comparatively "well off" are expected to share their relative good fortune with less-fortunate relatives. Thus, even though $O_T^2$ is appropriate for $p_L / p_K$ as drawn, producers may employ a greater than economically-optimal number of labor inputs.

As noted in Chapter III, in areas where tenurial uncertainty is high or where costs and returns are not shared in equitable proportions, tenants are often motivated to extract the maximum possible from landowners' resources without serious consideration to longer-term consequences for resource productivity. Thus, these production techniques may be optimal for the tenant in the short-run but not optimal to the landlord nor to society in the long-term context.

On large estates where land is often farmed extensively and a portion of productive land remains idle even though relatively inexpensive
labor could be employed to bring this land under cultivation, landowners' objectives as related to choice of production technique would seem to give substantial weight to factors other than economic. To the extent that political and social power are derived from land ownership and favorably skewed income distributions, landowners may prefer maintaining the economic and social status quo within the agricultural sector. Even though intensive cultivation by tenants and landless laborers is economically remunerative to landowners, the attendant higher incomes for these low-income groups and the potential rise in their aspirations and expectations for a greater share in the product may be viewed by the landlord as forces eroding his increased returns with eventual social and political unrest threatening his continued possession of the land. In this situation, producers' production techniques are not optimal in a macro-economic sense since the majority of people tend to view these techniques as contributors to suppression of developmental processes and individual well-being.

Optimal Production Technique

In selecting their optimal production technique, producers give consideration to the number of economically-feasible alternatives, economic conditions as reflected in price configurations, objectives they pursue, factor or input endowments, and allowance for various forms of uncertainty. The weights assigned to these factors vary with types of producers. For those operating essentially outside the market economy, physical input-output relationships are more important than market prices. Noneconomic considerations may be incompatible with meeting the marginal
conditions for economic efficiency. Owner-operators and producers with secure, long-term tenurial arrangements assign a zero weight, or nearly so, to tenurial uncertainty while tenant-producers may weigh heavily this uncertainty in making production and private investment decisions, decisions affecting both current and future production techniques used.

The optimal production technique is that one which is consistent with satisfaction of the marginal conditions for economic efficiency. This implies profit maximization, the objective whose generality has been questioned; but more specifically, the objective is stated as a constrained profit maximization. A number of side conditions can be reflected in the constraints. The capital constraint, $K^0$, can be defined as net of "social" expenditures, hoarding, and other essentially non-productive outlays. Labor endowments reflected in labor inputs available from family members may be expressed in quantities which are net of leisure preferences and of time devoted to social and governmental functions. Large landowners opting to produce crops amenable to extensive cultivation can constrain labor by the amount they want to employ consistent with maintaining existing social and economic relationships.

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1 Equations 2.15, 2.16 and 2.18 plus the second-order conditions.

2 To term these expenditures as nonproductive is perhaps incorrect. "Social" expenditures, for example, social observances of family events and giving gifts to relatives and patrons, can be viewed as means whereby the individual's position in local society is maintained or improved. Such practical consequences as being able to secure financing from relatives and landlords during adverse economic periods and to continue favorable tenancy arrangements may be partially contingent upon observing these social proprieties. Also, work-share arrangements among villagers are maintainable only with social stability within the village.
Initially, determination of the optimal production technique from the micro-economic or individual producer standpoint is discussed. Subsequently, the problem is viewed at the macro-economic level.

**Two input, one output, static case**

In Figure 4.4, isoquants similar to those in Figure 4.1 have been drawn. The shape of the isoquants is determined by the technical relationships incorporated in the production function. When juxtaposed with the appropriate input price ratio, the optimum production technique associated with the specified output levels is determinable. The corresponding optimal production technique varies with different producer situations.

![Figure 4.4](image)  
**Figure 4.4.** Derivation of optimal production techniques for two output levels under alternative input price relationships
With segmented isoquant A, rays $OT_3$ and $OT_1$ are also ridgelines denoting the extremeties of the alternative, economically-feasible production techniques. ¹ For isoquant B, any ray from the origin to any point on the isoquant is economically feasible. As observed earlier, producers operating along isoquant A are not restricted to producing at points a, b, and c. Superimposing the relevant budget constraints; i.e., the constraint on the amount of labor and capital which can be used, the appropriate least-cost combinations of inputs and the corresponding production technique are derived. The identical slopes of the two budget constraints indicate that both producers confront the same labor and capital costs. On isoquant A, $MRS_{K-L} = \frac{MPP_K}{MPP_L} = \frac{p_K}{p_L}$ at point b and technique $OT_2$ is used. On isoquant B, the corresponding optimum production technique is $OT_b$.²

Assume the slope of a new $p_K / p_L$ ratio is equal to the slope of one of the segments in Figure 4.5, for example, ab. From an economic standpoint the producer is indifferent as to which point on ab and the corresponding production technique he selects. However, his attitude towards using greater amounts of labor versus inanimate capital would condition his selection of a production technique.

¹The ridgelines delimit that portion of the isoquant reflecting nonzero marginal products of the two inputs.

²Points b and d represent least-cost combinations of producing 40 and 200 units of output, respectively. Implicitly assumed is that the variable costs of production at these output levels are at least covered by revenues earned. Also, points b and d denote economic coexistence of the two firms of different sizes using different production techniques only if the short-run variable costs of each firm are covered.
For producers with relatively fixed input endowments, for example, subsistence-oriented producers with relatively-large amounts of labor, the optimal production technique is less affected by market prices for the two inputs. If endowments consist of $OL_1$ and $OK_1$ of labor and capital, respectively, $OT_3$ will be employed even though the ratio of input prices indicates that $OT_2$ is that technique consistent with the marginal conditions. If the producer measures $p_L$ in terms of opportunity costs, taking into account his subjective estimates of social costs associated with his working as a laborer, the $p_L$ may be considerably below the prevailing market wage rate so that the modified $p_K / p_L$ ratio has a sufficiently high slope which tends to make $OT_3$ the production technique which also meets the marginal conditions for economic efficiency. Using the system described by Equation 2.19 where $K^O$ denotes a "wages fund" concept, Figure 4.4 is slightly modified, as in Figure 4.5. The same quantity of output can be produced with relatively fewer labors but with higher per capita consumption levels, $K^O / L$, needed to motivate and to enable them to perform the necessary labor functions. Conversely, more laborers with each working less than the previous case require a lower $K^O / L$. Thus, if in Figure 4.5 $OL_1$ of labor is normally available from the active members of the family unit, $OT_S$ denotes the production technique employed.

Estate owners may decide to constrain the level of labor use to $OL_2$ in Figure 4.4. To produce 200 units of output, production technique $OT_a$ would be used. According to the $p_K / p_L$ ratio, as drawn, $OT_b$ is the optimum technique. Is $OT_a$ nonoptimal for those producers who want to
Figure 4.5. Production technique, labor-use level, and per capita consumption for a subsistence-oriented producer

sustain existing economic and social patterns? As before, if \( p_L \) represents the opportunity costs for labor inputs, those producers who view the employment of more labor as having potential social, economic, and political costs can subjectively view \( p_L \) as being composed of the market wage plus these additional costs which producers may potentially incur. Thus, the \( p_K / p_L \) has a lower slope than that of the ratio drawn, and the corresponding optimal production technique may be one which approaches \( O T_a \).

Two input, two output, static case

This situation can be represented through the use of an Edgeworth Box diagram from which the production possibility curve or the product transformation curve can be derived. Rather than begin the analysis on the assumption of a fixed endowment of resources which specifies the
dimensions of the Edgeworth Box, the following, more meaningful situation is posited. Producers do not have a fixed endowment of the two inputs, but they have a budget constrain which permits them to employ alternative combinations of the two inputs. The range of alternative combinations is constrained by the input prices and the budget or expenditure constraint. This constraint, BB, is drawn in Figure 4.6 with a slope equal to $p_K / p_L$. Each point on this line is an economically-feasible combination of labor and capital.

Figure 4.6. Alternative, feasible combinations of labor and capital employable by the producer
What is the optimal combination of labor and capital to be applied to a nonspecified configuration of fixed inputs? Implicit in Figure 4.6 is the assumption that the two inputs are perfectly divisible. Non-divisibility can be easily introduced by specifying that only certain points on BB are feasible. Initially, consider point $E_1$ and the corresponding quantities of $L_1$ and $K_1$ of labor and capital, respectively. If this combination is used, these would effectively become the "fixed" endowments of the two variable inputs and, in turn, the dimensions of the Edgeworth Box represented in Figure 4.8.\(^1\) The range of alternative production techniques for $Y_1$ and $Y_2$, denoted by their respective ridgelines, are specified in Figure 4.7. Ridgelines OC and OD delineate the economically-admissible combinations of labor and capital for producing $Y_1$; OA and OB apply to $Y_2$. As arbitrarily drawn, the production of $Y_1$ involves production techniques which are capital-intensive relative to those for $Y_2$. Conversely, relatively labor-intensive techniques are used to produce $Y_2$. The isoquants for $Y_1$ and $Y_2$ together with their corresponding ridgelines are drawn in Figure 4.8. The $Y_1$ isoquants originate in the southwest corner of the box; northeasterly movements represent isoquants at higher output levels. Similarly, the $Y_2$ isoquants originate in the northeast corner of the box. For analytical simplification, constant scalar returns are assumed. Given the nature and positions of the isoquants in Figure 4.8, the production possibility or product transformation curve representing alternative combinations of $Y_1$ and $Y_2$ which can be produced with $L_1$ and $K_1$ is given in Figure 4.9. The prin-\(^1\)Edgeworth Box diagrams are familiar to economists. Figure 4.8 embodies an approach contained in a study by Eckaus (4.5).
Figure 4.7. Economically-feasible combinations of labor and capital bounded by ridgelines for producing $Y_1$ and $Y_2$.

Figure 4.8. Optimum input-use levels and under- or full utilization of available resources with alternative combinations of $Y_1$ and $Y_2$ produced.
The principle employed in deriving the production possibility curve is to select, for example, isoquant $Y_1^*$ in Figure 4.8 and then maximize the amount of $Y_2$ which can be produced. Given $Y_1^*$, both $Y_2'$ and $Y_2''$ are possible, but since $Y_2'' > Y_2'$, $Y_2''$ is preferred. This process continues until point b is reached where $Y_1^*$ is tangent to the highest $Y_2$ isoquant. One point on the production possibility curve has been determined, for example, point b in Figure 4.9. Point a in Figure 4.8 also represents a feasible combination of $Y_1$ and $Y_2$, but since b is preferred to a, point a would be an interior point to the production possibility curve in Figure 4.9. In this sense, point b in Figure 4.9 is on the production possibility frontier. These points of tangency between the $Y_1$ and $Y_2$ isoquants in Figure 4.8 delineate the "contract" curve or "efficiency locus".

If the producer is at point a in Figure 4.8, the output of either one or both of $Y_1$ and $Y_2$ can be increased by a movement to points on the "efficiency locus", for example, point b. These points on the "efficiency locus" can be mapped into points on the production possibility frontier in Figure 4.9 and vice versa.

To determine the economically-optimum configuration of $Y_1$ and $Y_2$, given $L_1$ and $K_1$, the ratio of the prices received by the producer for the two outputs is superimposed. If $p_{Y_2}/p_{Y_1}$ is as represented in Figure 4.9, the marginal conditions in Equation 2.16 are met at point b.

1 At point b, $\text{MRS}_{K-L} = \frac{\text{MPP}_K}{\text{MPP}_L} = \frac{\frac{Y_1}{MPP_L}}{\frac{Y_2}{MPP_K}}$; this point is one of a locus of points denoting physical efficiency given the endowments of labor and capital represented in Figure 4.8.
where \( p_{y_2} / p_{y_1} = \text{RPT} \). With \( Y_1^* \) and \( Y_2^* \), revenue is maximized. Returning to Figure 4.8, the combination of \( Y_1^* \) and \( Y_2^* \) is obtained at point \( b \) with \( L_1^1 \) and \( K_1^1 \) used to produce \( Y_1^* \) and \( Y_2^* \) and \( (L_1 - L_1^1) \) and \( (K_1 - K_1^1) \) used to produce \( Y_2^* \). In producing \( Y_1^* \), the most capital-intensive technique, \( OD \), is employed; for \( Y_2^* \), the appropriate production technique is represented by a ray drawn from \( O_2 \) to \( b \).

At this point the effect of using \( L_1 \) and \( K_1 \) in deriving \( p_1 p_1 \) in Figure 4.9 has been demonstrated. But this is only one of several feasible input combinations. Associated with each alternative input configuration in Figure 4.6 is a unique, corresponding production possibility curve. As these additional curves are derived, an envelope of such curves is obtained, as in Figure 4.10. For example, the \( p_1 p_1 \) curve, using \( L_1 \) and \( K_1 \), will have one point, for example, \( s_1 \), on the "super" production possibility frontier. Similarly, other points on the "super" frontier map back to: (1) input combinations in Figure 4.6 where these become the dimensions of the corresponding Edgeworth Boxes only one of which is given in Figure 4.8; and (2) that single point on the "efficiency" locus in each Edgeworth Box which corresponds to the \( Y_1 - Y_2 \) configuration associated with that point on the "super" frontier.

For convenience, assume that the \( p_{y_2} / p_{y_1} \) superimposed on the "super" production possibility frontier is tangent at \( s_1 \) and that this is also the point on the \( p_1 p_1 \) curve which is on the "super" frontier. Then, \( L_1 \) and \( K_1 \) remain the best combination of the two inputs and the optimum output configuration remains \( Y_1^* \) and \( Y_2^* \) as designated by point \( b \) in Figure 4.8.
Figure 4.9. Production possibility curve for producing $Y_1$ and $Y_2$ given $L_1$ and $K_1$.

Figure 4.10. "Super" production possibility frontier and derivation of socially-desirable production pattern.
Two input, two output, dynamic case

As discussed earlier, technological progress generally affects the production techniques and, in turn, relative input demand and output configurations for adopting producers. If \( p_L \) and \( p_K \) are assumed unchanged even though these prices would likely vary as relative input demand and supply conditions vary, the expenditure constraint and the feasible combinations of labor and capital in Figure 4.6 are unchanged. Changes occur, however, in the shapes and positions of the isoquants associated with each input endowment and, in turn, the marginal rates of substitution between the two inputs and the consequent optimal production technique. The hypothetical effects can be qualitatively expressed by the above diagrams, but a simple mathematical expression better demonstrates the impact of technological progress. Let Equation 4.1 denote the static production function and Equation 4.2 the dynamic form where the latter incorporates allowance for technological progress.\(^1\)

\[
Y = a L^\alpha K^\beta \tag{4.1}
\]

\[
Y(t) = a L^{\alpha(1 + \gamma_t)} K^{\beta(1 + \varphi_t)} \tag{4.2}
\]

\[
MRS_{K-L} = \frac{MPP_K}{MPP_L} = \frac{\beta(1 + \varphi_t)}{\alpha(1 + \gamma_t)} \cdot \frac{L}{K} \tag{4.3}
\]

Technological change is admitted for capital and labor where \( \gamma_t = \) coefficient of technology for labor inputs and \( \varphi_t = \) coefficient of
growth. The more conventional method of incorporating technological progress into the production function is the following:

\[
Y(t) = e^{rt} a L^\alpha K^\beta \tag{4.3}
\]

where \( r = \) rate of technological advance per time period, \( t \). In this formulation new technology is assumed to grow at the constant compound growth rate, \( r \). Technological progress, however, does not appear to take this path; rather, progress appears at different rates and points in time and not in each successive time period in the planning horizon.
technology for capital, each corresponding to the specific time period, \( t \), under consideration. Since technological progress does not flow at a continuous, constant rate, the values of the technological coefficients vary with time periods, for example, \( \gamma_1 = \gamma_2 < \gamma_3 = \gamma_4 \). Consider only two time periods where \( \gamma_2 \geq \gamma_1 \) and \( \phi_2 \geq \phi_1 \). If from \( t_1 \) to \( t_2 \), \( \phi \) increases relative to \( \gamma \), ceteris paribus, the \( \frac{\text{MPP}_K}{\text{MPP}_L} \) increases. That is, \( \text{MPP}_K \) increases relatively more than the increase in \( \text{MPP}_L \). Technological progress is capital-using in nature. See Figure 4.4, Panel a. Conversely, if \( \gamma \) increases relative to \( \phi \), the \( \frac{\text{MPP}_K}{\text{MPP}_L} \) ratio declines and the technological progress is labor-using or capital-saving. Technological progress tends to increase both \( \phi \) and \( \gamma \). Increased labor efficiency and improved managerial inputs through government extension services or some other educational program not only increase the \( \text{MPP}_L \), but since labor is in a position to use capital inputs more effectively, the \( \text{MPP}_K \) is also augmented. The converse is also true.

As indicated earlier, awareness and availability of technologically-improved inputs are necessary before producers incorporate these into their operations. In addition, producers have to estimate the values of \( \phi_t \) and \( \gamma_t \) and the consequent impact on resource productivity. Information of varying usefulness may be available on the productivity of a new seed variety, fertilizer mixture, or livestock ration. Even if pro-

---

1 In Equation 4.1, the term \( a \) reflects, among other factors, the impact of fixed inputs in the production process. By implication, the planning horizon is sufficiently short so that all inputs are not variable. Technological progress of a disembodied nature which affects the fixed inputs, for example, improvement in quality of management inputs, could be incorporated into Equation 4.2 in a form such as \( a (1 + \pi_t) \).
ducers have access to this information through extension services, communications media, or word-of-mouth, the production response obtained on a research farm or even on a neighboring producer farm is usually not directly applicable to the situation applicable to the potential adopter. Differing agronomic conditions, input complements, and weather factors affect the productivity that potential adopters expect to realize. For example, what is the expected shape and position of the isoquants under varying assumptions regarding weather factors and the effect of technological progress on the marginal physical productivities of labor and capital? These expectations whether rational or irrational, precise or imprecise, affect investment decisions, physical productivity possibilities, and physical efficiency of input usage. Such considerations then must be juxtaposed with estimated input and output prices in order to determine the optimal production technique.

Two input, two output, static macro-economic case

This situation is postulated as representing the agricultural sector as viewed by the national planner. The relative quantities of labor and capital, together with the components of $a$ in Equation 4.1, such as land, are now considered fixed to this sector. For convenience, assume that this sectoral endowment is as indicated in Figure 4.8. That is, the dimensions of the Edgeworth Box represent the quantities of labor and capital within the entire agricultural sector. Figure 4.9 would be the corresponding production possibility curve for the two agricultural outputs $Y_1$ and $Y_2$. Assume that a community indifference curve or social welfare function, SWF, representing combinations of $Y_1Y_2$ which provide equal amounts of utility to society, is superimposed in
Figure 4.9. The optimum combination of $Y_1$ and $Y_2$ is determined at the point of tangency between $p_1p_1$ and the highest SWF curve. This point is then "mapped" back into Figure 4.8 to determine the relative combinations of labor and capital to be used in producing the two outputs and the corresponding production techniques. These production techniques are optimal.

In two extreme cases which arise if the SWF curve is tangent at a point toward either end of the $p_1p_1$ curve, resource unemployment results. To demonstrate this phenomenon, initially assume that only $Y_2$ is produced. The maximum amount of $Y_2$ is obtained where $O_2B$ intersects the capital ($Y_1$) abcissa at point $e$ in Figure 4.8. Production of only $Y_2$ results in labor being fully employed, but $O_1e$ of capital as being redundant; i.e., labor is relatively scarce in this situation. As the production of $Y_1$ is increased, production technique $O_1D$ is used for $Y_1$. The use of the relatively capital-intensive technique for $Y_1$ is consistent with the abundance of capital relative to labor. The redundancy of capital continues until point $b$ is reached and $Y_1^*$ and $Y_2^*$

1 The relevant curve is $P^*P^*$. To postulate a tangency between the SWF and $P^*P^*$ at a point other than $S$, requires that a new diagram for Figure 4.8 be drawn. Consequently, Figures 4.8 and 4.9 are used to demonstrate the point that labor or capital can be unemployed when certain combinations of $Y_1$ and $Y_2$ are produced.

2 At relatively low output levels of $Y_1$, the $Y_1$ and $Y_2$ isoquants are tangent at points to the right of ridgeline $O_1D$. Therefore, at these points the $MPP_K$ in producing $Y_1$ is zero and capital usage is cut back to the point at which the isoquant being considered intersects $O_1D$. This holds until $Y_1$ is expanded to point $b$ in Figure 4.8.
are produced. The fixed endowments of labor and capital are fully employed at this point. Full employment continues up to point \( d \) in Figure 4.8. At higher \( Y_1 \) output levels, the tangency points between the isoquants fall to the right of ridgeline \( O_2A \). The \( MPP_L \) in production of \( Y_2 \) is zero at these points. Thus, production of \( Y_2 \) proceeds along \( O_2A \), the most labor-intensive technique for producing \( Y_2 \). As production of \( Y_1 \) is expanded beyond point \( d \) and up to point \( f \) where only \( Y_1 \) is produced, labor is a redundant resource and capital is now relatively scarce. Referring to Figure 4.9, only those combinations of \( Y_1 \) and \( Y_2 \) possible on arc \( bd \) result in full employment of both labor and capital. If the community indifference curve were tangent at points on arcs \( cb \) or \( de \), the optimum output configuration would be associated with the unemployment of capital and labor, respectively.

The relative prices of labor and capital, and, hence, the least-cost combinations of producing \( Y_1 \) and \( Y_2 \) have so far been ignored. As indicated earlier, if only \( Y_2 \) is produced initially with production of \( Y_1 \) successively increased, \( Y_1 \) would be produced using production technique \( O_1D \). Since capital is redundant, the \( p_K \) is zero and the slope of \( p_K / p_L \) is therefore zero.\(^1\) Thus, the least-cost combinations of producing \( Y_1 \) between points \( e \) and \( b \) in Figure 4.8 will also occur along ridgeline or production technique \( O_1D \). Between points \( b \) and \( d \) where both inputs are fully employed, the market forces will operate to effect the appropriate prices for labor and capital so that at the points of tangency between the \( Y_1 \) and \( Y_2 \) isoquants both labor and capital are

\(^1\) \( p_K \) is zero only if the redundant capital remains in the agricultural sector and only if production is restricted to \( Y_1 \) and \( Y_2 \), as in Figure 4.8.
fully employed and the proportions in which labor and capital are used are also the least-cost combinations of producing the respective quantities of $Y_1$ and $Y_2$.

The hypothetical consequences of technological progress and government policies on the level of resource employment are discussed in the following section.

**Two input, two output, dynamic macro-economic case**

Two possible actions by the government which affect relative input use-levels are considered: (1) The government is able to influence the direction of technological progress through research programs and public policies affecting the availability of technology; and (2) The government can implement programs affecting resource demand in various sectors of the economy and resource mobility among these sectors. Figure 4.8 is again used to demonstrate the effect of these measures. If a more labor-intensive production technique for $Y_1$ were developed, ridgelines $O_1C$ and $O_1D$ would tend to rotate counter-clockwise about $O_1$. Point $d$ on $O_2A$ would move along ridgeline $O_2A$ towards $O_2$. Each movement towards $O_2$ reduces the amount of previously-redundant labor. In principle, a sufficiently labor-intensive technique would permit full employment of labor. If, concomitantly, a more capital-intensive technique were developed for producing $Y_2$, the possibility for full employment of both labor and capital is increased. Conversely, if a more capital-intensive technique for producing $Y_1$ is devised and implemented, a greater amount of labor becomes redundant. Consequently, society and particular individuals incur both economic and social costs as a portion of the labor force remains unemployed or underemployed. Underemployment arises when
labor is substituted for capital beyond the point where the $MPP_L$ equals zero. Consider the production of $Y_2$ in Figure 4.8. If additional labor is used beyond ridgeline $O_2A$, the $MPP$ of these increments of labor is zero. Such labor is underemployed in the sense that even though the labor is engaged in the producing activity, such labor could be removed from production without decreasing production or requiring additional units of capital to maintain production. A change in production technique; i.e., a change in the proportion in which labor and capital are employed, would be necessary, however.

The government has another potential means for alleviating the labor redundancy situation. Government investment in nonagricultural sectors increases the demand for labor in these areas. A portion of the labor force is induced to migrate from the agricultural sector in response to higher wage rates in other sectors. Also, government projects directly employing previously unemployed or underemployed individuals would have the same effect. The impact of these measures would be partially offset by growth in population and in the agricultural labor force. As indicated earlier, these growth rates tend to be high for most less-developed areas. Such growth in the agricultural labor force would increase the vertical dimension of Figure 4.8. In the absence of other changes, this growth would tend to mitigate the potential capital redundancy situation but exacerbate potential labor unemployment. This appears to be the crux of several development problems; i.e., growth in the labor force versus growth in employment opportunities. Not only is there a direct effect on labor utilization and per capita incomes, but in turn, implications for social and politi-
cal stability are apparent. These latter forces condition the environment for private investment and for developmental processes, in general.

If a net amount of labor is removed from the agricultural sector, that is, the $Y_2$ origin point $O_2$ is moved downward along the right-hand side of the Edgeworth Box in Figure 4.8, the labor redundancy situation associated with arc de on $p_1p_1$ in Figure 4.9 could be eliminated. With the ridgelines remaining unchanged, sufficient amounts of labor can be removed, without affecting $p_1p_1$, so that both labor and capital can be fully employed. The production technique employed may have to be changed, however. In Figure 4.11, the two isoquants which produce a tangency at point $r$ in Figure 4.8 are isolated for examination.

Figure 4.11. Determination of redundant amounts of labor and capital which are removable without reducing production levels
Considering the production of $Y_2$, points $t$ and $r$ are both feasible. If production occurs at $t$ with the use of production technique $O_2A$, the quantity of labor unemployed amounts to $u$ units. However, if production takes place at $r$ with $O_2A'$, the MPP of units of labor beyond point $t$ is zero. The AVP of all laborers is still greater than zero, however. The point to be made here is that if initially production takes place at $r$, the reduction of agricultural laborers through their migration to other sectors of the economy can occur until point $t$ is reached. Associated with the new position of full employment of both labor and capital is a different production technique, that is, $O_2A$ for producing $Y_2$. Thus, the output of $Y_2$ can be maintained only with a change in production technique.

By similar reasoning, the amount of capital which is potentially redundant can be reduced or eliminated through the transfer of capital out of the agricultural sector and(or) the employment of a more capital-intensive technique for producing $Y_2$. Thus, through such measures as influencing the direction of technological progress and the relative costs of labor and capital, the government is, theoretically, in a position to affect the production techniques employed in the agricultural sector and, in turn, the employment levels of labor and capital.¹

¹Chapter VI has a subsection discussing public investment in the infrastructure of the economy.
Choice Indicators and Imputation of Product to Production Inputs

After inputs have been committed to production and an actual output configuration realized, the monetized value of the outputs can be imputed to the various inputs employed. This imputation process can be executed in any number of ways. The theoretical approach most commonly employed is that of allocating the values of the outputs according to the marginal value productivity of the various inputs used in producing these outputs. Implicitly, the production process is assumed to be instantaneous in that inputs are paid only after the production is realized. Actually, wages paid to hired laborers and consumption requirements of family laborers during the production period represent a continuing claim on quantities subsequently produced and harvested. Referring to Equation 2.9, these claims are sustained by $K^0$. Expenditures for other variable inputs such as fertilizers and irrigation water are additional claims against $K^0$.

If the working capital, $K^0$, was secured through external financing, then $K^0$ plus interest must be repaid out of current or future revenues. If $K^0$ is accumulated internally within the firm and if $K^0$ is to be available for the succeeding production period, then $K^0$ must be withheld from current revenues, obtained externally, or some combination of funds from these two sources must be obtained.

If the production function is linearly homogenous and if inputs are paid their marginal value products, then the total product or revenue will be completely exhausted. However, if the firm is operating
in a perfectly competitive market so that the demand curve it faces is perfectly elastic, both \( MC \) and \( MR \) are linear and horizontal so that the optimum output level is indeterminate if \( MR \geq MC \). If \( MR < MC \), the output level is zero. Determinateness can be effected if the production function is nonhomogenous so that the cost curves are not linear.

Total product can be fully imputed to inputs if the first- and second-order conditions for profit maximization are satisfied and if total revenue equals total costs. The following equations are in terms of a single output; the procedure is generalizable to several outputs.

\[
pq = \sum_{j=1}^{m} p_j q_j \quad \text{where} \quad q = f(q_1, \ldots, q_m) \quad (4.4)
\]

\[
p_j = pf_j = MVP_j \quad (j = 1, \ldots, m) \quad (4.5)
\]

\[
pq = p \sum_{j=1}^{m} f_j q_j \quad \text{and} \quad q = \sum_{j=1}^{m} f_j q_j \quad (4.6)
\]

\[
pq = \sum_{j=1}^{m} \left( -\frac{\partial R}{\partial q} \frac{\partial q}{\partial q_j} \right) f_j q_j \quad (4.7)
\]

Equation 4.4 requires that \( TR = TC \) where \( f \) is the functional relationship between the inputs and output \( q \). The first-order conditions for profit maximization require that each input be used up to the point where the MVP of each input is equal to the cost of the input. This condition is represented in Equation 4.5. By substitution, Equation 4.6 is derived which indicates that if each input is paid its MVP, the
total value of the output is just exhausted.\(^1\) If the demand curve faced by the producer is not horizontal so that his output level affects the market price, then the more general condition expressed in Equation 4.7 is applicable.\(^2\) With horizontal demand curves, the conditions for total imputation of the outputs are also represented in Figure 4.12.

Figure 4.12. Cost curves for two firms of different size

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\(^1\)Samuelson states that Equation 4.6 is not the same as that derived on the basis of Euler's theorem since the latter should be written as an identity; i.e., \( m = q \) (4.11, p. 86). Equation 4.6 is derived from the first-order conditions for profit maximization and is not based on a linearly homogenous production function. Under purely competitive conditions, the homogenous function would generate the above identity.

\(^2\)With a horizontal demand curve \( \frac{\partial R}{\partial q} / \frac{\partial q}{\partial q_j} = p \). With a downward sloping demand curve, Equation 4.5 should be rewritten as: \( p_j = \left( \frac{\partial R}{\partial q} / \frac{\partial q}{\partial q_j} \right) f_j = MRP_j \) where \( MRP_j \) is the marginal revenue product of the \( j \)-th input.
Implicit in the cost curves is the condition that the first- and second-order conditions for profit maximization have been met. That is, each cost curve represents the minimum unit cost of producing the corresponding output.

With $p_1$, $TR = TC$ at point A for a firm having a cost structure $SAC_1$ and $MC_1$. If each input used in producing $Oq_1$ is paid its MVP, then total revenue, amounting to $Op_1Aq_1$, will be completely imputed or exhausted. For the firm with a cost structure resulting in $SAC_2$ and $MC_2$, $Oq_3$ is produced if the expected market price is $p_1$. However, $TR > TC$ for this firm, i.e., $Op_1Cq_3 > OpDq_3$.

$$pq > \sum_{j=1}^{m} p_j q_j$$

Equation 4.4 is rewritten as an inequality in Equation 4.4'. Equation 4.5 still holds; however, Equation 4.6 becomes an inequality and is rewritten as Equation 4.6'. The reason $q > \sum_{j=1}^{m} f_j q_j$ is because at point $D$ on $SAC_2$, the $AP_j > MP_j = \hat{f}_j$ and summing with the $MP_j$ underestimates the total product. If with $p_2$ the output level were $Oq_2$, $TR$ would equal $TC$. Alternatively, point B is the minimum point on both $SAC_2$ and $LRAC$. Therefore, at point B constant returns to scale prevail and $AP_j = MP_j$ and the total product and revenue will be fully imputed. At point B, however, $p_1 > MC_2$ so that this is a nonoptimal output level. If $p_1$ prevails, the "pure profits" accruing to Firm 2 will eventually be capitalized into the cost structure thereby raising the SAC curve until
the "pure profit" is eliminated.

The importance of prices received and paid is evident in Figure 4.12. If the \( p \) increase while technology remains essentially un-
changed, the cost curves would move upward. With \( p_1 \), the firm
operating with SAC\(_1\) would not be able to cover its total costs. The
firm having SAC\(_2\) would experience a decrease in the "pure profits" being
realized. An increase in taxes would also raise average costs. A
similar result would occur if \( p_1 \) falls through shifts in the market
supply and demand schedules. If through market imperfections or public
pricing policies \( p_1 \) is maintained, firms operating to the right of SAC\(_1\)
with larger physical plants are able to realize profits in excess of
normal returns on their investment plus allowance for risk-taking. Con-
sequently, after paying all costs, including taxes, they have a residual
which can be consumed, saved, or privately invested. That is, they
have the financial capability for, among other uses, net private in-
vestment in the firm. Some first can move downward along LRAC until
point B is reached. However, increased private investment may raise
the \( p \) so that the cost curves tend to shift upward.

When TR = TC and the total product is fully imputed to the inputs,
the income distribution pattern relative to the income pq being con-
sidered is also determined. The income is distributed on the basis the
amounts and the productivity of the resources or inputs owned by in-
dividuals. Some of the \( q_j \) in Equation 2.9 represent inputs of family
labor and management and of services from draft animals. The amount of
pq imputed to these inputs represents income to the firm for consumption
purposes and, in the case of management inputs, a return for risk-
taking. Similarly, a portion of \( pq \) is imputed to other inputs owned by the firm such as land and tools which are not included in the \( q_j \) but appear implicitly in \( F \), the implicit production function. For those \( q_j \) obtained from merchant-traders, \( p_j q_j \) of total \( pq \) is paid to these individuals. If these \( q_j \) were obtained on credit, then the effective prices are \( p_j (1 + i) \) and \( p_j q_j \) plus interest must be repaid to the merchant-traders. As the terms of trade to cultivators vary, so does the income distribution within the agricultural sector and among sectors of the economy. Furthermore, creditors are often in a position to effectively force debtors to market their output with them and at a price set by the creditor. For example, if the firm having \( SAC_1 \) in Figure 4.12 produces in terms of \( p_1 \) where \( p_1 \) is either the market price expected to prevail or is even a publicly-supported price, \( Oq_1 \) will be planned production level. If \( Oq_1 \) is realized but the cultivator's creditor pays a price less than \( p_1 \), then \( TR < TC \) and the income imputed to family labor or fixed inputs must be decreased.

In densely-populated areas, land is usually the most limiting production input. For short-run production decisions, land is usually a fixed input to which a residual is imputed after expenditures for the variable inputs have been made. The opportunity cost of the investment in land by owner-operators should be included in the short-run cost curves in Figure 4.12. The capitalized value of this residual to land is one estimation of the value of the land. This residual is also one approximation of the rent value of the land.
Literature Cited


CHAPTER V. RURAL CREDIT INSTITUTIONS

At some point in time, external financing is required by most agriculturalists throughout the world. The factors creating demand for credit are universal: to sustain consumption patterns during periods of falling incomes, to accommodate emergency situations, to finance private investment and production expenses, and to engage in conspicuous consumption. The conditions affecting credit availability and use vary with the size of the firm and the stage of development of the agricultural sector and of the economy, in general. For subsistence-oriented producers, external financing is a means of alleviating the impact of those factors which upset the relatively stable pattern of production and consumption. For these individuals, the need is often so imperative that the terms under which credit is provided is not of immediate importance. The consequences, however, can be of long-term importance. High interest rates and repayment schedules not geared to the debtor's capacity to repay, a capacity which is extremely low for subsistence-oriented producers, put the debtor primarily at the mercy of private lenders. The consequence is often the need to secure additional credit and possible, eventual appropriation of the debtor's assets by the lender. Consequently, providers of funds, whether professional moneylenders, merchants, or landlords, are able to accumulate assets and labor services from the debtor, both which further weaken his bargaining power relative to those exerting influence on his economic and social well-being.

Because of a relatively larger stock of assets and better acumen for engaging in business relationships, the market-oriented producer is
in a somewhat more favorable position that subsistence-oriented producers. Through the bargaining process, the terms of credit granted him are more reflective of the purpose for which the credit is to be used and of his credit worthiness. Yet, smaller, market-oriented producers are subjected to many of the pressures surrounding credit to subsistence-oriented producers. They have a relatively low capacity to save and, therefore, are highly dependent upon external financing.

The owners of large production units such as estates and plantations usually have recourse to the same sources of credit as industrialists and import-export firms. These commercial sources are in a position to provide relatively low-cost credit. Too often, the services of these institutions are not available to smaller producers or are available only on a very limited scale. Foreign-owned enterprises have access to relatively inexpensive capital available from the developed countries. These firms have the collateral, managerial competence, and business contacts permitting them to secure financing on favorable terms.

As a generalized definition, credit may be viewed as a temporary transfer of resources, either in monetary or real form, from those with a relative abundance to those in need of additional resources where the latter, in addition to repaying the initial value of the credit extended, compensate the owner for the use of his resources. This compensation, that is, "interest", assumes a number of forms. It may be monetary or payment in kind, labor services provided by the debtor, or creditors having the use and product from some of the debtor's resources for a limited period of time. In addition to credit in the form of money, credit
in kind is granted as seeds, fertilizers, and tools are advanced by a local merchant, landlord, or cooperative organization. Credit in the form of consumption goods is also usually available from merchants.

As will be examined below, some of the available evidence attests to the irony of this situation. That is, some of those who need credit most are those who are also crucial to the success of stimulating and sustaining growth in the agricultural sector. Yet, they cannot secure the necessary financing on favorable terms. In contrast, large, extensively-farmed estates have access to low-cost credit but are often interested in maintaining existing economic and social relationships. Further, plantations producing export crops generate foreign exchange, but only a relatively small proportion of these earnings are returned as investment in the agricultural sector.

Subsequent to an examination of the data found in the literature and a discussion of the factors affecting the supply-demand conditions for credit in the agricultural sector, concluding statements will be made relative to (1) whether or not the interest rates as reported being paid by cultivators appear to be exorbitant, and (2) the impact of contemporary rural credit institutions on investment decisions and on individual economic and social well-being. The heterogeneity of sources of credit and the terms under which credit is granted greatly complicate an analysis of the operation of credit institutions in less-developed areas. This is further accentuated by the relative lack of empirical evidence on credit operations, especially credit from
private sources.  

Demand for Credit

The necessity and usefulness of credit financing have already been alluded to in the first paragraph. This necessity arises from the fact that wealth is not distributed according to the various capital requirements of individuals engaged in economic activities. In the context of agricultural growth, credit represents the means whereby private investment in improved inputs, to the extent that such inputs are available, provides the potential for shifting the production function upward or for reducing the variability of output realized in any production period. Credit also is necessary to obtain working capital, both in traditional and improved forms, so that the producer can begin cultivation and planting operations.

Credit provides one of the ingredients for transforming the structure of the agricultural sector so that both development and growth can potentially proceed. This longer-term credit may be used for digging wells and expanding irrigation systems. Long-term credit may permit previous tenants to become landowners, thus modifying the tenure structure with potentially favorable effects on private investment and land-use patterns. Also, cooperatives engaged in marketing and input-supplying activities may be financed by private and public funds.

1The credit surveys undertaken in India have provided valuable data for this country. The results of the 1951-52 rural credit survey have been published (5.13). Annual follow-up surveys were undertaken for the years 1956-60.
External credit enables cultivators to weather unexpected contingencies, seasonal discontinuities of income, and crop reductions or failures which in the absence of credit would force cultivators to sell a portion of their productive assets or labor services. Other things being equal, this reduction in productive inputs would tend to reduce future production and, in turn, the producer's capacity to meet annual production and consumption requirements.

The high incidence of credit obtained from private or informal sources, and these lenders' predilection not to keep records nor to divulge the nature of their transactions tend to obscure the reasons for demanding credit and the actual use made of funds provided by creditors. However, determination of the actual use of credit is important in devising credit institutions which can accommodate the needs of borrowers and in assessing the economic efficiency of using one of the scarcer resources in most less-developed areas.

Despite a general reluctance to incur the economic and social onus of debt, the data obtained in the All-India Rural Credit Survey (5.13) indicate that among cultivators and noncultivators, the percent of families borrowing was 58.6 and 38.6, respectively, during the 1951-52 period. In determining the demand for credit, both the number of prospective borrowers and their respective credit requirements must be considered. In addition, the distribution of demand through time has an important bearing on the capacity of credit suppliers to provide the quantities of credit demanded.\textsuperscript{1} Tables 5.1 and 5.2 contain the

\textsuperscript{1}A high proportion of short-term loans gives creditors relatively high liquidity with a capacity to accommodate credit needs as they arise. As will be suggested later, this liquidity is usually associated with higher credit costs to the borrower.
Table 5.1. Frequency distribution of districts according to the proportion of borrowing families among four classes of cultivators in India during 1951-52*

<table>
<thead>
<tr>
<th>Proportion of borrowing families</th>
<th>Number of districts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Big cultivators</td>
</tr>
<tr>
<td>Below 10 percent</td>
<td>-</td>
</tr>
<tr>
<td>10 to 20 percent</td>
<td>3</td>
</tr>
<tr>
<td>20 to 30 percent</td>
<td>1</td>
</tr>
<tr>
<td>30 to 40 percent</td>
<td>7</td>
</tr>
<tr>
<td>40 to 50 percent</td>
<td>18</td>
</tr>
<tr>
<td>50 to 60 percent</td>
<td>13</td>
</tr>
<tr>
<td>60 to 70 percent</td>
<td>15</td>
</tr>
<tr>
<td>70 to 80 percent</td>
<td>12</td>
</tr>
<tr>
<td>80 to 90 percent</td>
<td>6</td>
</tr>
<tr>
<td>90 to 100 percent</td>
<td>--</td>
</tr>
<tr>
<td>Total districts</td>
<td>75</td>
</tr>
</tbody>
</table>

*Source: Jakhade (5.7, Table II.).
Table 5.2. Frequency distribution of districts according to average size of borrowing among four classes of cultivators in India during 1951-52*

<table>
<thead>
<tr>
<th>Average size of borrowing</th>
<th>Big cultivators</th>
<th>Large cultivators</th>
<th>Medium cultivators</th>
<th>Small cultivators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per family</td>
<td>Per family</td>
<td>Per family</td>
<td>Per family</td>
</tr>
<tr>
<td>Nil</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Below Rs. 100</td>
<td>5</td>
<td>5</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Rs. 100 - 200</td>
<td>8</td>
<td>17</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>Rs. 200 - 300</td>
<td>13</td>
<td>14</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Rs. 300 - 400</td>
<td>6</td>
<td>13</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Rs. 400 - 500</td>
<td>10</td>
<td>10</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Rs. 500 - 600</td>
<td>12</td>
<td>8</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>Rs. 600 - 700</td>
<td>5</td>
<td>2</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>Rs. 700 - 800</td>
<td>2</td>
<td>--</td>
<td>7</td>
<td>--</td>
</tr>
<tr>
<td>Rs. 800 - 900</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>Rs. 900 - 1000</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Rs. 1000 - 2000</td>
<td>8</td>
<td>2</td>
<td>9</td>
<td>--</td>
</tr>
<tr>
<td>Rs. 2000 and above</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total districts</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>

*Source: Jakhade (5.7, Table IV.).
frequency distributions for the number of borrowing families and the amount borrowed for four classes of cultivators, respectively.

According to Table 5.1, the percentage distribution of borrowers is not markedly different for the four classes of cultivators. The overall borrowing rates further substantiate this. The percent of families borrowing in all districts was 57 percent for the "big" cultivators, 59 percent for the "large" cultivators, and 61 and 55 percent for "medium" and "small" cultivators, respectively (5.7, p. 254).

Table 5.2 indicates a positive association between the size of the farming operation and the amount borrowed. "Small" cultivators borrow or are restricted to borrowing in relatively small amounts. This does not suggest, however, that small cultivators do not have need for or could use larger quantities of credit. "Big" cultivators not only have the collateral for securing large loans, but they would also be expected to require larger amounts for investment and working capital. This is borne out in Table 5.3 where capital and current expenditure on farms are positively associated with farm size while family or consumption expenditures have an inverse association with farm size. Nearly 60 percent of the credit obtained by small cultivators was reported as

1Within each village, cultivating families were ranked in descending order by the size of cultivated holding into ten deciles of approximately equal numbers of families. For the village sample, two families from each of the first five deciles and one family from each of the last five deciles were randomly selected. At the district level, the deciles were grouped into three categories. The "large", "medium", and "small" cultivator categories represent the first three, the middle four, and the last three deciles, respectively. The "big" cultivator category is a subset of the "large" and represents only the first decile. Where the "upper and lower strata" terms are used, they represent the first five and last five deciles, respectively (5.13).
Table 5.3. Percentage distribution of borrowing according to purpose among four classes of cultivators in India during 1951-52*

<table>
<thead>
<tr>
<th>Purpose of borrowing</th>
<th>Big cultivators</th>
<th>Large cultivators</th>
<th>Medium cultivators</th>
<th>Small cultivators</th>
<th>All cultivators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Percent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital expenditure on farm</td>
<td>35.5</td>
<td>34.7</td>
<td>30.5</td>
<td>23.2</td>
<td>31.5</td>
</tr>
<tr>
<td>Current expenditure on farm</td>
<td>13.3</td>
<td>12.1</td>
<td>10.1</td>
<td>6.8</td>
<td>10.6</td>
</tr>
<tr>
<td>Non-farm business expenditure</td>
<td>6.4</td>
<td>4.9</td>
<td>3.3</td>
<td>6.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Family expenditure</td>
<td>37.2</td>
<td>41.2</td>
<td>49.5</td>
<td>59.8</td>
<td>46.9</td>
</tr>
<tr>
<td>Other expenditure</td>
<td>7.2</td>
<td>6.6</td>
<td>6.0</td>
<td>3.9</td>
<td>6.0</td>
</tr>
<tr>
<td>More than one purpose</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Total*</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>(Percent)</td>
<td>(25.2)</td>
<td>(51.1)</td>
<td>(33.0)</td>
<td>(15.9)</td>
<td></td>
</tr>
</tbody>
</table>

*Figures in brackets represent the percent of total borrowings accounted for by each class of cultivator.

*Source: All-India Rural Credit Survey II (5.13, p. 293).
being used for family expenditures. This likely reflects the relatively low incomes and cash reserves of these individuals and their seasonality of income. Larger producers have more opportunities to diversify farm enterprises and to receive a more even flow of income throughout the year.

The distribution between short- and long-term loans for alternative purposes is given by Table 5.6. Considering average borrowings for agricultural uses, about two-thirds of the credit was obtained on a long-term basis and the remaining one-third was considered to be of a short-term nature. In comparison, average borrowings for consumption were nearly evenly divided between short- and long-term arrangements. The amounts borrowed for other uses were relatively unimportant. Again, it should be kept in mind that these data are those reported for 1951-52 only.

Prior to examining some estimates of demand elasticities, estimates which are not disaggregated according to purpose of borrowing, an intuitive discussion of the nature of the demand curves for the major uses of credit is presented. In Figure 5.1, demand curve $D_1D_1$ is drawn to reflect a low responsiveness of credit demand to changes in the interest rate. Curve $D_1D_1$ is appropriate for small-scale cultivators borrowing for short-term consumption expenditures and for financing working expenses necessary for planting and cultivation of

---

1 The interest elasticity of demand varies with points on the demand curve. Thus, low responsiveness does not imply an inelastic demand. Rather, incremental changes in interest rates are associated with less-than-proportional changes in quantities of credit.
crops. Curve $D_2D_2$ may be appropriate for a different class of consumption expenditures. These are, for example, marriages and other social events where social pressure may motivate borrowers to expend at least a minimum outlay, which is assumed to require $C_m$ of credit. Beyond this level, however, the amount borrowed in order to increase the lavishness of the event is more responsive to changes in the interest rate (5.6). The credit demand function for consumption expenditures is implicitly summarized in Equation 5.1 where $i =$ effective interest rate, $R =$ cash reserves or stocks of saleable commodities, $C =$ consumption to meet physiological requirements, and $S =$ social pressures influencing consumption patterns.

$$D_c = D_c(i, R, C, S) \quad (5.1)$$

The weights attached to the independent variables differ with different consumption objectives. For $D_1D_1$, $R$ and $C$ assume importance while $i$ and especially $S$ have only a secondary impact. Conversely, for $D_2D_2$, $i$ and $S$ are of much greater importance. For large-scale cultivators, those with more assets and presumably higher reserves, both the shape and position of the demand curves in Figure 5.1 will be different from those specified.

An implicit demand function for credit to be used as working capital is given in Equation 5.2. The $p_i/p_j$ ratio reflects the product-

1 An important policy consideration should be apparent. With a demand curve such as $D_1D_1$, the borrower's need is so imperative that the price or interest rate is of secondary importance. This, juxtaposed with private lenders' monopolistic or oligopolistic powers, suggests that lenders are in a favorable position to exploit borrowers by charging higher than justified interest rates. That is, they can readily shift their supply schedules to individual borrowers to the left and exact higher interest rates.
input price relationships which condition the profitability of using the j production

\[ D_w = D_w(i, p_i/p_j, MPP^w) \]  

(5.2)

inputs. The term \( MPP^w \) is a proxy for the MPP of the j inputs purchasable with the producer's working capital. The cost of securing credit, \( i \), can be added to \( p_j \) so that the purchase price plus interest costs represent the total cost of acquiring inputs through external financing. The demand curve for a single input is identical to that in Figure 3.1. The input j can profitably be used in the production of output i up to the point where the \( MVP^i_j = p_i \cdot MPP^i_j = p_j \) where credit costs are included in \( p_j \). For two inputs, Figure 2.3 is appropriate.

Figure 5.2 is used to demonstrate the demand for credit for medium- and long-term investments in individual farming operations. The demand curve for capital which represents the optimum capital stock at each rate of interest is defined in terms of that level of cost for capital goods or services which would be operative if net investment were zero. This cost level is denoted as \( r \) in Panel c. In Panel a, points of optimum capital stock are represented by the marginal efficiency of capital curve, MEC. Each point on the MEC reflects expected net yields associated with the various levels of capital. The downward slope results from diminishing returns to additional increments of capital when replacement cost of capital amounts to \( r \).

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\(^1\) For a more comprehensive discussion of Figure 5.2, see Shapiro (5.16), pp. 249-261. The macro-economic formulation he describes is adapted here to represent private investment decisions.
Figure 5.1. Demand schedules for short-term credit to meet consumption expenditures

Figure 5.2. Derivation of demand for investment goods when secured through external financing
The initial capital position is postulated as $K_o$. Capital has been added to the point where MEC is equal to the prevailing interest rate, $i_o$. Panel b contains the marginal efficiency of investment curves associated with alternative capital positions. For example, $(K_o)$ represents the net returns to increments of investment added to capital stock $K_o$. The MEI curves slope downward for two reasons: (1) Diminishing returns are associated with increments of investment to the previous capital stock; and (2) The supply curve of capital or investment goods to the individual investor slopes upward. The supply curve, $S'S'$, is drawn to reflect not only the acquisition costs of capital goods which are assumed to be constant to the individual investor but also the additional costs of financing the purchase of these goods through the use of credit. Assuming that credit costs increase with additional amounts borrowed, $S'S'$ is an upward-sloping supply function.\(^1\) This is assumed due to higher opportunity costs and additional risk associated with larger quantities of credit provided. These factors should be partially offset by lower administrative costs associated with loans of larger amounts.

Let some exogenous change occur which causes MEC$^o$ to shift to MEC$^1$. This might occur as a result of a change in the tenure arrangement, a newly-initiated government program of price supports or public investment in irrigation systems, or any other number of factors. The new

\(^1\)Whether the supply curve $S'S'$ is linear or curvilinear, the rate at which it slopes upward, and the range throughout which it exists for individual borrowers are empirical questions. The assumption that the cost of investment goods, exclusive of interest charges, is constant is invalid when several investors are considered.
optimal capital position is $K^* > K_o$ where $K_o$ is the initial position. The corresponding MEI curve is now $(K_o')$. In the first time period, investment is undertaken to point $I_1$, the new temporary equilibrium, where MEI equals $i_o$. This amount of investment is added to $K_o$ and a new capital stock of, for example, $K_1$ is obtained. However, this is still short of $K^*$, the desired capital stock. Another MEI curve corresponding to $K_1$ is drawn and investment amounting to $I_2$ is made in period two. This process is repeated until sufficient investment is made so that $K^*$ is realized. As is apparent, the rate of investment declines as successive additions to the capital stock are made.

The credit demand function for investment goods necessary to attain the optimum stock of capital is implicitly represented by Equation 5.3. The term $D_t^t$ represents the demand for credit to finance payment of investment goods in period $t$, $(K^* - K_t)$ is the disequilibrium in optimal capital position, $p_I$ is the total acquisition cost of capital or investment goods, and $T$ represents an allowance for technological change.

$$D_t^t = D_t[i, MEC, (K^* - K_t), p_I, T]$$ (5.3)

Some variations in the credit supply curve which have differential impacts on the rate of investment and on the length of time necessary to reach $K^*$ can be postulated. For example, the debt incurred in investing $I_1$ may make the borrower a higher risk. The lender may then be motivated to alter the credit supply curve for period two, for example, $S'S'$ rotates about point $S'$ in a counter-clockwise direction. This results in $MEI(K_1)$ having a higher slope and, in turn, investment in period two is less than $I_2$. To the extent that this occurs in period two and
subsequent periods, more time elapses before $K^*$ is reached. A variation with an opposite consequence might be the following: the borrower's credit worthiness is increased by some agency guaranteeing repayment of his loan. Instead of facing $S'$, the credit supply curve rotates about $S'$ in a clockwise manner so that investment in each time period is augmented and $K^*$ is reached in a shorter period of time. In all of the above discussion related to Figure 5.2, it has been implicitly assumed that the only changes occurring are those which have been postulated. In reality, the shift in the NEC curve may also affect the shape and position of the $S'S$ curve. Furthermore, changes in the interest rate alter optimum capital positions and the amount of investment that can be profitably added during each time period.

Estimates of demand elasticities for credit have been calculated for Indian cultivators based on the data obtained in the 1951-52 rural credit survey and follow-up surveys undertaken during 1956-60 (5.12).\(^1\) Several tables are included in the study; only two are presented for consideration here. Table 5.4 is a composite of the derived marginal propensities to borrow and the estimated demand elasticities associated with various combinations of the independent variables.

\(^1\)Pani (5.12) used simple least squares techniques in deriving regression coefficients. The statistical model employed was $\text{Credit} = a_0 + a_1R + a_2C + a_3F + a_4A + u$ where the independent variables are average rate of interest, capital expenditure on farm, family expenditure on selected items, and average value of selected assets, respectively; $u$ is the error term. Pani discusses the limitations of his study on pp. 187-188 and concludes that "The results have been interpreted more on their consistency rather than their statistical inference" (5.12, p. 188).
Table 5.4. Marginal propensities to borrow and derived elasticities for credit demand among Indian cultivators for two time periods**

<table>
<thead>
<tr>
<th>Marginal propensity to borrow in Rs. with respect to changes in</th>
<th>Average interest rate (percent per annum)</th>
<th>Family expenditure on capital expenditure on selected farm (Rs.) items (Rs.)</th>
<th>Value of selected assets (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1951-52 (75 districts):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 72.35</td>
<td>- 4.43</td>
<td>+ 0.74</td>
<td>+ 0.16</td>
</tr>
<tr>
<td></td>
<td>(1.84)</td>
<td>(0.14)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>+ 71.99</td>
<td>- 4.52</td>
<td>+ 0.78</td>
<td>+ 0.19</td>
</tr>
<tr>
<td></td>
<td>(1.83)</td>
<td>(0.13)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>+ 127.29</td>
<td>- 4.94</td>
<td>+ 0.93</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(1.87)</td>
<td>(0.12)</td>
<td></td>
</tr>
<tr>
<td>+ 395.91</td>
<td>- 9.63</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(2.42)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 11.37</td>
<td></td>
<td>+ 1.02</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.11)</td>
<td></td>
</tr>
<tr>
<td><strong>1956-60 (36 districts):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 79.52</td>
<td>- 4.04</td>
<td>+ 0.63</td>
<td>+ 0.22</td>
</tr>
<tr>
<td></td>
<td>(2.80)</td>
<td>(0.22)</td>
<td>(0.15)</td>
</tr>
<tr>
<td>+ 79.14</td>
<td>- 4.00</td>
<td>+ 0.65</td>
<td>+ 0.22</td>
</tr>
<tr>
<td></td>
<td>(2.74)</td>
<td>(0.19)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>+ 109.78</td>
<td>- 2.64</td>
<td>+ 0.87</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(2.63)</td>
<td>(0.13)</td>
<td></td>
</tr>
<tr>
<td>+ 452.69</td>
<td>-11.81</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(3.43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 52.81</td>
<td></td>
<td>+ 0.94</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.11)</td>
<td></td>
</tr>
</tbody>
</table>

*The average interest rate is exclusive of loans at the "nil" rate of interest.

*Variable not included in the equation. Figures in parentheses are standard errors of the coefficients.

**Source: Pani (5.12, Table 9).
<table>
<thead>
<tr>
<th>Multiple or simple correlation</th>
<th>Elasticity at average level with respect to changes in</th>
<th>Family expenditure on selected items</th>
<th>Average value of selected assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R$ or $r$</td>
<td>Average rate of interest</td>
<td>Capital expenditure on farm</td>
<td>Assets</td>
</tr>
<tr>
<td>+ 0.77</td>
<td>- 0.43</td>
<td>+ 0.68</td>
<td>+ 0.29</td>
</tr>
<tr>
<td>+ 0.77</td>
<td>- 0.43</td>
<td>+ 0.72</td>
<td>+ 0.36</td>
</tr>
<tr>
<td>+ 0.75</td>
<td>- 0.47</td>
<td>+ 0.86</td>
<td>*</td>
</tr>
<tr>
<td>- 0.42</td>
<td>- 0.93</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>+ 0.72</td>
<td>*</td>
<td>+ 0.94</td>
<td>*</td>
</tr>
<tr>
<td>+ 0.84</td>
<td>- 0.25</td>
<td>+ 0.54</td>
<td>+ 0.39</td>
</tr>
<tr>
<td>+ 0.84</td>
<td>- 0.24</td>
<td>+ 0.55</td>
<td>+ 0.39</td>
</tr>
<tr>
<td>+ 0.83</td>
<td>- 0.16</td>
<td>+ 0.74</td>
<td>*</td>
</tr>
<tr>
<td>- 0.50</td>
<td>- 0.72</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>+ 0.82</td>
<td>*</td>
<td>+ 0.80</td>
<td>*</td>
</tr>
</tbody>
</table>
The derived credit demand equations when all four independent variables are included are given in Equations 5.4 and 5.5 which correspond to the 1951-52 and 1956-60 data, respectively. Considering Equation 5.4, a one percent decline in the average interest rate, ceteris paribus, is estimated to increase borrowings by about 4.4 rupees. Similarly, if only capital expenditure is increased by 100 rupees, the amount borrowed is estimated to increase by 74 rupees. An increase in family expenditures by 100 rupees, with the values of other variables unchanged, is associated with an increase in borrowing by 16 rupees. The variable denoting "value of selected assets" has only a negligible effect on the marginal propensity to borrow. The marginal propensities to borrow derived from the 1956-60 data are of the same general magnitude as those in Equation 5.4. Borrowers, however, were expected to be somewhat less responsive to changes in capital expenditures and slightly more responsive to changes in family expenditures.

\[
\text{Credit} = 72.35 - 4.43(R) + 0.74(C) + 0.16(F) + 0.004(A) \quad (5.4)
\]

\[
\text{Credit} = 79.52 - 4.04(R) + 0.63(C) + 0.22(F) + 0.001(A) \quad (5.5)
\]

The derived demand elasticities in Table 5.4 have the expected signs. Based on the 1951-52 data when all independent variables are included in the regression equation, a reduction in the average rate of interest by one percent, ceteris paribus, is associated with and increase in credit borrowed by .43 percent. If capital expenditures on the farm increase by ten percent, borrowings are estimated to increase by 6.8 percent. In comparison to these estimates, the demand elasticities based on the 1956-60 data are all lower except for family expenditures on selected items. Thus, with the exception of family ex-
penditures, credit demand had become less responsive to changes in the selected variables. Pani does not attempt an interpretation of this. Cultivators in the later period may have been in a relatively poorer economic position so that more credit was necessary for consumption expenditures, and the interest rate was less important in meeting these and other expenditures.

The amount of variation explained by the independent variables is obtained by squaring R or r. The fit for the 1956-60 data is somewhat better; i.e., about .71 as compared with .59 for the 1951-52 data. As family expenditures and average value of selected assets are omitted from the equations, the coefficients of determination, \( r^2 \), are essentially unchanged. That is, these variables had little effect in explaining the variation in credit or amounts borrowed, the dependent variable.

The demand elasticities associated with subgroups of cultivators are given in Table 5.5. For the 1951-52 data, the interest elasticity of demand was much lower for the bottom fifty percent as compared with the top half. That is, the average interest rate is a relatively less important factor in determining the amount of credit borrowed for the lower half of the cultivators. The respective interest elasticities derived for the subgroups of cultivators in the 1956-60 surveys are more difficult to interpret. The interest elasticities for the last two groups would be expected to be lower than for the top ten or thirty percent of cultivators.\(^1\) Looking at the 1956-60 portion of Table 5.5,

---

\(^1\)Pani's only comment is that "This divergence is possible due to the fact that compared to the level of credit operations the marginal changes in loans are small in the case of the top group of cultivators" (5.12, p. 197).
Table 5.5. Elasticities of credit demand among Indian cultivators, classified according to decile, for two time periods *

<table>
<thead>
<tr>
<th>Period/subgroup of cultivators</th>
<th>Average interest rate&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Capital expenditure on farm</th>
<th>Total expenditure on selected items</th>
<th>Value of selected assets</th>
<th>Total expenditures (3 + 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top fifty percent</td>
<td>-0.51</td>
<td>+0.71</td>
<td>+0.28</td>
<td>+0.09</td>
<td>+0.99</td>
</tr>
<tr>
<td>Bottom fifty percent</td>
<td>-0.10</td>
<td>+0.62</td>
<td>+0.34</td>
<td>+0.11</td>
<td>+0.96</td>
</tr>
<tr>
<td>1956-60:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top ten percent</td>
<td>-0.15</td>
<td>+0.82</td>
<td>+0.12</td>
<td>-0.04</td>
<td>+0.94</td>
</tr>
<tr>
<td>Top thirty percent</td>
<td>-0.10</td>
<td>+0.88</td>
<td>+0.02</td>
<td>-0.01</td>
<td>+0.90</td>
</tr>
<tr>
<td>Middle forty percent</td>
<td>-0.39</td>
<td>+0.08</td>
<td>+0.91</td>
<td>-0.11</td>
<td>+0.99</td>
</tr>
<tr>
<td>Bottom thirty percent</td>
<td>-0.25</td>
<td>+0.05</td>
<td>+0.88</td>
<td>-0.02</td>
<td>+0.93</td>
</tr>
</tbody>
</table>

<sup>a</sup>The average interest rate is exclusive of loans at the "nil" rate of interest.

*Source: Pani (2, Table 14).
credit demand by the top two subgroups is quite responsive to changes in capital expenditures on the farm. In contrast, credit demand by the lower two subgroups; that is, those in relatively poor economic positions, is essentially unaffected by capital expenditures. Conversely, family expenditures are very important in affecting the credit demand of these economically less-"well-off" cultivators as compared with the top ten and thirty percent of cultivators.

Sources of Credit

Perhaps the best term to characterize sources of credit in less-developed areas is that they are heterogenous--heterogenous in their objectives associated with supplying credit, in the terms under which credit is offered, and in the nature of attendant services provided by creditors. Alternative sources often range from credit provided by relatives with low or no interest being paid to closely-supervised credit offered by agricultural banks or government-regulated marketing cooperatives requiring payment of interest. This variability complicates the design and implementation of public programs to effectively regulate and supplement private sources of credit.

Table 5.6 is a summarization of the data collected for 1951-52 in the All-India Rural Credit Survey (5.13). "Organized" or public sources; that is, government and commercial banks provided only 3.2 percent of the reported amount borrowed. On the other hand, moneylenders represented the most important source of credit, providing nearly two-thirds of the average amount borrowed per family. Slightly over 10 percent was furnished by relatives. In addition, moneylenders were the source of the
Table 5.6. Average borrowing of Indian cultivators and percentage distribution according to source of credit for 1951-52, classified according to purpose and source**

<table>
<thead>
<tr>
<th>Credit agency</th>
<th>Purpose</th>
<th>Total*</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount</td>
<td>Percent</td>
<td>Amount</td>
<td>Percent</td>
<td>Amount</td>
<td>Percent</td>
</tr>
<tr>
<td>Government</td>
<td></td>
<td>5.2</td>
<td>2.7</td>
<td>0.7</td>
<td>2.8</td>
<td>3.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Cooperatives</td>
<td></td>
<td>6.2</td>
<td>3.2</td>
<td>2.8</td>
<td>11.3</td>
<td>1.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Relatives</td>
<td></td>
<td>22.4</td>
<td>11.8</td>
<td>1.9</td>
<td>7.5</td>
<td>6.7</td>
<td>13.1</td>
</tr>
<tr>
<td>Landlords</td>
<td></td>
<td>4.2</td>
<td>2.2</td>
<td>0.5</td>
<td>2.1</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Agriculturist moneylenders</td>
<td></td>
<td>63.3</td>
<td>33.2</td>
<td>8.4</td>
<td>34.1</td>
<td>19.9</td>
<td>38.7</td>
</tr>
<tr>
<td>Professional moneylenders</td>
<td></td>
<td>61.8</td>
<td>32.4</td>
<td>6.2</td>
<td>25.1</td>
<td>12.0</td>
<td>23.3</td>
</tr>
<tr>
<td>Traders and commission agents</td>
<td></td>
<td>16.3</td>
<td>8.5</td>
<td>2.5</td>
<td>10.1</td>
<td>4.4</td>
<td>8.6</td>
</tr>
<tr>
<td>Commercial banks</td>
<td></td>
<td>1.0</td>
<td>0.5</td>
<td>0.4</td>
<td>1.7</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>10.6</td>
<td>5.5</td>
<td>1.3</td>
<td>5.3</td>
<td>2.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>191.0</td>
<td>100.0</td>
<td>24.8</td>
<td>100.0</td>
<td>51.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Includes "others".

**Source: Jakhade (5.7, Table X).
<table>
<thead>
<tr>
<th>Purpose</th>
<th>Non-agricultural</th>
<th>Consumption</th>
<th>Repayments of old debts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-term Am-</td>
<td>Long-term Am-</td>
<td>Short-term Am-</td>
</tr>
<tr>
<td></td>
<td>count</td>
<td>Per-</td>
<td>count</td>
</tr>
<tr>
<td>--</td>
<td>--</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.8</td>
</tr>
<tr>
<td>--</td>
<td>1.4</td>
<td>0.5</td>
<td>5.3</td>
</tr>
<tr>
<td>--</td>
<td>1.8</td>
<td>--</td>
<td>0.8</td>
</tr>
<tr>
<td>0.6</td>
<td>25.2</td>
<td>0.4</td>
<td>6.2</td>
</tr>
<tr>
<td>0.5</td>
<td>22.9</td>
<td>5.6</td>
<td>84.1</td>
</tr>
<tr>
<td>0.3</td>
<td>15.6</td>
<td>0.1</td>
<td>1.7</td>
</tr>
<tr>
<td>--</td>
<td>1.8</td>
<td>--</td>
<td>0.2</td>
</tr>
<tr>
<td>0.7</td>
<td>30.8</td>
<td>--</td>
<td>0.2</td>
</tr>
<tr>
<td>2.2</td>
<td>100.0</td>
<td>6.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>
largest loans obtained, both on a short- and long-term basis. The amounts provided by the "organized" credit market were not substantial.

In the case of agriculturalists in Chile, an estimated 30 percent of the total rural population obtains credit from state financial institutions, reform agencies, and private commercial banks. The remaining 70 percent only have access to the "unorganized" or informal sources (5.11). In a survey of 200 Chilean farmers, 45 percent reported that they participated in the "organized" or formal credit market, 44 percent in the informal market, and 25 percent reported no borrowing. Some of those obtaining credit had access to both markets. Nisbet (5.11) points out that the percent borrowing in the formal market was higher than the estimated national average because the survey was conducted in Central Chile where agriculture is relatively commercialized, and farmers have easy access to the formal credit market. A monetized economy with commercialized agriculture not only generates a need for larger quantities of credit but because of a larger volume of marketing and investment activities, more or larger financial institutions can be supported. A causal relationship is not necessarily implied, however. The establishment and operation of these institutions may have been instrumental in commercializing the area through granting credit for consumption and production needs on terms favorable to expanding production and increasing incomes. Thus, agricultural growth on a commercialized basis and expansion of credit facilities are likely mutually reinforcing.

As will subsequently be noted, the scope and operation of credit institutions, both public and private, have important consequences for the
growth and development of the agricultural sector. Since the amount of credit provided by the "organized" or public sector is relatively low, attention will primarily be directed toward the organization and operation of the private or "unorganized" suppliers of credit such as landlords, professional moneylenders, merchants, and relatives. The volume of loans provided by commercial institutions at relatively low rates is small largely because the majority of agriculturalists have limited amounts of assets which do not provide adequate collateral for securing loans at low interest rates (5.13, 5.17). In addition, commercial banks have few offices in rural areas. The expense associated with traveling to bank locations, the relatively-detailed procedures required to apply for a loan, and a wary attitude toward these institutions motive agriculturalists to rely primarily on local sources of credit.¹

¹In some areas, particular cultural attributes generate special sources of credit. According to Islamic doctrine, usury is prohibited, and the explicit charging of interest is viewed as a usurious practice. In Afghanistan, Hassana is altruistic form of lending with no interest charged on the loans (5.8). However, during prolonged periods of economic adversity, the capacity and willingness to provide funds to one's compatriots declines as individuals become more concerned with their own well-being. Even when loans at zero interest are made, collateral is frequently required. The lender often has the right to the product from the mortgaged property which in any average year would exceed the amount of "reasonable" interest charges if such interest were levied. The term of the loan, unless otherwise specified, is indefinite. In Chore, Ethiopia, informal mutual aid organizations are operative. For example, the eder is an organization which provides financial assistance to member households in cases of death or adversity. The egub is an informal small savings association to which members make regular contributions. The order in which members have access to the amounts collected is determined by lot (5.9).
Lenders' objectives

The classification of lenders in less-developed areas is somewhat arbitrary; however, the principal categories are reflected in Table 5.6. If a survey of lenders' objectives were undertaken, the results would likely indicate that the objective of private moneylenders, other than relatives, was to "earn a fair return" on credit advanced while relatives would likely indicate humanitarian motives with no monetary or real "return" paid to them. It is not always possible to impute objectives from the terms of credit or the longer-term consequences of lending activities. For example, high interest rates need not imply exorbitant or excessive returns. Also, repayment default and appropriation of a part of the debtor's assets do not necessarily support the conclusion that the lender geared credit terms not to the debtor's repayment capacity but so as to increase the likelihood of debtor default. Finally, even though no interest may be stipulated on a loan from a friend or relative, repayment in kind can result in an implicit interest rate being realized when prices are variable. Similarly, according to legislation or bank charters, public institutions may have the stated objective of meeting credit needs of agriculturalists, especially smaller cultivators, as a means of promoting general agricultural expansion. In fact, however, small cultivators are often not able to provide the collateral or credit references to satisfy requirements for credit worthiness. In other cases, political patronage replaces need and productivity considerations in the distribution of available funds.
The following section will cite a number of situations where the opportunity to inflate interest costs above a "fair" or "normal" return exists. Whether these opportunities are exploited and whether lenders have objectives pernicious to the economic and social well-being of agriculturalists is an empirical question. Such a question cannot be answered with nonempirical arguments.

Terms of credit

The terms of credit are the principal factors which determine the rationing or distribution of available funds. If the credit market operated perfectly, funds would be distributed, both spatially and temporally, according to their highest uses. The term structure of interest rates would reflect productivity and risk considerations, and interest rates would guide and determine the movement of funds among sectors of the economy and into short- and long-term employments. As will be discussed below, the magnitude and permanence of credit market

---

1 If the credit market operated perfectly, credit would be allocated according to the prices or interest rates borrowers would be willing to pay; i.e., borrowers realizing high returns would be willing to pay high rates. But, such returns are conditioned by resource distribution and, in turn, income distribution. Those cultivators with the largest resource bases perhaps also realize the highest returns from the use of credit because they have the necessary complementary resources. They also have the highest capacity to repay and, hence, can afford to pay high interest rates. However, the rates they pay are relatively low. To the extent this is true, smaller cultivators, relying primarily on traditional inputs which yield relatively low returns, are in a weak competitive position to obtain funds. Unless they have access to improved inputs, any gains generated by the development processes largely bypass them. In this connection, highest uses are also influenced by the degree of efficiency in other markets. Even if the input market operates well and a producer has access to inputs which increase his physical product, the economic returns from investment may be low if adequate transportation and marketing outlets are not available. In addition, returns are affected by the amount and accuracy of information producers have relative to market conditions, both for inputs and outputs.
imperfections inhibit the growth and development processes which less-developed areas plan and hope to achieve.

The interest rates paid by borrowers reflect the terms of credit. Small, short-term loans for consumption purposes are available at relatively high rates of interest; that is, relative to medium- and long-term loans of larger amounts for productive investment. In addition to the size and purpose of the loan, a number of other factors affect the structure of interest rates: (1) The availability of collateral to secure loans; (2) The supply and demand conditions which generate fluctuations in interest rates; (3) The opportunity costs of lending funds to agriculturalists; (4) The objectives and degree of competitiveness among the lenders; and (5) The number of services provided by the lender such as the marketing of produce and the retailing of producer and consumer goods. These factors were summarized in Equation 2.53.

Figures 5.3 and 5.4 represent a geometrical determination of the interest rate charged a hypothetical borrower. Figure 5.3 denotes a three-dimensional credit supply surface where the quantity supplied is a function of the interest rate and the discount factor. The interest rate increases with successive movements to the left of the origin. Conversely, the discount factor, d, decreases with movements to the right of the origin. The isoquant $C_0$ represents combinations of i and d for which the amount of credit supplied is invariant. That is, a high d is compensated for by a high i; when d is low, the creditor is

\footnote{For a description of the discount factor, see the discussion relating to Equation 2.54.}
willing to lend at a relatively low \( i \). A two-dimensional demand curve, \( D_1 \), is superimposed, reflecting that quantity demanded varies with the interest rate. If the demand schedule is tangent to the credit supply surface at point \( A \), \( i_4 \) is charged for quantity \( AB \) of credit. If the demand schedule shifts to \( D_2 \) so that more is demanded at each \( i \), the interest rate increases to \( i_6 \) and the discount factor increases to \( d_6 \). The higher discount factor reflects the situation that a previous portion of debt \( AB \) has not been repaid or the borrower's collateral is not sufficient to provide additional credit at \( i_4 \). In short, the borrower's credit worthiness has declined.

Figure 5.4 is a two-dimensional representation of the determination of \( i \) where the credit supply curves are derived from Figure 5.3. The demand curves are drawn fairly steeply indicating that the quantity demanded is not highly responsive to changes in \( i \). The supply schedules are drawn to indicate that additional increments of credit are supplied only at proportionately higher rates of interest. With the shifts in the two schedules resulting from a rightward movement of the demand schedule, the interest rate is increased to \( i_6 \). The increase from \( i_4 \) is decomposable into that due to the shift in demand and that generated by the increased risk associated with the increments in credit supplied. The amounts \( OC_1 \) and \( OC_2 \) are equivalent to \( AB \) and \( A'B' \), respectively, in Figure 5.3. The generalized formulation is \( D(i^o) = S(i^o) \) where \( i^o \) is the equilibrium rate of interest. The equilibrium rate varies with the source of credit.

1If the demand curves in Figure 5.4 are assumed to be for consumption expenditures, the stock-flow problem resolved in Figure 5.2 is not encountered here.
Figure 5.3. Credit supply surface and interest rate determination for individual borrower

Figure 5.4. Credit supply schedule and interest rate determination for individual borrower
In addition to the factors determining $i$ in Figures 5.3 and 5.4, lenders often raise the effective interest rate by hidden charges and unscrupulous practices such as the following (5.1, 5.12, 5.18):

1. Deducting the interest charge at the time the loan is made or deducting a premium with interest to be paid on the full amount requested;

2. Demanding repayment in kind and undervaluing the commodity used for repayment at a price much lower than that likely to be in effect at harvest time $^1$ (5.1, 5.11, 5.18);

3. Overpricing commodities when credit in kind is provided. This applies not only to fertilizers, seeds, and tools, but also to consumer goods;

4. Demanding labor services, for example, by landlords providing credit to tenants, in addition to payment of interest; and

5. Keeping improper records and not giving receipts so that the principal repaid is in excess of that borrowed. This applies to both monetary credit and credit in kind and is easily effected when borrowers have low levels of literacy.

As mentioned earlier, the informal nature of supplying funds by private lenders greatly complicates the determination of interest rates actually charged. Table 5.7 gives a tabulation of reported rates for selected countries. Wai (5.18) estimates that in the majority of countries, the weighted average rate of interest in the "unorganized" credit market varies between 24 and 36 percent per annum.

$^1$The lender stands to realize even greater returns during inflationary periods. Not only does he gain through the lower price he pays, he gains as the commodities paid to him as "interest" appreciate in value.
Table 5.7. Annual rates of interest charged by moneylenders in selected countries classified according to frequency of occurrence a, b, *

<table>
<thead>
<tr>
<th></th>
<th>Lower exceptional b</th>
<th>Usual b</th>
<th>Occasional b</th>
<th>Higher exceptional b</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFRICA:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td>45</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
</tr>
<tr>
<td><strong>ASIA:</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(1)</td>
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<td>24-36</td>
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<td>400-1800</td>
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<tr>
<td>(2)</td>
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<tr>
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</tr>
<tr>
<td>(2)</td>
<td>6</td>
<td>6-18</td>
<td>18 and above</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>10-15</td>
<td>17-20</td>
<td>27-36</td>
<td>50</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
<td></td>
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<td>600</td>
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<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>20-30</td>
<td>40 and above</td>
<td>100-200 and</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>24-36</td>
<td>72-96</td>
<td>300-400</td>
<td></td>
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<td>India</td>
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<td></td>
</tr>
<tr>
<td>(1)</td>
<td>12-50</td>
<td></td>
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<tr>
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<td>25-50</td>
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<td></td>
</tr>
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<td>500-600</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
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</tr>
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<td></td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Data refer to postwar years unless otherwise indicated in the section, "Descriptive Notes and Sources of Data, by Area", given in (5.18, pp. 141-142).

b "The usual rate is that at which more than half of the total loans of moneylenders are granted, while the occasional rate refers to loans constituting from 10 to 20 per cent of the total. The lower and higher exceptional rates refer to loans constituting less than 5 per cent of the total loans granted" (5.18, p. 102). Multiple reports for a given country denote alternative sources of data.

* Source: Wai (5.18, Table 11).
Table 5.7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Lower exceptional&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Usual&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Occasional&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Higher exceptional&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>30</td>
<td></td>
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<tr>
<td>(2)</td>
<td>25-30</td>
<td></td>
<td>150</td>
<td></td>
</tr>
<tr>
<td><strong>Philippines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>60-200</td>
<td></td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>25-30</td>
<td>100-200</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>20</td>
<td></td>
<td>300</td>
<td></td>
</tr>
<tr>
<td><strong>Thailand</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>36</td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>18 and below</td>
<td>25-30</td>
<td>40-60</td>
<td>92</td>
</tr>
<tr>
<td><strong>Vietnam</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>(1)</td>
<td>20</td>
<td>36-100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>50-100</td>
<td>240-300</td>
<td>3,650</td>
<td></td>
</tr>
<tr>
<td><strong>LATIN AMERICA:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Colombia</strong></td>
<td>18-24</td>
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<td>48</td>
</tr>
<tr>
<td><strong>Cuba</strong></td>
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</tr>
<tr>
<td>(1)</td>
<td>12</td>
<td>24-30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>8-18</td>
<td>24-40</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Guatemala</strong></td>
<td>8-12</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td><strong>Haiti</strong></td>
<td>100</td>
<td></td>
<td></td>
<td>over 100</td>
</tr>
<tr>
<td><strong>Honduras</strong></td>
<td>24-36</td>
<td></td>
<td></td>
<td>200-600</td>
</tr>
<tr>
<td><strong>Mexico</strong></td>
<td>60</td>
<td></td>
<td></td>
<td>300-1200</td>
</tr>
<tr>
<td><strong>MIDDLE EAST:</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Egypt</strong></td>
<td>15</td>
<td>25-40</td>
<td></td>
<td>200</td>
</tr>
<tr>
<td><strong>Iran</strong></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td><strong>Iraq</strong></td>
<td></td>
<td></td>
<td></td>
<td>775</td>
</tr>
<tr>
<td>(1)</td>
<td>20-50</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>100</td>
<td>200-400</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td><strong>Israel</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>18-24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>30</td>
<td></td>
<td></td>
<td>80-90</td>
</tr>
<tr>
<td><strong>Jordan</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>20-40</td>
<td></td>
<td></td>
<td>exorbitant</td>
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</table>
Table 5.7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Lower exceptional^b</th>
<th>Usual^b</th>
<th>Occasional^b</th>
<th>Higher exceptional^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lebanon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td>22-24</td>
<td>50-100</td>
<td></td>
</tr>
<tr>
<td>Sudan, Northern</td>
<td></td>
<td></td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Syria</td>
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</tr>
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<td>9-20</td>
<td>40-45</td>
<td>150</td>
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<tr>
<td>(2)</td>
<td>18</td>
<td>40</td>
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</tr>
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</table>

Table 5.8 is a summarization of the interest rates reported being paid by agriculturalists in Chile. About one-half of the loans were reported as obtained for consumption purposes and one-fourth each for

^Nisbet comments on the negative interest rates: "... it is likely that these rates would be positive if we could take into account hidden charges commonly levied with or without the borrowers' knowledge. The effective rates charged by some moneylenders and patrones would also increase as a result of hidden charges. It is impossible to know exactly how extensive these practices are since lenders, naturally, are unwilling to give such information, and many borrowers are unaware of the charges or do not take them into account within the financial arrangement" (5.11, p. 78). For example, in connection with loans obtained by sharecroppers, "Patrones often receive the benefit of cheap labor not only of the sharecropper, but of his family. Rates of return to some patrones were well over 100 percent on their investment, allowing them to lend without nominal interest" (5.11, p. 87).
Table 5.8. Reported rates of interest in rural Chile where money interest rates are deflated to real rates and rates on loans in kind are expressed in real terms a, *

<table>
<thead>
<tr>
<th>Type of lender and type of loan</th>
<th>Interest rate distribution</th>
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<tr>
<td></td>
<td>-33</td>
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<tr>
<td>(1) Friends:</td>
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</tr>
<tr>
<td>Cash</td>
<td>4</td>
</tr>
<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(2) Neighbors:</td>
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</tr>
<tr>
<td>Cash</td>
<td></td>
</tr>
<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(3) Relatives:</td>
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<tr>
<td>Cash</td>
<td>3</td>
</tr>
<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(4) Patrones:</td>
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<tr>
<td>Cash</td>
<td>16</td>
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<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(5) Village stores:</td>
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<tr>
<td>Cash</td>
<td>1</td>
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<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(6) Itinerant traders:</td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td></td>
</tr>
<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>(7) Moneylender:</td>
<td></td>
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<tr>
<td>Cash</td>
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<tr>
<td>Kind</td>
<td></td>
</tr>
<tr>
<td>Total cases c</td>
<td>25</td>
</tr>
</tbody>
</table>

aAll rates are on actual loans for the agricultural year May 1964 through May 1965, and money interest rates were deflated by using the consumer price index. The terms ranged from one month to over one year, so all rates were adjusted to annual figures.

bThe same lender extends credit to different borrowers, in some cases. The rate of interest charged was at times the same to different borrowers, and at other instances different rates were charged by the same lender on similar loan arrangements.

cIn seven cases, borrowers did not know the interest rate charged, and there were eight cases of recargos (charges in addition to the original sum of value lent).

*Source: Nisbet (5.11, Table 2).
(in annual percentage rates)

<table>
<thead>
<tr>
<th></th>
<th>30</th>
<th>33</th>
<th>40</th>
<th>46</th>
<th>60</th>
<th>75</th>
<th>90</th>
<th>128</th>
<th>165</th>
<th>360</th>
<th>Total cases</th>
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<td>7</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>7</td>
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<td>1</td>
<td>4</td>
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<td>5</td>
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<td>2</td>
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<td>4</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>
production and combined consumption and production uses. As to be expected, the rates charged by merchants and moneylenders were high relative to friends and relatives, partly because of different objectives on the part of the lenders. In addition, credit risks are likely higher for the former than the latter.

Another factor tending to cause high interest rates is that moneylenders often grant loans secured only by verbal promises to repay.¹ Where collateral with a secure title is offered as security, credit is usually obtainable at a much lower rate (5.1, 5.17). This is particularly true if the prospective borrower has access to funds provided by commercial and agricultural banks.² Private lenders, while charging higher rates, are in a better position to meet the credit needs of prospective borrowers, at least for loans of modest amounts. First, private lenders often have detailed knowledge of the prospective borrowers' needs and credit worthiness. Credit can be advanced rapidly with little or no red tape and with no publicity. Second, the terms of repayment, in particular the repayment dates, are often flexible so as to accommodate the debtor's repayment capacity. At times, no due date is specified; often, repayment is due only after the

¹Landlords and merchants are fairly certain that they will be reimbursed because they serve indispensable roles as employers of tenants and(or) marketing middlemen, respectively. In the Chilean credit survey, two-thirds of the loans supplied by merchants and moneylenders were not secured by financial or physical assets (5.11).

²In Thailand, the low interest rates charged by institutional lenders are so low as to be uneconomic in the sense that the interest payments are, at times, not sufficient to cover even the administration costs of the loans. In addition, a very large portion of the capital of cooperatives and other lending agencies has been lost through debt default (5.13).
annual harvest. This flexibility may also be detrimental to the borrower because interest obligations accumulate as due dates are relaxed, and additional debt may be added to that already incurred increasing the danger of eventual appropriation of the borrower's assets if the lender should require complete repayment on short notice.

The rates of interest charged by private lenders appear to be high, though not necessarily exorbitant, especially in those areas where monetization of the economy is at low levels and where cooperatives and commercial banks operate only on a very small scale. As economic activity expands, the level of monetization and of credit supplied by cooperative and public sources generally increases. The structure of interest rates, especially those charged by the private lenders, would be expected to fall. For individual borrowers, however, interest rates will likely not fall substantially until their credit worthiness is improved.\(^1\) To the extent that these borrowers are beneficiaries of economic expansion, their credit position should be enhanced.

The rates reported being charged by cooperatives and tabulated by Wai (5.17) are substantially below those levied by moneylenders.\(^2\) Since the cooperative movement has not been strong in Latin America, few data

\(^1\) In relatively developed countries, small loans of essentially risky nature, for example, consumer credit, are often available at interest rates comparable to those levied on agriculturalists in less-developed areas. This is probably an outgrowth of administration and risk charges which are correspondingly high in the two situations (5.2).

\(^2\) Wai (5.17) has tabulated in Table 10, pp. 134-139, the interest rates of cooperative societies and specialized agricultural banks or institutions owned or sponsored by the government for the period 1950-54 in a number of less-developed countries. He has added remarks relative to the duration of loans and collateral requirements.
are reported. For Asia, the lending rate is usually between 8 and 12 percent. The lower bound is for medium-term credit while the higher rates are those for short-term advances. This range of rates also applies to the Middle Eastern countries. Few data are available for Africa. The lending rates of specialized agricultural institutions are quite low. A sampling of these rates in annual percents follows:

(1) Land and Agricultural Bank of Kenya, 4½ percent for long-term loans;

(2) State Agricultural Bank of Burma, 6½ percent for seasonal and medium-term loans;

(3) Agricultural Development Finance Corporation of Pakistan, 4-5 percent with the lower rate offered to cooperatives and the higher rate to individuals with land required as collateral;

(4) Agricultural Credit and Cooperative Bank of Egypt, 3-5 percent primarily for short-term loans but also for credit of longer duration. The higher rate applies to individuals; the lower to cooperatives;

(5) Agricultural Bank of Bolivia, 8 percent plus other expenses such as the cost of trips of the bank's technician and guarantor. The amount lent is up to 66 percent of collateral such as machinery and cattle; and

(6) Agricultural Development Bank of Peru, 6½-8 percent plus charges for technical aid for loans of all durations. The amount lent is up to 75-80 percent of the collateral offered.

Two points relative to these low rates should be made. First, the absolute amount of credit available for lending at these rates is not
known. Second, in some cases, the borrowers have to pay additional costs which raise the effective rate of interest. Furthermore, the requirement that loans be secured by collateral reduces the number of borrowers who have access to these sources.

The term structure of interest rates and the mode of operations in the "organized" money markets of less-developed areas are not much different from those of counterpart institutions in the developed countries. This correspondence is not surprising since commercial banks, which account for most of the activity in the "organized" money markets, have been patterned after the structure and practices of commercial banks in the developed countries. In general, interest rates, including those charged in the "organized" money markets, are higher than those in the more-developed countries. The more pronounced difference between the two groups of countries is that the range of interest rates is generally much wider in the less-developed areas (5.17). Within each category of interest, the rates at which commercial banks lend are a function of the size of the loan, the credit worthiness of the borrower, and the type and amount of collateral available to secure the loan. Interest rates are higher for smaller loans secured by less liquid collateral and vice versa. However, it is quite possible for a prospective borrower with little collateral but with good credit rating to obtain loans at rates lower than another person with a good collateral position but not a good credit standing (5.17). In a few cases, commercial banks lend funds to agricultural banks and cooperatives who in turn attempt to provide "supervised" credit to cultivators. Again, however, those with the larger farm units and better asset positions are in a favored position.
to obtain loans. In any case, the volume of loans granted at relatively low rates is not sizeable. The principal constraining factor is the limited amount of collateral against which these loans can be secured.

Another point should be mentioned. Commercial banks and government lending agencies have the capacity to increase the amount of funds for credit at a rate which is a multiple of their contingency reserves. If lending by these institutions is not financed by savings, taxation, and borrowing from the public, inflationary tendencies may be generated or accelerated. The effectiveness of monetary policy is questionable since the link between the organized and unorganized money markets is rather weak. But since the volume of credit going to the agricultural sector is low and since this credit is usually for productive purposes, the danger of inflation arising from credit granted to agriculturalists is perhaps rather low.

**Competition among lenders**

Because of a high degree of immobility, lack of awareness of possible alternative sources, and the typing of loans to landlord and merchant relationships, cultivators largely confine their borrowing activities to their home villages or communities. They often purchase inputs and consumer goods, market outputs, and secure credit from the same individual. In each transaction, the middleman is in a position to exploit the cultivator to some degree. These integrated economic activities, together with a usually small number of sources of credit, provide lenders with oligopolistic or monopolistic powers (5.3, 5.4, 5.11). Even though alternative sources exist, for example, relatives, landlords, and money-lenders, the amounts obtainable from the first two sources are often in-
adequate so that the bulk of the credit must be secured from moneylenders and merchants. Whether or not these lenders exploit their positions of power is a question of fact. The relatively high interest rates charged by them is not sufficient evidence.

In the Indian rural credit survey, villages having four or more resident moneylenders accounted for only 10.3 percent of the total (5.4). In the Chilean survey, the number of moneylenders ranged from none to three, with an average of one operating per rural credit market area. In no case did a moneylender operate in an adjoining market area. Concerning the number of village stores providing credit, the number ranged from two to five with an average of three per rural credit market area (5.11).

The number of lenders per market area overstates the number of sources actually open to the prospective borrower. Some lenders provide marketing and retailing services which are interrelated with credit advances. Debtors may be effectively forced to secure any additional credit from the lender who originally advanced credit or face the threat of repayment and foreclosure (5.10, 5.19). Tenants may have to rely on landlords as their principal source of credit. The lender's relatively intimate knowledge of the borrower's position places him in a good competitive position especially if the borrower does not have good collateral with secure title. The strength of these personal relationships and the

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Nisbet (5.11) indicates three reasons why moneylenders in Chile operate on a small scale and do not compete with each other: (1) They lack detailed knowledge of the larger market so they engage in relatively small-scale operations; (2) Since their operations are illegal, they are motivated to restrict both the number of individuals they service and the total volume of credit granted; and (3) Since they are primarily farmers whose volume of lending does not represent more than 50 percent of their annual gross income, (footnote continued on the following page)
obligations therein suggest that borrowers do not have several sources to choose from even when several sources exist in the community.

The relatively high interest rates charged by moneylenders and merchants are not necessarily evidence of monopolistic power. High rates are at least partially the result of high administrative costs associated with small, short-term loans plus allowance for risk on poorly-secured loans (5.2). Only if the interest rate charged exceeds these costs plus the opportunity costs associated with the credit advanced does the rate reflect an additional component of monopoly profit. In addition, if the moneylenders' credit reserves remain idle throughout a part of the year, as with seasonal lending for working expenses and consumption expenditures before harvest, the lender may quite legitimately increase charges to compensate him for the time his funds and administrative abilities are idle because of borrowers' seasonal demand. If the lender invests the otherwise idle funds, the costs of liquidating these investments will likely be passed on to the borrower when loans are made.

**Regulation of lending practices**

Commercial banks and cooperatives have constraints or guidelines controlling their lending activities. In some areas, legislation controls the maximum rates that can be charged and the process by which the credit worthiness of prospective borrowers is determined. Also, due dates for loans more closely approximate the size and purpose of the loan. This is in contrast to the more flexible terms usually provided by professional (footnote continued from preceding page) only limited quantities of funds are available for lending.
moneylenders. The credit provided by agricultural banks and cooperatives is, to some extent, "supervised" credit through which these lenders exert influence over the use of the credit advanced and provide additional services as an attempt to make the most productive use of credit. In the recent past, "supervised" credit has been used in a few Latin American countries (5.1, 5.17). For the majority of the less-developed areas, this control or assistance in the use of credit is lacking, although more attention will likely be given to this practice in the future.\(^1\)

An exception to the general pattern of "unsupervised" credit is the integrated cooperative system which evolved in Egypt in the early 1960's (5.5). After the 1952 revolution, the government instituted a system of "supervised cooperatives", the administrators of which had the responsibility for organizing production and distributing available credit among the farmer members. The supply of credit was permitted to keep pace with farmers' demand for productive purposes. The Central Bank and the commercial banks controlled by the government channeled credit funds through the Agricultural Credit Bank.\(^2\) To ensure that farmers with little collateral had access to credit, cooperatives were directed to provide credit to members on the basis of their credit requirements for production purposes. Simultaneously, the number of defaults was minimized by commissioning a government agency with marketing the farmers'

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1Sen in commenting on supervised credit provided by cooperatives in India, indicates that this supervision induces some cultivators, in their ignorance, to prefer dealing with moneylenders rather than the cooperatives. This is reinforced by the high proportion of loans used for consumption purposes (5.15).

2The Central Bank purchased the long-term, low interest-bearing bonds issued by the Agricultural Credit Bank. By 1961, commercial banks had come under State ownership.
cash crops. Not only was repayment ensured, but a mechanism was created for altering the terms of trade to agriculture; i.e., the government could determine the prices to be paid to growers. By 1962, cooperatives had become the sole source of agricultural credit and cooperative membership was mandatory for all farmers. By 1965, cotton, wheat, onions and a major part of the rice crop were subject to compulsory marketing. Finally, to increase control over the cooperative activities, in 1963 the Agricultural Credit Bank was made a State organization under supervision of the Ministry of Agriculture. This reformed rural credit system primarily benefited small owner-operators who previously lacked adequate capital to secure low-cost loans from institutional sources. The plight of the landless tenants with few assets was not substantially alleviated, however.

There appears a general belief that only a weak link exists between the organized and unorganized markets in less-developed areas. This link, whatever its strength, does provide a connection between the two markets whereby the central banks, already operating under regulations, can have an influence on the availability and terms of credit in the

1 "Available evidence indicates that in Egypt the price paid to farmers for certain crops has been lower than the price at which the Government has disposed of them in the internal market and abroad" (5.5, p. 106).

2 In Japan a close link between the two markets has been achieved "mainly through the agricultural bill system which has been incorporated into the cooperative movement. In order to raise funds, agriculturalists and cooperative associations draw promissory notes or 'agricultural bills.' These bills are discounted and rediscouned by the cooperative associations, the credit federations, and the Central Cooperative Bank for Agriculture and Forestry, which borrows funds from the Bank of Japan whenever necessary" (5.18, p. 97).
"unorganized" money market, including that of the rural credit market (5.14, 5.17). The extent to which commercial banks have advanced funds to the agricultural sector is one indicator of the strength of the connection between the "organized" and "unorganized" credit markets.\(^1\)

Commercial bank loans to the agricultural sector are less than 10 percent of these banks' total loans in most less-developed countries.\(^2\) The exceptions are Indonesia, the Philippines, and some Latin America countries such as Columbia, Cuba, Peru, and Paraguay. This evidence, based on data as available, suggests a relatively-weak link between the two markets.

Additional links exist between the two markets which operate to make monetary policy more effective. Depending upon individual situations, these links may include the following:

1. In areas with a large agricultural export sector, exporters and traders borrow from commercial banks and make advances to producers, either directly or through smaller merchants, in order to ensure an adequate supply of exportable commodities at favorable prices (5.17);

2. In Africa where marketing boards are operative, the buying agents of the boards secure much of their credit from commercial banks and then give credit to smaller traders who, in turn, advance credit to

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\(^1\) Sen indicates that commercial banks in India "... do provide substantial amounts of short-term credit for financing the marketing of agricultural produce sometimes directly to the relatively-big farmers but generally through traders" ... "The chief reason why the commercial banks have not been able to advance even marketing finance directly to the agriculturists to any appreciable extent, is the absence of licensed warehouses through which the agriculturist can pledge his produce for an advance from commercial banks" (5.15, p. 723).

\(^2\) See Wai (5.17, pp. 129-133, Table 9) for a complete tabulation of those countries for which data were available together with the sources of these data.
the cultivators;

(3) Importers, extending credit to wholesalers who, in turn, provide credit to village retailers who finally extend credit to agriculturalists provides yet another link; and

(4) In Latin America the "latifundia" owners not only have access to credit by the commercial banks for meeting their needs and advancing credit to the "minifundia" operators, but some also have administrative or other influence over commercial banking activities.

The essentially-informal operations of private leaders make enforcement of any regulations of lending practices difficult. Even if a legal maximum is placed on interest rates that can be charged, the opportunities for adding hidden charges, and the general lack of credit records make the determination of actual interest rates difficult. In addition, those cultivators charged highest rates are also those who are likely unaware that they may be paying usurious rates. They are disinclined to report payment of such rates to the proper authorities, the names and locations of which are perhaps unknown to most of the small-scale cultivators. Social pressures within the community may motivate private lenders to engage in self-regulatory practices. Those living in but not integrated in the community structure, for example, foreign-born moneylenders, are largely immune from such pressures. In addition, the few alternative sources of credit relative to cultivators' demand lessen the importance of maintaining customer goodwill by charging what appear to be "reasonable" rates.

Government programs to regulate lending activities by private suppliers are not only difficult to enforce, but where effective, the
quantity of funds supplied for lending likely falls (5.15). This re-
duction in credit availability may more than offset the gains derived
from obtaining credit on more favorable terms. Similarly, land reform
programs disrupt normal credit channels between landlords and tenants.
Thus, a complementary program of increased agricultural credit is neces-
sary if reform programs are to be most effective.

Credit availability relative to needs

The supply of credit is inelastic. The fact that commercial banks
have a capacity to provide a volume of credit which is a multiple of
actual funds on deposit is not of much significance to the agricultural
sectors at this time because the proportion of funds provided by these
banks to agriculturalists is small. The private lenders, on the other
hand, are largely constrained in their lending activities by the amount
of funds they have on hand. Large landlords and some moneylenders can
augment their reserves by borrowing from the commercial banks but this
practice does not appear to be widespread. Changes in the quantities
available for credit are largely effected by variations in agricultural
prosperity. For example, during favorable periods landlords who lent
in the past now have expanded reserves. Others now find they have
"surplus" funds on which a return can be made. Improved agricultural
incomes provide opportunities for merchants to expand profits, and in-
creased debt repayment to moneylenders increases their monetary reserves.
As noted earlier, borrowers are often restricted to obtaining their credit
from particular merchants, marketing middlemen, or landlords. Each of
these sources, however, has only a limited quantity of funds available for
lending.
The nature of demand elasticities is less clear. The demand for credit to be used for consumption expenditures and working capital is highly interest inelastic. Consumption loans are often needed for survival. Without the working capital, the normal crop cannot be planted, income is not forthcoming, and additional debt must be incurred. The demand for intermediate and long-term loans is expected to be more elastic because (1) These are expenditures which can be deferred; and (2) Loans are of larger amounts which may motivate cultivators to be more responsive to changes in the interest rate.

High interest rates levied by the private lenders are only partially symptomatic of a strong demand for credit relative to supply. As mentioned earlier, high administrative costs and high risks tend to maintain rates at relatively-high levels. A high opportunity cost component in the structure of interest rates is another factor.

To some extent the scarcity of credit may be more apparent than real, especially on a geographical basis. This is the consequence of too few credit institutions, not properly distributed, so that institutionalized mechanisms are not available for channeling the hoards and savings of some into the hands of those who have productive uses for these funds. In addition, peasants may be reluctant to entrust their savings to these institutions with which they are at least initially unfamiliar, and prospective borrowers also often have a preference for dealing with the local moneylender even though higher costs for using the credit must be paid.

In the final analysis, credit availability relative to needs is again an empirical question. The quantity of funds available for
mobilization and transfer to areas of excess demand is largely unknown. The establishment of additional outlets for saving should not only increase the aggregate quantity of funds available but, ceteris paribus, tend to have a depressing effect on the entire structure of interest rates. From the demand side, effective demand must be distinguished from a more generalized concept of demand. Nearly every cultivator has a demand for a certain quantity of credit, but whether he can use it productively or, more importantly, whether he can use it more productively than his competitors and whether he has the capacity to repay are additional questions which must be taken into account. In the larger context, credit demand and productivity within the agricultural sector should be reconciled with requirements and investment opportunities with the nonagricultural sectors. If credit markets operated perfectly, available credit would gravitate toward its most productive uses. In the absence of this credit structure, national planners must determine the most productive uses and the means for generating and channeling funds into these uses. If it is determinable that the opportunity costs for credit are highest in the agricultural sector and such intersectoral differentials persist, then a case can be made for concluding that credit available to the agricultural sector is inadequate relative to the demand for credit.

An additional qualifier is necessary. If the supply of agricultural credit is increased, are complementary programs also initiated or is the institutional structure essentially unchanged? For example, increased production expected to accompany the use of more credit may strain existing transportation and marketing facilities. In subsistence-oriented
areas, these facilities may have to be created in order to provide outlets for increased production. These factors and many more affect the estimated returns on additional credit made available to the agricultural sector. Thus, the attempted optimal distribution of available credit must take into account complementary development processes or the absence of these forces.

Summary

In summary, the principal functions of credit institutions are to provide an outlet for personal savings and a mechanism for making these savings and other sources of credit financing available to those individuals who are demanders of credit, whether for personal or business expenditure. In many rural areas, few institutions exist for receiving savings and paying interest on them. In addition, agriculturalists often have a preference for converting savings to assets, both productive and unproductive, especially where strong inflationary pressures exist and where uncertainty and unfamiliarity surround the operations of public credit institutions. The nature of the "unorganized" or informal credit market is such that private lenders do not solicit savings but normally lend only that amount that they themselves have accumulated, together with the relatively-small amounts they secure from commercial sources. As cooperatives and agricultural banks or rural branches of commercial banks increase in number, savings and lending functions will be operated in a more-coordinated manner.

Returning to the two areas of inquiry set out at the beginning of this section, only qualified statements can be made. Evidence exists
that the interest rates charged agriculturalists by commercial banks and cooperatives are not grossly dissimilar from those charged in the developed countries. The relatively high rates levied by private sources reflect a large demand for credit relative to limited, inelastic supplies of funds available for lending. The strong demand is primarily an outgrowth of the inability of agriculturalists to realize savings from their relatively-low incomes which would permit them to internally finance consumption and production expenses and to meet unforeseen contingencies. The amount borrowed from commercial banks for subsequent lending to agriculturalists is not large. Further, private lenders, unlike commercial banks, do not act as repositories for customers' savings nor have the capacity to issue a volume of credit which is a multiple of required reserves.

High interest rates charged by private lenders are also the result of some of the same factors which cause high rates for consumer credit in developed countries; i.e., high administrative costs, default rates, and risk on the part of borrowers. Thus, high rates do not imply exorbitant rates. If exorbitant, they must be in excess of some standard or "fair" rate. As has been demonstrated, several opportunities exist for charging high interest rates. A good deal of competition among lenders does not exist. The integrated functions of landlords and merchants with borrowers provide opportunities for imposing hidden charges. Low levels of literacy and precarious economic positions among peasants make them vulnerable to paying high, if not excessive, interest rates. Only if the rates exceed allowance for opportunity costs, administrative overhead, and credit worthiness of borrowers, can the rates be termed
excessive or exorbitant.

Based on the evidence available, contemporary credit institutions generally have a depressing effect on economic and social well-being for the majority of agriculturalists in less-developed areas. Because of seasonality of income and abnormally low incomes in poor crop years, many producers must resort to credit financing in order to sustain consumption requirements. Even though the size of these loans is relatively small, the high interest rates compared to producers' incomes and capacity for saving place a burden on the borrowers. If abnormally low incomes persist over a period of time, the debtor's economic position is exacerbated.

Finally, the nature of the credit system; i.e., the essentially unintegrated "organized" and "unorganized" markets, tends to perpetuate conditions of economic dualism or quasi-dualism. For example, savings do not freely flow among sectors according to their most productive uses, either on a private or social product basis. The subsistence sectors continue to operate at low levels of monetization which, in turn, discourage the implementation of commercial credit institutions in these areas. Yet these are the institutions most likely to have the capacity for providing adequate credit on terms approaching the credit requirements and repayment capacities of agriculturalists in less-developed areas. The more aggregative problem is that of increasing the level and reducing the variability of cultivators' incomes. These phenomena would reduce the need for borrowing, especially for consumption expenditures, and would improve the credit worthiness of prospective borrowers.
Literature Cited


Social overhead capital facilities are synonymous with the infrastructure of the economy. That is, they represent the constellation of transportation, communication, marketing, education and government facilities which provides the machine for economic activity and the foundation for economic growth. This infrastructure conditions nearly all aspects of economic and social well-being; it functions both as a parameter and as an instrument variable for stimulating developmental processes. At low levels of economic development where economic stagnation tends to be the norm, these components of the infrastructure are essentially parameters in economic processes. True, traders, labor migrants, and extension agents alter somewhat the communication and education mechanisms. However, the impact of these largely-exogenous influences is only realized in a longer-term situation and when other changes in the structure of the economy are effected or evolved to generate a more favorable economic environment.

Poor transportation and communications facilities tend to isolate villages at distances from the actual or potential growth centers of

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1 The infrastructure includes institutions such as land tenure systems, sources of public and private credit, and social and economic systems affecting producers' attitudes and motivations. Since these attributes are abstracted for separate discussion in this study, their interrelationships with the above are only briefly described here.
the economy. A series of subeconomies with few external linkages results. Consequently, the impact of any pressures and incentives generated by developmental processes, such as government policies and changes in market demand, is dissipated with little, if any, effect on producers' activities and economic systems in remote areas. Economic expansion largely confined to growth points in cities and industrial enclaves tends to create a relatively dualistic economic system. The "modern" sector expands through the adoption of modern technology and through private and public investment. Conversely, the "traditional" sector, while subjected to some external influences, continues to employ traditional production techniques and activities are oriented toward meeting local consumption requirements.

Economic dualism need not be detrimental to aggregate growth of the economy. The "modern" sector may be the source of export earnings and capital accumulation, a portion of which is invested in other sectors of the economy. Furthermore, certain "spread effects" may emanate from this sector. The qualifiers are necessary because such "modern" sectors have differential impacts on the economy. Contrast the petroleum industry in the Middle East with plantation systems producing cash crops in parts of Africa and South Asia. Both generate foreign exchange earnings, part of which is transferred to other countries when the export-generating industry is foreign owned. The "spread effects" are different, however.

\footnote{With regard to West Africa, Bauer notes: "Part of the Benue, the principal tributary of the Niger, is open for navigation during two months of the year only, and the annual requirements of the substantial hinterland of the upper Benue have to be transported within that short period. Considerable quantities of export are evacuated by the Benue and if they are not shipped in time, they may have to wait almost another year" (6.5, p. 14). Abbott (6.1, p. 48) (footnote continued on the following page)}
The petroleum industry provides a limited demand for domestic labor. Domestically-produced, crude petroleum needs refining before it can be used locally. Local demand, however, is not likely substantial. Conversely, plantation systems not only generate substantial employment opportunities but introduce workers and producers in the surrounding area to new crops and production skills. Consequently, local producers have opportunities to produce cash crops and to diversify production patterns. The marketing mechanism established by the plantation owners also serves as an outlet for the same crops produced by local peasants. The new sources of output and income give impetus to local trading in both agricultural commodities and other consumer goods. Expansion of trading opportunities, in turn, tends to result in labor specialization and in the attraction or mobilization of additional capital inputs. As long as export markets remain strong and plantation crops are produced at competitive costs, the potential for additional "spread effects" remains favorable.

The lack of diversification in exports renders a country's foreign exchange position vulnerable to fluctuations in export demand and, in turn, export earnings. But foreign exchange is usually a basic component of the means for financing national developmental plans. This uncertainty regarding the stability of exchange earnings complicates the formulation and effective implementation of national plans. Consequently, national planners have an interest in expanding the export base. Such an orientation tends to reduce the degree of "economic dualism".

(footnote continued from preceding page) cites additional examples applicable to parts of Asia.
Other potential advantages of diversification are apparent: (1) Increased integration of various sectors of the economy enhances the effectiveness of government policies in guiding economic activity; (2) New and stronger sectoral interrelationships affect resource mobility and the internal distribution of consumer goods; and (3) From a social and political viewpoint, increased participation in the economy by previously relatively-isolated individuals and communities may be conducive to improving economic well-being and consequent social stability. Diversification and integration require additional capital and administrative inputs. Marketing reforms, public distribution of inputs, and dissemination of information on production techniques and marketing are usual necessary concomitants of public policies to stimulate coordinated growth of the economy.

A generalized discussion of the marketing and transportation systems in less-developed countries follows. Other components such as education and health systems are extremely important, but they will not be directly considered here. In addition, the structure and stability of the government.

As noted in Chapter VIII however, the inability to satisfy or realize new expectations and aspirations generated by increased contact with a money economy and public exhortations for harder work, increased saving, and productive investment motivates individuals to adjust aspirations downward or creates the potential for social and political unrest. Neither consequence is desirable.

The delineation of capital and administrative inputs does not imply that administrative inputs are not also capital inputs.

Public programs dealing with extension services, marketing boards, and tax-collecting measures are covered in Chapter VII.
ment system undoubtedly affects investment decisions of indigenous and foreign investors and the receptiveness of individuals and villages to government policies and programs.

Role of the Marketing Mechanism

According to economic theory, the market mechanism performs an important role in guiding economic activity. In both product and factor markets, prices are the links between quantities supplied and demanded which cause markets to be cleared. Through the pricing system, consumers reflect their demand preferences for consumer goods and producers reflect their demand for factors of production, including intermediary goods. Also, producers and resource owners indicate the amounts of goods and factor services, respectively, which they will offer at various prices. Acting in an environment of imperfect knowledge, economic agents must estimate these prices or exchange ratios before making their respective consumption, resource allocation, and factor supply decisions so as to maximize their individual objectives. These are considerations primarily affecting the static efficiency of the market in allocating resources and distributing the final product. As is subsequently discussed, the market mechanism as an instrument variable serves to generate and sustain developmental processes which affect the motivations and objectives of economic agents and the integration of these individuals into a more-fully interdependent economic system. It is in this sense that the marketing sector may also be a leading sector in promoting economic development.

1A theoretical discussion of quantities of agricultural commodities marketed as a function of price and some of the available empirical evidence are included in Chapter VII.
The nature and scope of the marketing systems vary with stages of economic development and with attendant transportation and communications systems. As already noted, at low stages of economic development, the economy's infrastructure tends to support a collection of essentially self-contained economic or functional areas with few links among these groupings. The individual areas are mostly self-sufficient and as yet largely unaware of exchange opportunities with other areas. The marketing system is largely confined to an exchange economy with only limited purchases of goods not locally produced. As producers rely less on diversification to meet most of their consumption needs and more toward specialization of labor and firm activities, the scope and need for participating in an exchange or money economy continually increase. But the fact that most are not entirely self-sufficient suggests that a wedge for disturbing the low-level equilibrium of these communities exists. This wedge is in the form of the local merchant or itinerant trader who initially supplies a limited range of goods which are not locally produced. He is the producer-consumers' link with the "outside world"; he represents a potential channel for initiating change and altering individuals' values and attitudes toward change. However, the scope of the merchant-trader's activities is also constrained. The relatively low incomes and consequent limited purchases by his customers, both individually and collectively, result in a small retail market. His constricted retail market, in turn, limits his incentive for increasing the variety and quantity of goods offered. Poor transportation and communications facilities effectively limit the merchant-trader's range of contact and awareness of opportunities for altering traditional
practices.

Change is essentially exogenous in nature; that is, exogenous to the majority of individuals affected. For example, foreign investment in a plantation system for producing export crops, railway systems built by the government, creation of cooperatives and marketing boards, and activities of merchants and traders tend to set up pressures and incentives for economic change. While these phenomena are essentially necessary for stimulating economic processes, they are not sufficient. The building of a railroad and the establishment of a marketing board do not result in increased production and marketings if economic incentives, resource productivities, and producers' goals are not conducive to increased production. The railroads, marketing boards, and school systems only provide the means through which economic change can be facilitated. Thus, the infrastructure of the economy provides the framework or machine for economic growth which must be juxtaposed with the objectives of producers, consumers, and resource owners and with the incentives and opportunities open to these individuals.

1 Population growth and the consequent pressure of population on land forcing or causing labor migration and changes in production technique may be viewed as endogenous. However, the stimulant to population growth, whether through medicine or the impact of favorable weather on production, is still usually of an exogenous nature.

2 Geertz (6.12), for example, comments on the impact of foreign-owned plantations on production and marketing systems in Indonesia. Kamarck (6.18) and Neumark (6.27) indicate the importance of railroads as a stimulant to production of export crops in Africa. The impact of marketing boards is briefly discussed in Chapter VII. The significance of merchants and traders in providing credit and generating new wants is documented in this chapter.
Market-exchange system

Essentially all producers have some contact with an exchange or money economy. Since the majority of producers in less-developed areas produce and market on a relatively-small scale and since this vast body of people is to be eventually or more fully integrated into a national economic system, it is important to understand the factors affecting marketing and exchange. The point of departure is that of producers in contact with an exchange economy where producers bring their produce; i.e., their endowments, to exchange for those goods they do not produce but consume. Such endowments result from resource allocation decisions affecting current production, any changes in stocks on hand, and producers' consumption decisions. In the next section, a merchant-trader is introduced into the exchange system.

Each participant has a maximum quantity of goods for exchange. Through the supply-demand conditions for individual goods, exchange rates are evolved. For example, a bushel of wheat may have an exchange value equivalent to ten yards of cloth. In a poor crop year, the exchange value may increase so that a half bushel of wheat now has a worth equivalent to ten yards of cloth. Exchange is facilitated through use of a numeraire; i.e., a measuring unit or standard by which the exchange values of the various goods can be expressed in terms of a single good or monetary unit.

The advantage of exchange is often represented by the Edgeworth box diagram where the utility of one or both individuals can be increased following a movement from an initial point off the "contract curve" to a point on the "curve". See the discussion relative to Figure 4.8.

The basic equations used to represent the exchange economy are those presented by Henderson and Quandt (6.15, pp. 128-131).
Producer's endowments are denoted as \( q^o_{ir} \); they represent the quantity of the \( i \)-th good brought to the market for exchange by the \( r \)-th producer. Similarly, \( q_{ir} \) is the amount of the \( i \)-th good which the \( r \)-th producer-consumer demands or wishes to obtain in the market. The excess demand for the \( i \)-th good by the \( r \)-th individual is given in Equation 6.1. If \( E_{ir} \) is positive, the \( r \)-th individual is a net demander of the \( i \)-th good. If \( E_{ir} \) is negative, he is a net supplier of the \( i \)-th good to be offered in exchange for some other good. Excluding the possibility of credit financing,\(^1\) the value of the goods obtained through exchange is restricted to the value of the producer's endowment. This restriction is represented by Equation 6.2. The exchange activities are assumed to be costless. Alternatively, the \( p \) can

\[
E_{ir} = q_{ir} - q^o_{ir} \quad (i = 1, \ldots, n) \quad (r = 1, \ldots, t) \tag{6.1}
\]

\[
Y_r = \sum_{i=1}^{n} p_i q^o_{ir} = \sum_{i=1}^{n} p_i q_{ir} \quad (r = 1, \ldots, t) \tag{6.2}
\]

\[
\sum_{i=1}^{n} p_i (q_{ir} - q^o_{ir}) = \sum_{i=1}^{n} p_i E_{ir} = 0 \tag{6.3}
\]

\[
U_r = U(q_{1r}, \ldots, q_{nr} : [C]) = U(E_{1r} + q^o_{1r}, \ldots, E_{nr} + q^o_{nr} : [C]) \tag{6.4}
\]

be assumed to be net of any buying and selling costs. Using the restriction expressed in Equation 6.2, Equation 6.1 is rewritten as Equation 6.3. Equation 6.4 represents the \( r \)-th producer-consumer's utility function. His aggregate utility is a function of the quantities of the goods he obtains through exchange and subsequently consumes, and

\(^1\) The possibility of credit financing is introduced in Chapter IX, Case 3.
of the quantities of goods he produces but consumes directly. The latter is denoted as vector \([C]\). The producer's objective, now operating as a consumer, is to maximize his utility subject to his budget constraint, Equation 6.2. This formulation is given in Equation 6.5.

\[
S_r = U_r(E_{ir} + q_{ir}^0, ..., E_{nr} + q_{nr}^0; [C]) - \lambda \left( \sum_{i=1}^{n} p_i E_{ir} \right) \tag{6.5}
\]

Taking the partial derivatives of Equation 6.5 with respect to \(E_i\) and \(\lambda\) and setting these equal to zero, the following system of equations for the \(r\)-th individual is obtained:

\[
\frac{\partial S_r}{\partial E_{ir}} = \frac{\partial U_r}{\partial E_{ir}} - \lambda p_i = 0 \quad (i = 1, ..., n) \tag{6.6}
\]

\[
\frac{\partial S_r}{\partial \lambda} = - \sum_{i=1}^{n} p_i E_{ir} = 0 \tag{6.7}
\]

Since \(\frac{\partial E_{ir}}{\partial q_{ir}} = 1\), Equation 6.6 can be rewritten as:

\[
\frac{\partial S_r}{\partial E_{ir}} = \frac{\partial U_r}{\partial E_{ir}} \cdot \frac{\partial E_{ir}}{\partial q_{ir}} - \lambda p_i = 0 \tag{6.6'}
\]

The \(nt + 1\) equations with \(nt + 1\) unknowns, the \(q_{ir}\) \((i = 1, ..., n; r = 1, ..., t)\) and \(\lambda\), can now be solved simultaneously. Assuming the second-order conditions for a constrained maximization problem are met, utility maximization for the \(r\)-th producer-consumer is obtained when the following holds:

\[
\frac{\partial U_{ir}}{\partial q_{ir} / p_i} = \ldots = \frac{\partial U_{nr}}{\partial q_{nr} / p_n} \quad \text{or}
\]
\[
\frac{\text{MU}_{1r}}{p_1} = \ldots = \frac{\text{MU}_{nr}}{p_n} \quad (r = 1, \ldots, t) \tag{6.7'}
\]

Equation 6.7' implies that each producer consumes a portion of each good. Given his \( q^0_{ir} \) and the \( p_i \) in the market, the \( r \)-th producer now acting as a consumer is in equilibrium when Equation 6.8 holds. If all other participants in the exchange system are in equilibrium, Equation 6.9 is also satisfied. That is, a configuration of \( p_i \) \((i = 1, \ldots, n)\) exists such that Equations 6.8 and 6.9 hold simultaneously.

\[
E_r(p_1, p_2, \ldots, p_n) = 0 \quad (r = 1, \ldots, t) \tag{6.8}
\]

\[
\sum_{r=1}^{t} E_r(p_1, p_2, \ldots, p_n) = 0 \tag{6.9}
\]

The \( q^0_i \) for the participants in the market need not reflect only agricultural produce in its raw form. Relatively simple processing techniques, which are usually highly labor-intensive, can be applied to grains and livestock products so as to increase their exchange value in the market, thereby providing additional returns to the producer's labor inputs. Corn can be dried, rice husked, and milk processed into butter and cheese. In addition, the \( q^0_i \) can include handicrafts produced by the household such as weaving, pottery-making, and wood products. The "value-added" through processing may not be substantial in absolute terms; but if the opportunity cost of labor inputs is low, such processing may still be remunerative. The bargaining and exchange process is usually time-consuming. However, these operations are labor-intensive,
and the opportunity cost of labor and time is low. In addition, social interaction associated with exchange activities often provides psychic returns to the participants, returns which should be included in their utility functions.

Expenditures on consumer goods affecting quantities marketed

A number of items are normally consumed but not produced within the village or marketing area. Included would be items such as sugar, salt, tobacco, kerosene, and manufactured textiles usually supplied by itinerant traders and local merchants. At very low stages of economic development, the quantities of these goods consumed by subsistence-oriented producers can be assumed to be essentially fixed according to traditional consumption patterns. The variety of goods supplied by traders and merchants is assumed to be essentially invariant from one

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1 For example, See Dewey (6.10, p. 232-3, 236), Bauer (6.5, p. 26), Bauer and Yamey (6.6, pp. 33-34) and, implicitly, Mintz (6.21, p. 178).

2 For example, Hammond (6.14) makes the following comment relative to the Mossi located in Upper Volta: "Social satisfactions derived from participation in the market are greatly valued; it provides an opportunity for meeting friends and kinsmen and for exchanging gossip and observations on one another's dress, the crops, and current political developments. The market is a place for making loans and receiving small gifts from kinsmen and friends, for flirtations and the arrangement of rendezvous, and for that casual sort of social interaction which is one of the principal pleasures of life in the Yatenga" (6.14, p. 245).

3 Related to this assumption is the following statement by Neumark (6.27): "... the demand for money in a subsistence or embryonic exchange economy is derived from a demand for specific things for which there is a felt need. Once a limited objective has been attained, any further exertion to earn money would be meaningless. Such a demand for money may be called a target demand" (6.27, p. 48).
time period to the next so that consumer preferences and consumption
decisions do not vary.\(^1\) Let \([E]\) be a vector representing the respective
quantities of these goods consumed. A corresponding price vector, \([p_E]\),
reflects prices charged by the trader or merchant. The quantity of ex-
penditures on consumer goods, \(E^*\), is given in Equation 6.10.\(^2\) In order
\[
E^* = [p_E] [E]
\]  
(6.10)
to make \(E^*\), producers must sell a quantity of goods which has a value
equivalent to \(E^*\). For convenience, assume that only one good, \(q_n\), is
marketed. Other goods are exchanged according to the mechanics of the
exchange economy. Given the prevailing market price for \(q_n\), \(p_n\),
Equation 6.12 reflects the amount of \(q_n\) that must be marketed.
\[
E^* = [p_E] [E] = p_n q_n
\]  
(6.11)
\[
q_n = \frac{[p_E] [E]}{p_n}
\]  
(6.12)
If Equations 6.11 and 6.12 hold for producers at low stages of economic
development, a few interesting relationships can be derived. If \(p_n\)
increases, ceteris paribus, the quantity of \(q_n\) which needs to be marketed
falls. Conversely, if \(p_n\) falls, ceteris paribus, a larger amount of \(q_n\)
must be marketed. Thus, a perverse relationship between quantities

\(^1\) Even though consumer preferences remain invariant, consumption
patterns would vary with factors such as changes in family size, ob-
servance of special family events, and family illnesses.

\(^2\) At a later point in the study \(E^*\) is rewritten as \(E^* = [p_E] [E]\)
FC where FC represents the fixed cash payments for rents and
taxes.
marketed and prices received exists. See Figure 6.1.

Figure 6.1. Inverse relationship between market price and quantities marketed

Curve SS is a rectangular hyperbola. The elasticity of quantity marketed with respect to price is equal to negative unity at all points on the curve. How realistic is this proposition? Figure 6.2 is useful in giving an intuitive answer to this question.  

1A survey of studies focusing on the relationships between market prices and quantities marketed is given in a subsection of Chapter VII. The derived estimates of the price elasticities of quantities marketed indicate that under certain conditions a perverse market relationship may be operative.

2The mechanics of Figures 6.2 and 6.3 are fairly straightforward. The discussion relative to Figures 8.1 and 8.3 is also applicable to the above figures.
Figure 6.2. Optimum labor-use levels to maintain $I_o$ as income-possibility curves shift upward.

Figure 6.3. Optimum labor-use and income levels are income-possibility curves shift upward and shape and position of utility curves vary.
Figure 6.2 represents a situation where the producer's objective is to achieve a fixed, target income denoted as $I_o$. Assume that $I_1$ is the income-possibility curve corresponding to the various levels of labor inputs, given the technical coefficients of labor and the values of outputs produced. Utility is maximized at point A when $L_1$ of labor generates $I_o$ of income. Assume that with $I_o$, both $E^*$ and [$C$] are satisfied. If $p_n$ increases, ceteris paribus, the entire income-possibility curve shifts upward for all labor-use levels. Since the producer's objective is still to realize $I_o$, the indifference curves must be drawn in a particular manner so that the points of tangency result in maintaining $I_o$.

With the higher $p_n$ generating income-possibility $I_2$, point B represents the new point of utility maximization. Since $U_2 > U_1$, a higher level of utility is obtained. With $I_o$, [$C$] can still be met as can $E^*$. But according to Equation 6.12, a lesser amount of $q_n$ needs to be produced and(or) marketed. The reduction of labor inputs from $L_1$ to $L_2$ results in a reduction in the quantity of $q_n$ produced. Leisure has been substituted for income. If $p_n$ increases again so that $I_3$ is the relevant income-possibility curve, utility is maximized at point C where $L_3$ is used to generate $I_o$. Thus, with successive increases in $p_n$, ceteris paribus, less labor is employed and less $q_n$ needs to be produced and marketed. Price and quantity marketed move in opposite directions. Similarly, if $p_n$ successively falls resulting in $I_3$, $I_2$ and then $I_1$, increasing amounts of $q_n$ must be marketed. To increase the production and marketing of $q_n$, more labor inputs must be utilized. If $p_n$ continues to fall so that the point of tangency results in an
income less than \( I_o \), then (1) External financing to the extent that actual income plus financing equals \( I_o \) must be secured; and (or) (2) Income and consumption must be reduced if, in fact, this is a feasible alternative.

Referring to Equation 6.11 again, if \([p^E]\) increases, ceteris paribus, \( E^* \) increases as does the amount of \( q_n \) that must be marketed. The terms of trade have been turned against the producer. Utility maximization through consumption requires that Equation 6.13 must be satisfied.

\[
\frac{\text{MU}}{[p^E]} = \frac{\text{MU}}{p_1} = \ldots = \frac{\text{MU}}{p_n}
\]  

(6.13)

According to Equation 6.13, as \([p^E]\) increases but \([E]\) is unchanged, \( \text{MU} \) is invariant but the ratio \( \frac{\text{MU}}{[p^E]} \) falls. This disequilibrium persists unless (1) \([E]\) is reduced so that \( \text{MU} \) increases; or (2) The marginal utilities of the \( q_i (i = 1, \ldots, n) \) are reduced by increasing the consumption levels of each. Alternative (2) is feasible if sufficient amounts of \( q_n \) are produced so that \( E^* \) can be made and \( q_n \) can be traded for the other \( q_i \). This alternative, however, is tantamount to an increase in income demand which is inconsistent with maintaining \( I_o \). The increase in \([p^E]\) must be offset by a reduction in \([E]\) so that total expenditure is unchanged and Equation 6.13 is satisfied. If \([E]\) is to be maintained as \([p^E]\) increases, ceteris paribus, an income level higher than \( I_o \) is necessary. A higher income which is still consistent with utility maximization is possible if the shape and position of the indifference curves are changed as in Figure 6.3. Similarly, if \([E]\) is increased, ceteris paribus, a larger quantity of income is demanded or needed to meet consumption expenditures. This higher income
is possible with a change in the map of indifference curves, as in Figure 6.3.¹

**Merchant-trader-landlord middlemen**

In most less-developed areas, marketing middlemen are the most important links in the system that channels agricultural commodities from producers to domestic consumers and exporters. Marketing boards and marketing cooperatives are important outlets for certain crops in certain areas. While these organizations perform middlemen activities, the nature and scope of their operations differ from that of the large number of middlemen operating individually and on a small-scale basis. Despite a relatively high proportion of production consumed directly by small-scale producers, their aggregate marketings constitute a significant part of total marketings by all producers. In the case of non-edible cash crops which are grown by producers having operations of diverse size, a very high percentage of production realized is marketed.

At low stages of economic development, the number of marketing middlemen is generally high. However, their distribution throughout the economy is strongly conditioned by population densities, transportation facilities and costs, and the effectiveness of communications systems in denoting areas of marketable supplies and excess consumer demand. Furthermore, a system of credit advances by wholesalers which filter down to various individuals in the marketing structure affect the location and size of operations of these various middlemen. As the distance from

¹The shape and position of the new indifference curve map condition the effect of upward shifts in the income-possibility curves on the labor-use levels and corresponding income levels which maximize the producer's utility.
established market areas increases, the number of middlemen at each
stage of the marketing process decreases. The producer has progressiv­
ly fewer alternative marketing outlets.

Numerous roles are actually and potentially performed by the
middlemen. In such capacities, middlemen are in positions to both
stimulate and inhibit developmental processes. Quite apparently,
their impact on these processes is an indication of the need for market
reform and the nature of needed reform measures. The roles which are
subsequently discussed are generally applicable to most less-developed
areas. Again, marketing boards, marketing cooperatives, and compulsory
marketings to public agencies also affect marketing structures in many
of these areas.

Want creation Since merchants and traders supply those goods
consumed but not produced, they represent the vehicles for expanding
the quantity and variety of consumer goods available to purchasers.
The introduction of new consumer goods, often imported goods, and the
creation of new consumer wants have favorably affected producers' be­
havior as evidenced by higher production levels and increased quanti­
ties marketed (6.4, 6.6, 6.25). In Africa where increases in production
and marketings have primarily been in nonedible export crops appended to
traditional food production patterns, increased exports need not have

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1 See Figure 8.5 in Chapter VIII for a diagrammatical representation
of this change in behavior. With regard to the lack of consumer goods,
Yudelman writes, "At present in many parts of Central and East Africa
the only sources of supply for 'incentive' goods are small trading posts.
Most of these carry a narrow and uninspiring range of products. The
apparent rewards for effort are restricted to the basic necessities of
daily life" (6.33, p. 175).
reduced the domestic supply of food. However, as specialization in production of export crops occurs, producer-consumers obtain increasing amounts of food items in the market. This specialization may reduce domestic supplies of food in the short run, but the increased market demand tends to increase returns to domestic producers and suppliers of food items which, in turn, may stimulate production.

Want creation may have adverse consequences too. New consumer goods may increase the importance of present consumption over future consumption with an adverse impact on saving and private investment in the firm. However, this phenomenon may only be temporary and primarily applicable to consumer goods that can be purchased in small quantities. As goods are introduced which require relatively substantial expenditures, the motivation for deferring present consumption may increase. At this point, another factor with longer-term consequences is relevant. This is the credit extended by merchants and moneylenders which borrowers use for obtaining new consumer goods. Higher indebtedness without an improved repayment capacity places the creditor in a stronger bargaining position vis-a-vis the indebted producer. The possible implications for required marketings to the creditor at prices determinable by the latter were discussed in Chapter V.

Credit to producers

Producers are often forced or inclined to make the bulk of intended marketings shortly after harvest. The absence of storage facilities and the demand for money to pay rent, taxes, debt obligations, and expenditures for post-harvest social events are the primary reasons for this seasonality of marketing. These expenditures are often made in kind rather than money. In either case, the producer
parts with his output. In areas where the more stable flow of income through multiple cropping or diversification of farm enterprises is not available, producers often have to resort to credit for financing consumption and production expenses until the next harvest period arrives. In addition, the need to make unplanned expenditures for unforeseen events often requires that the producer secures external financing. Such credit is provided by middlemen (6.13, 6.21, 6.31, 6.32). Wharton (6.32), for example, notes that producer indebtedness requires that the small-scale rubber producer in Malaya must continue to sell his rubber to the rubber buyer-lender who, in turn, makes regular deductions from his payments to the producer until the latter's debt is repaid. In some areas the rubber buyer is also a local merchant retailing consumer goods and production inputs to the producer. Indebtedness and purchases on account insure that the buyer-lender has a reliable source of rubber.1

Similar situations exist elsewhere where vertical trading relationships are established through the use of credit (6.12, 6.22, 6.23). By providing credit and perhaps price concessions to producers, the middleman becomes the marketing outlet for the indebted producer. At the same time, the middleman often obtains financing from a wholesaler or the next individual in the marketing chain to whom marketing obligations

1Ward (6.31) indicates that a similar middleman-lender system exists among the Chinese rubber producers in Sarawak. See adds that the Melanans producing sago in Sarawak are not as industrious as the Chinese and are included to withdraw from work after a certain amount of sago flour has been produced. Consequently, the Chinese middlemen-retailers attempt to keep the Melanans in debt. Under the threat of withdrawing future credit, the middlemen attempt to coerce sago producers into maintaining a more continuous supply of sago flour to them. Further, the debtor-creditor relationship reduces the threat of competition for supplies from other middlemen in the area (6.31, p. 152-3).
now exist. A similar pattern of credit advancement by moneylender-traders in India exists which effectively forces indebted producers to market their commodities with them (6.13, 6.19). Where assistance is offered by landlords, their tenants are often obligated to use the landlords as market middlemen.

The importance of credit in production and marketing is apparent. Credit advances by market intermediaries satisfy a mutual interdependence. That is, producers require financing for production and consumption expenditures while middlemen-lenders represent local sources of credit and marketing outlets. The latter individuals are also able to lessen the uncertainty surrounding continued source of supply from which to procure commodities and sources of demand for those consumer goods retailed. In addition, producers may find the relationship somewhat advantageous in that the uncertainty relative to marketing and credit decisions is reduced. Price and interest cost concessions may be given to clients of long standing. Tenants may be given preferential treatment in the distribution of plots of land for cultivation, in dispensation of personal and business counsel by the landlord, and in work obligations to and wage-labor opportunities provided by the landlord. Conversely, continued indebtedness maintains or increases the superior bargaining position of the lender relative to the borrower.

Collection, aggregation and distribution processes Producers located near marketing and consuming centers often engage in petty trading. That is, they do not rely on the first middleman to start their goods through the marketing channels; they are that first middleman. Producers located at successively farther distances from these centers are
confronted with increasing transportation, labor and time costs and decreasing awareness of existing and anticipated market conditions if they are to market their goods themselves. Due to the state of transportation and communications facilities, wholesalers rely upon a hierarchy of middlemen to search out the relatively-small quantities sold by individual producers, grade and bulk these commodities of variable quality, and transport them to collection points (6.5, 6.6, 6.21, 6.31). These operations are costly, in terms of labor and time expended, relative to the value of the commodities involved. Wholesalers find it economically advantageous not to employ and supervise a staff of employees to complete these labor-intensive operations (6.5). As mentioned previously, the opportunity cost associated with the middlemen's time and labor inputs is often not high. Consequently, each is willing to work for a relatively small absolute return. Collectively, such returns may be substantial in comparison to the prices received by producers and paid by consumers.

Middlemen perform similar operations in the distribution of domestically-produced and imported consumer goods. Due to relatively low per capita incomes and inadequate storage facilities, consumers make their purchases in small quantities at frequent intervals. Under such conditions, retail sales are highly labor-intensive. Consequently, middlemen and small retailers break down the aggregates into small lots and distribute the goods in the amounts demanded by consumers. Again, wholesalers would find these distribution procedures costly if they were to employ salaried workers to carry out these operations.
Communication of information on supply-demand conditions

With limited transportation and communications facilities and low literacy rates, exchange of information among middlemen at different stages is a principal means of identifying market conditions. Information is transmitted on the quantities and sources of supply and on demand for both agricultural commodities and consumer goods. These individuals also are in positions to introduce producer-consumers to new crops for which a market exists, to improved production inputs, and to new consumer goods. Conversely, the same middlemen transmit information to wholesalers relative to the adoption of new crops and changes in consumer demand.

Entrepreneurship and mobilization of resources

Entrepreneurship has important implications for economic development. Entrepreneurs are able to perceive and, subject to capital and social constraints, to exploit or take advantage of economic opportunities as they arise. Similarly, they are more responsive to changing market conditions and to public policies attempting to guide economic activity. Trading and performing other middlemen functions are important means for acquiring knowledge and experience of the workings of the market and of entrepreneurial activities (6.12, 6.21).^1 This is true for both small traders who aspire to expanding their scale of operations and for agricultural producers engaging in some trading activities. Since such trading often takes place in an environment of brisk competition, the economically and socially sagacious trader is rewarded for his efforts. Thus, the acquisition and perfection of entrepreneurial skills are seen as the

[^1]: Also see Marris (6.20).
means to economic survival.¹

The middleman's role in creating new wants leading to the mobilization and better use of available resources was discussed above. Further, his role in serving as the outlet for producers' marketings has been observed. Without adequate marketing outlets, increased production is largely consumed locally. Where such outlets exist, the means for channeling agricultural commodities and expenditures for consumer goods to other sectors of the economy exists. Thus, middlemen can serve as both the mobilizers and the redistributors of resources within the economy. Furthermore, middlemen's margins in both their marketing and retail distribution activities represent net transfers from the agricultural sector. Such capital accumulation can potentially be used for productive uses in other areas of the economy, including the marketing sector.

**Market speculation**  As intermediaries in the marketing process, middlemen are in a position to withhold quantities from the marketing channels in anticipation of higher future prices. Where individuals are obligated, because of credit advances, to move goods to the next middleman in the structure, the former forego the opportunity for speculation. As the market demand and supply schedules tend to be relatively steeply-sloped, temporary shifts of the supply schedule to the left by speculative withholding force prices upward. Some middlemen can now sell at higher prices with higher prices paid by consumers without producers benefiting from these price advances (6.2, 6.19, 6.28).

¹ As noted in Chapter V, the entrepreneurial activities of money-lenders may be individually rewarding but often have an inhibiting influence on the capability of agriculturalists to improve their economic well-being.
Speculative hoarding on the part of smaller-scale middlemen is constrained by their need for cash and limited storage facilities. Such gyrations in market prices do not facilitate short- and longer-term planning by producers.

**Number of middlemen**

As distance from marketing and consuming centers increases, the number of local buyers and middlemen generally decreases (6.6, 6.16). This is due to high transportation costs, the relatively small quantities, individually sold by producers, and limited knowledge of local production and market supply conditions. As mentioned previously, differentiation in product quality and marketings in small quantities require substantial inputs of labor in grading, bulking, simple processing, and transporting these commodities prior to sale to the next middleman or wholesaler. In general, the concentration of middlemen is found at the marketing level where buyers have collected the goods from the countryside and have brought these to a middleman for sorting and bulking processes. Where producers are in close proximity to this marketing center, they may bring the commodities directly thereby avoiding

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1 In a study of cotton and groundnut marketing in the Indian district of Rajkot in Gujarat State, Jasdanwalla observed that progressively fewer buyers were available at successive distances from the market center (6.16, Table LIV, p. 85). However, only 19.4 percent of those interviewed said they sold to a monopolistic buyer. The rest sold to two or more buyers. In addition, there was not a close association between the producer's size of operations and the number of buyers to which sales were made (6.16, Table LIII, p. 84). Jasdanwalla adds that in India a superior marketing mechanism for cotton and groundnuts exists relative to other agricultural commodities.
payment of the buyer's commission. More enterprising producers, togeth¬
er with landlords and merchants, often perform this initial col-
lection and transportation operation.

The large concentration of middlemen at this level is due to few
barriers to entry, a relatively low opportunity cost on time and labor
expended, and the opportunity to earn income through simple "value-
added" processes plus normal trading margins. Since these processing
and trading activities are labor-intensive in nature, require limited
capital outlays, utilize trading skills which can be fairly readily
obtained, and provide a quick turnover of capital or commodity stocks,
a large number of traders and producer-traders participate (6.5, 6.10,
6.21, 6.24). Similar attributes partially account for the large number
of individuals involved in distributing and retailing consumer goods.

Two additional factors are important. When middlemen operations
proceed beyond the scope manageable by an individual or his family,
additional administrative skills are required. The relative scarcity
of these skills and the uncertainties associated with hiring other in-
dividuals tend to motivate or constrain traders to operating on a small-
scale basis. In addition, the relative scarcity of both individual
savings and financing by public agencies for trading activities limit
the scale of individual operations. Where credit is advanced by higher
intermediaries, such credit is often provided on the security of personal
relationships and to a relatively large number of individuals so as to
spread the lender's risk. These factors interact to sustain a system
of small-scale traders.
Market-exchange system with merchant-trader

Equations 6.1 to 6.9 represented the conditions for individual and aggregate utility maximization in a pure exchange economy. Utility maximization was constrained by the values of producers' endowments; i.e., the purchasing power of the goods exchanged in the system. But the system was closed in that there were no leakages of goods from the exchange system nor external introduction of goods. Adding a merchant-trader to the exchange system provides a link with the external economy and a channel for outward movement of agricultural commodities and inward flow of consumer goods and production inputs.

How does this new participant in the system affect the activities of others? First, the range of goods available to consumers is expanded. Second, the merchant-trader often both purchases and later retails to producer-consumers the same type of agricultural commodities for consumption. Third, the merchant-trader often provides credit in kind to producers who have insufficient incomes or inventories to tide them over from one production and harvest cycle to the next. Depending upon the number of competitors, the merchant-trader may have both monopolistic and monopsonistic powers. Where producers are located close to the marketing area, they may engage in direct retailing to consumers in competition with the merchant-trader. Yet, because of the services provided by the latter, he is able to establish his own clientele and, in turn, exert

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1 In Equation 6.4, the direct consumption vector \( [c] \) can also include quantities of goods necessarily withheld from exchange for payment in kind of rent, taxes and debt obligations. Taxes and perhaps rent would represent leakages to the economy external to the exchange system.
influence over his purchasing and retailing activities. The development of improved transportation and communications facilities would tend to lessen these powers as competition among middlemen increases.

Figures 6.4 and 6.5 represent situations where the merchant-trader has both monopolistic and monopsonistic powers. The S curves represent the supply schedules; i.e., offer curves, of agricultural commodities by producers to the merchant-trader.\(^1\) Because the curves slope upward, the acquisition cost to the merchant-trader; i.e., the marginal expenditure for additional units denoted as \(\text{ME}_s\), increases as purchases are expanded.\(^2\) The merchant-trader has the options of selling these agricultural commodities to another trader and at a later date, to some of the same producers who initiated the marketings. In Figure 6.4, the merchant-trader is assumed to market his purchases with a trader or wholesaler at the next level in the marketing structure. Because of a limited number of competitors, imperfect communications systems, and differentiated products, the demand curve faced by the merchant-trader is assumed to have some downward slope. Consequently, marginal revenue is less than average revenue at each quantity demanded, and the marginal revenue curve lies below the demand curve at all points. If the merchant-trader is

\(^1\)Implicit in the supply schedules is the behavioral assumption that higher prices offered by the merchant elicit increased quantities of goods marketed with him. This assumption is re-examined in Chapter VII.

\(^2\)Total cost = \(\text{TC} = pq\) and \(p = f(q)\). Therefore, \(\text{ME}_s = \frac{d\text{TC}}{dq} = p + \frac{qdp}{dq}\). Because the supply curve, \(S\), slopes upward, \(\frac{dp}{dq} > 0\) and \(\text{ME}_s > p\).
Figure 6.4. Monopolistic and monopsonistic positions of the merchant-trader in wholesale trade

Figure 6.5. Monopolistic and monopsonistic positions of the merchant-trader as a retailer
a profit-maximizer, he will purchase \( Oq_1 \) units from producers at price \( Op_1 \). To the left of point M in Figure 6.4, the marginal revenue associated with an increment of the good is larger than the marginal cost of acquiring the increment. At point M, marginal revenue is equal to marginal expenditure and profit is maximized. In turn, the merchant-trader markets quantity \( Oq_1 \) at price \( Op_2 \) to another trader. Given the demand and supply schedules as drawn in Figure 6.4, the merchant is able to realize a margin of \( p_1p_2AB \) through his buying and selling activities. This margin represents total revenue of \( Op_2Aq_1 \) less expenditures of \( Op_1Bq_1 \). This margin also represents the merchant-trader's gross capital accumulation. The question then arises as to the disposition of this margin. The available alternatives depend upon the stage of economic development and would include some of the following:

(1) To purchase additional consumer goods thereby expanding both the quantity and variety of goods offered to consumers. The newly-offered consumer goods may motivate some producers to alter their preferences between income and leisure so that more labor inputs are utilized and agricultural output is increased. To the extent that margins are used to purchase imported goods for subsequent retail, capital leakages in the domestic economic system occur. Merchant-traders could also provide traditional and improved production inputs to producers to the extent they are available to the merchant;

(2) To invest in the marketing structure thereby creating links with other marketing areas through vertical ties with suppliers of consumer goods and purchasers of agricultural goods and through horizontal expansion of marketing outlets in other areas. Conceivably, the former
increases the flow of goods into and out of the market area with possible reductions in acquisition and unit transportation costs. Horizontal expansion of marketing facilities increases the number of retail and purchase outlets. The larger market may permit the merchant to realize some cost savings through bulk purchasing from both producers and wholesalers of consumer goods. It does not follow that such cost savings are passed on to others through higher producer prices and lower retail prices;

(3) To invest in areas other than marketing. Investments in land and housing are not directly productive. In fact, purchases of agricultural land further increase the control of the merchant-trader over producers. On the other hand, investment in government certificates increases the flow of government revenue, a part of which can be used for public investment and underwriting the cost of public policies; and

(4) To provide additional credit to producers and consumers. In doing so, the merchant-trader provides an important service. His position as a creditor, however, increases the potential for reducing the bargaining power and range of individual behavior of his clientele.

If additional merchant-traders enter the market to compete with the sales by the individual represented in Figure 6.4, the degree of monopolistic power accruing to the individual under consideration is reduced. The new demand curve faced by him will tend to have less slope than dd in Figure 6.4 and will shift toward the price axis. That is, at each price, the individual merchant-trader can only market a smaller quantity as competitors encroach upon his previously-existing market.
Let this modified demand curve be denoted as \( d'd' \). The new point of profit maximization is \( M' \). A larger quantity is purchased from producers at a higher price. The corresponding margin accruing to the merchant-trader is smaller than previously realized. A redistribution of income has taken place. In the aggregate, producers receive a larger revenue; the individual merchant-trader realizes a smaller marketing margin.

In Figure 6.5, the merchant-trader is represented as an individual who purchases, for example, rice from producers and then resells rice to them at a later date. The merchant retains the monopolistic powers he had in Figure 6.4 but has relatively greater monopolistic powers in Figure 6.5. The greater monopolistic power is implicit in the more steeply-sloping demand curve for the good he retails. The \( ME_{s}^{*} \) curve incorporates \( ME_{s} \) plus storage costs and any opportunity costs and, therefore, lies to the left of the \( ME_{s} \) curve. The merchant-trader's profits are maximized at point \( M \). He purchases \( Oq_{1} \) at price \( Op_{1} \) from the producer. Later, he retails the same quantity but at price \( Op_{2} \). The producer-consumer is exploited from two sides. If the price received by producers were \( Op_{e} \) corresponding to point \( N \) where the demand and supply schedules intersect, producers would not only be able to market a greater quantity at a price higher than \( Op_{1} \); but, in addition, as consumers they would demand a larger quantity at a much lower price. In fact, the merchant-trader would not be able to generate a capital surplus through his pricing, purchasing and retailing policies. He would only realize his normal profit from the transactions. Producers' profits are

\[ \text{The equilibrium at point } N \text{ ignores a consideration of the storage costs and any opportunity costs.} \]
revenues amounting to $O_p N q_2$ would also equal their expenditures for the quantity $O q_2$ of goods demanded at $p_e$.

Although the numerical scales in Figures 6.4 and 6.5 have not been specified, the market supply curves, the S curves, as drawn suggest that producers have a large number of price-quantity marketed combinations open to them. That is, the quantities marketed by producers are positively correlated with a wide range of prices received. As mentioned earlier, producers bring endowments to the market for exchange with other producers and for sale to the merchant-trader. With a given endowment during a marketing period, the producer has alternative outlets for his products and, in turn, can vary the quantities offered to individual purchasers as the price and exchange values vary. If the producer has storage facilities for relatively-nonperishable goods, he has more power over regulating the marketing of his commodities as market conditions change over time. Thus, producers with storage facilities are able, in the aggregate, to influence both the position and shape of the S curve from one production period to the next. Of course, the maximum amount they can market in any period is constrained by endowments or inventory stocks. At this quantity, the S curve becomes vertical; beyond this point, the price elasticity of quantity supplied to the market is perfectly inelastic.

The absence of storage facilities tends to accentuate the variability in market prices. At the end of the harvesting, large quantities of produce are typically marketed. The local market supply curve shifts substantially to the right while the demand curve for agricultural products would tend to shift to the left. The shift in demand is a consequence of producers now consuming from their own pro-
duction rather than purchasing food grains in the market. The inter-
action of these two factors tends to depress market prices in the im-
mediate post-harvest season. See Figure 6.6. During the planting and
pre-harvest period, diminishing inventories of agricultural produce
cause the local market supply curve to shift to the left, for example,
$S_{ph}$. At the same time, however, other producers who have exhausted
their stocks demand greater quantities in the market in order to tide
them over to the harvest season. Let this demand be represented by $D_{ph}$.
Consequently, prices are forced upward such as $p_{ph}$ in Figure 6.6. In
order to sustain consumption patterns during this period, producers with
low incomes and few savings often have to resort to credit financing from
a moneylender or credit in kind from the merchant-trader. The debt
obligations to the moneylender represent a demand on future income.
The merchant-trader also has a claim on future income; but because of
his role as a creditor and as a purchaser and retailer of commodities,
he is in a strong position to directly influence the economic well-being
of the producer. As a creditor, the merchant-trader can effectively
force the indebted producer to sell his output and purchase his consumer
goods from him at prices which are favorable to the merchant-trader.
At times, the merchant-trader is able to purchase the crop prior to
harvest at prices which are lower than would prevail in the market at
the time of harvest. In addition, the producer's reliance on the
merchant-trader to provide credit in kind permits the latter to increase
prices producers must pay for food and other consumer goods obtained
\footnote{To simplify the exposition, corresponding ME and MR curves are
not drawn in Figure 6.6.}
from him. In this situation, the producer does not have the market supply and demand options implicit in Figures 6.3 and 6.4. The prices he receives and pays are determined, or potentially determinable, by means external to the forces of the market.

Inadequate storage facilities and the demand for money for meeting tax, rent, and interest payments force or induce many producers to market the major proportion of their commodities following harvest. The post-harvest supply curve is designated as $S_h$ in Figure 6.6. As producers harvest their crops, the market demand curve for these commodities shifts leftward, such as $D_h$. The direction and magnitude of these two shifts depress market prices in the post-harvest period, for
Returning to Equations 6.1 to 6.5, the addition of the merchant to the exchange economy does not alter the producer's utility maximization process. Assume the merchant-trader buys only product $q_n$ from producers. The price paid producers is determined as in Figure 6.3. Since producers also consume $q_n$, the cost or valuation of consuming $q_n$ is the price the producer could have received; i.e., his opportunity cost, if he had marketed the $q_n$ consumed. Let $q_n^0$ and $p_n$ be defined as the quantity marketed by the producer and the price paid by the merchant-trader, respectively. Assume that the merchant-trader provides five goods not previously available to producer-consumers. The quantities which can now be demanded, the $q_{ir}$, range from $(i = 1, ..., n+5)$. In any production-consumption period, the prices $p_n$ through $p_{n+5}$ are essentially fixed by the merchant-trader. In Equation 6.2, which requires that the $r$-th producer-consumer's expenditures must equal his income, the $q_{ir}^0$ for $(i = n+1, ..., n+5)$ are all zero. The constrained utility maximization process is identical to that derived in Equations 6.1 to 6.9.

**Proportion of production marketed**

If the agricultural sector is to provide the food and fiber necessary for the expansion of other sectors and for generating foreign exchange earnings, more important than production levels are the quantities marketed and transfers of goods through payments in kind. If the producing unit consumes its entire production directly, essentially no contribution is made to development of the economy. No portion of this production is made available for sustaining other workers and for ex-
panding exports. Similarly, producers do not acquire the income through marketing which can be spent on consumer goods produced elsewhere in the economy. Therefore, from an economic standpoint, it is in the interest of national planners to attempt to induce the maximum movement of goods from the agricultural sector without adversely affecting future levels of production and private investment in the firm. Quantities marketed are a function of a number of factors, some of which are discussed below. Some of these factors also affect the time-distribution of marketings.

**Size of production unit** The absolute limit on quantities marketable is the amount harvested plus any carryover in inventories. If the net returns from marketings are extremely low, producers may not harvest a part of their standing crops, especially nonedible, cash crops. Small-scale producers are expected to consume directly a large proportion of the edible commodities they produce. However, data available for India do not show a strong positive correlation between percent of production marketed and size of land holdings. Table 6.1 represents a summarization of results from three studies concerned with this relationship.\(^1\) Columns (3) and (4) reflect only food grains marketed.

\(^1\)The three researchers have used different size groupings. Only Dharm Narain (6.11) explicitly states that only direct marketings by producers are included in his concept of marketed surplus. Consequently, payments in kind for wages and repayment of credit would not be included. However, payments in kind to other producers, such as rent and credit repayments to cultivating landlords, would be reflected in the surplus marketings of these individuals. In addition to tenure arrangements and variations in land productivity affecting production and marketing decisions, family size and direct consumption complicate any interpretation of size of marketings by the size of land holdings. For example, Jasdanwala, in her survey of Indian farmers, found a positive association between size of family and the proportion of land allocated to food grain production. (footnote continued on next page)
Table 6.1. Distribution of marketed surplus by size-grouping of land holdings in India

<table>
<thead>
<tr>
<th>Farm size (acres)</th>
<th>Value of marketed surplus as a percent of value of total agricultural production (1)a</th>
<th>Column (1) as a percent of total value of marketed surplus (2)a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.25 - 2.50</td>
<td>33.6</td>
<td>26.0</td>
</tr>
<tr>
<td>2.50 - 3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.75 - 5.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00 - 7.50</td>
<td>27.4</td>
<td>20.5</td>
</tr>
<tr>
<td>7.50 - 10.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.00 - 15.00</td>
<td>23.1</td>
<td>7.9</td>
</tr>
<tr>
<td>15.00 - 20.00</td>
<td>30.1</td>
<td>8.0</td>
</tr>
<tr>
<td>20.00 - 25.00</td>
<td>32.2</td>
<td>5.1</td>
</tr>
<tr>
<td>25.00 - 30.00</td>
<td>39.7</td>
<td>5.4</td>
</tr>
<tr>
<td>30.00 - 40.00</td>
<td>39.8</td>
<td>6.4</td>
</tr>
<tr>
<td>40.00 - 50.00</td>
<td>46.4</td>
<td>5.0</td>
</tr>
<tr>
<td>50.00 - 60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60.00 - 70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.00 - 100.00</td>
<td>51.4</td>
<td>15.7</td>
</tr>
<tr>
<td>100.00 - 150.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150.00 - and above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.00</td>
</tr>
</tbody>
</table>

a Dharm Narain (6.11, p. 35). Data apply to India for the 1950-51 period.

b Jasdanwalla (6.16, p. 31). Data apply to a sample of farmers in Rajkot District in Gujarat State for the 1956-57 period.

^A. M. Khusro as cited in Bansil (7.1, p. 28). Data apply to India for the 1953-54 period.
<table>
<thead>
<tr>
<th>Marketed surplus as a percent of total food grains production (3)^b</th>
<th>Column (3) as a percent of total marketed surplus of food grains (4)^b</th>
<th>Marketed surplus as a percent of total agricultural production (5)^c</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.6</td>
<td>1.2</td>
<td>5.8</td>
</tr>
<tr>
<td>13.1</td>
<td>10.3</td>
<td>32.0</td>
</tr>
<tr>
<td>18.1</td>
<td>19.6</td>
<td>34.6</td>
</tr>
<tr>
<td>8.5</td>
<td>7.0</td>
<td>15.1</td>
</tr>
<tr>
<td>11.4</td>
<td>9.9</td>
<td>35.5</td>
</tr>
<tr>
<td>31.5</td>
<td>25.3</td>
<td>37.3</td>
</tr>
<tr>
<td>14.0</td>
<td>6.2</td>
<td>34.2</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>36.6</td>
</tr>
<tr>
<td>57.5</td>
<td>20.5</td>
<td>34.6</td>
</tr>
<tr>
<td>100.00</td>
<td></td>
<td>53.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39.5</td>
</tr>
</tbody>
</table>
The other columns refer to all agricultural products.

Looking at columns (1), (3), and (5), the only indication of a positive correlation between farm size and the percent of production marketed is found in column (1) for farms larger than 15 acres. In all three studies, small-scale producers marketed a comparatively-large proportion of their production. See columns (1), (3), and (5).

Columns (2) and (4) reflect the percent of total surplus marketed attributable to producers of different farm size groupings. For example, in Dharm Narain's study, column (2), producers operating less than five acres of land marketed 26.0 percent of the value of total marketings by all producers. In column (2), a concentration of marketings at both extremes of farm size exists.

No concentration pattern is observable in column (4). The distributions in columns (2) and (4) are not comparable for a number of reasons. Column (2) reflects monetary values, includes all agricultural produce and applies to all India. Conversely, column (4) is based on physical quantities of food grains marketed and applies to a sample of 200 cultivators in a specific area of India. Among producers surveyed who were operating less than ten acres, their contribution (footnote continued from preceding page) Furthermore, a negative association between family size and the amount of marketable surplus of groundnut and cotton cash crops was observed (6.16, p. 32-33). Finally, in her sample of 200, a positive association between family size and size of land holding was evident (Table XIX, p. 40).

1Dharm Narain (6.11) presents two sets of estimates. Those given in columns (1) and (2) result from upward revisions of available estimates based on official statistics to reflect the estimated under reporting of these official statistics of food production. The values of agricultural output for each farm size were increased by 30 percent (6.11, p. 33-34).
ducers surveyed who were operating less than ten acres, their contribution to total marketed surplus of food grains was only 1.2 percent, as indicated in column (4). However, this size-grouping allocated about 58 percent of their land to producing groundnuts and cotton while about 41 percent was devoted to food grains production (6.16, p. 29). With larger farm sizes, there was a trend toward allocating relatively more land to food grains production than to the two specified cash crops. Consequently, if column (4) included cash crops, a larger percentage of total marketings would be found among the smaller farm size groupings.

Production of edible versus nonedible commodities Since production decisions are partially oriented toward consumption requirements, the proportion marketed partly depends upon whether the commodity is edible or nonedible. In addition, consumption preferences of producer-consumers must be taken into account. Edible commodities are also used for wages in kind and for livestock feed. Table 6.2 is a composite of several estimates from various sources of amounts marketed as a percent of production for several crops in India. The percent marketed is high for both edible and nonedible cash crops. For several food crops, the percentages are relatively low.  

1 Several other estimates are available in the collection of papers included in "Problems of Marketable Surplus in Indian Agriculture" of which (6.2), (6.17) and (6.29) are cited in this chapter. Yudelman writes that among African producers only about 20 percent of total production, including firewood and livestock, is marketed (6.33, p. 178). Solomon, writing primarily about the Middle East, states that family consumption, seed for the next production period, and the landlord's share of the tenant's crop absorb from 70 to 100 percent of peasants' production of agricultural staples, consisting primarily of food grains (6.28, p. 134).

2 In column (4) of Table 6.2, the relatively-high percentage of wheat marketed is attributed to the low preference for consuming wheat among inhabitants of Hyderabad (footnote continued on following page)
Table 6.2. Marketable surplus as a percent of total production for specified commodities in India and three Indian states

<table>
<thead>
<tr>
<th></th>
<th>All India(^a)</th>
<th>Punjab(^b)</th>
<th>Pepsu(^b)</th>
<th>Hyderabad(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>27.5</td>
<td>-</td>
<td>53.3</td>
<td>33.8</td>
</tr>
<tr>
<td>Wheat</td>
<td>37.7</td>
<td>24.8</td>
<td>28.9</td>
<td>66.6</td>
</tr>
<tr>
<td>Jowar</td>
<td>23.8</td>
<td>17.9</td>
<td>28.0</td>
<td>20.5</td>
</tr>
<tr>
<td>Gram</td>
<td>44.3</td>
<td>20.2</td>
<td>-</td>
<td>57.1</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>80.0 - 90.0</td>
<td>-</td>
<td>-</td>
<td>82.8</td>
</tr>
<tr>
<td>Cotton</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>93.7</td>
</tr>
<tr>
<td>Tobacco</td>
<td>97.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jute</td>
<td>97.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^a\)Srinivasan (6.29, pp. 112-113). The percentages have been obtained primarily from reports issued by the Directorate of Marketing and Inspection, and apply to differing, unspecified time periods. Srinivasan, writing in 1961, adds that some of the figures are out of date. Percentages are given for a number of other crops and some livestock products.

\(^b\)Kahlon and Reed (6.17, pp. 48-9). The percentages apply to the 1954-55 period.

Market Efficiency

Since the understanding of the operation of product and input markets in less-developed countries is limited, it is not surprising that relatively little is known about the efficiency with which markets operate. Too often, efficiency is imputed on the basis of estimated marketing margins and/or the apparent degree of competitiveness in (footnote continued from preceding page) State. Conversely, the low percentage of wheat marketed relative to rice in Pepsu State, column (3), reflects consumption preferences for wheat (6.17, pp. 48-9).
markets. Neither is sufficient for evaluating efficiency. What appear to be relatively-high marketing margins may be the consequence of high transportation costs and the amount of services applied to the good prior to retail to consumers. The difference between retail price and the price initially received by producers need not reflect exploitation of the latter. Similarly, a large number of middlemen at one stage in the marketing process may help to ensure that each earns only a minimum return. However, where credit advances my middlemen and merchant-traders are used to finance marketing and production activities, opportunities for price discrimination within the vertical structure of the marketing channels arise. Furthermore, the large number of middlemen is normally found only at first stages of marketing. At higher stages, relatively-few participants are found. Finally, poor transportation and communications facilities require that much of the market information be transmitted by word of mouth among middlemen. Regardless of the number of middlemen, such a communications system does not ensure that reliable market information is transmitted.

**Technical versus economic efficiency**

Technical efficiency abstracts from costs and returns. Only physical relationships are encountered. Producers operating in areas remote to marketing centers with poor transportation facilities are motivated to primarily gear production decisions to consumption requirements. The impact of improved marketing and transportation facilities in making incentive goods available to these individuals so as to raise the levels of production and quantities marketed has already been noted. However, investment in transportation and marketing facilities is
economically feasible only if the potential increment in quantities marketed is sufficient to keep per unit transportation and marketing costs sufficiently low so that the commodities can be competitively priced in internal and export markets. Technical efficiency, in terms of increasing the quantity of goods moving to the market or consumption center, may be offset by economic costs which make the modified market structure economically inefficient.

Mechanization of the grading, bulking and processing activities normally done by middlemen may improve the quality and timeliness of completing these operations. This potential technical efficiency is often offset by the costs incurred in maintaining and supervising a staff of employees to perform these operations (6.5). The small-scale producers and traders who have low opportunity costs associated with these labor-intensive activities can do the jobs at less cost to the wholesaler-purchaser. Again, economic efficiency is not synonymous with technical efficiency. Furthermore, mechanization displaces labor previously employed and earning incomes. Consequently, in addition to economic costs, social costs should be taken into account.

Of the two considerations, economic efficiency is always the more restrictive. If an innovation has the potential for increasing technical efficiency, it may also improve economic efficiency. If a technically-efficient innovation is not economically efficient under the prevailing cost structure, it may subsequently be economically feasible as prices and costs change.
Static versus dynamic efficiency

Static efficiency refers on how well the marketing system performs its functions when exogenous change is minimized; i.e., when usual economic activities take place. The influence of the forces of nature on production and potential marketings is exogenous and variable. However, when these forces operate in an essentially static economic framework, the concept of static efficiency of the marketing system still applies.

The essence of economic development is economic and social change. The impact of changes in public investment, export demand, sectoral resource demand, consumer preferences, and per capita real incomes on developmental processes is stifled if the marketing system is unable to accommodate and transmit such pressures and incentives to the relevant economic agents. Are changes in preferences effectively communicated to producers who, in turn, adjust production decisions accordingly? If public investment in irrigation facilities and extension services increase production levels, can the marketing system absorb the increased quantities marketed and move such quantities to areas of strongest effective demand? It is in this context that a consideration of dynamic efficiency is relevant.

Signals through the pricing mechanism Prices play important roles at the production, marketing and consumption stages. Such prices evolve through the interplay of the forces of supply and demand in the market place, regardless of the existing degree of competition. At times, public intervention in the form of price supports and price floors are employed in an attempt to guide economic activity. Beginning at the
production level, publicly-announced or estimations of prices likely to prevail in the future have a differential impact on producers. Where producers are primarily subsistence-oriented, consumption requirements are more important than market prices in planning resource allocations. If sufficient resources are available to produce more than necessary for basic consumption needs, price relationships become more important. The prices of concern to the producers are those he receives and pays. These are not the prices which exist in the marketing centers, but estimates of these prices adjusted for transportation costs and marketing margins. Where government-supported prices apply to specified procurement points, producers at varying distances from these points must still make allowance for transportation costs. In situations where producers are obligated to market their output with merchant-traders or landlords, supported prices and price floors have little or no impact on these producers. The impact may be on the consumption side when these producers are forced to re-enter the market at a later date to purchase some of the same commodities they previously sold.

The efficiency of using prices as signals depends not only upon their communication to producers and resource owners but also on the extent to which the price structure reflects consumers' preferences for quality differentials. As grading practices improve and price differentials are established for different quality grades, producers are better able to decide which quality to produce so as to maximize their objectives. When government price supports apply only to the higher grades of a commodity but internal and export markets exist for other grades, producers' resources tend to be allocated inefficiently. As
distance from the marketing center increases, so do the difficulties of communicating market information. Newspaper reports are of limited usefulness when literacy rates are low. Transmission by word of mouth results in the reliability of information being questionable by the time it reaches producers. Government pronouncements and reports of extension service personnel may be discounted by those who question the motives of government agencies.

Market prices may indicate that profits are maximized only if the production pattern is altered. Where prices indicate that a crop not previously produced is profitable, producers may not shift to production of that crop because of production and market uncertainties, managerial limitations, and inability to secure the complementary inputs necessary to maximize returns. Both attitudinal factors and credit limitations are operative. This underscores the need for coordinated adjustment within the economy.

**Resource mobility under price changes** An efficient marketing system requires that resources or production inputs move to their highest uses in the economy. Although land is essentially immobile, several studies of aggregate changes in cropping patterns in response to changes in relative prices indicate an intra-firm mobility of land services.

Labor mobility is relatively high in many areas. The rapidity with which individuals enter and engage in petty trading when economic opportunities exist has been noted. The hiring of labor for seasonal work is common even among small-scale producers who themselves may later offer labor services for hire either locally or at some distance from the farm. However, much of the labor migration from rural to more urban
areas is not in response to wage-earning opportunities. Indirectly, the pressure of population on land and the low returns imputed to labor likely force or induce some movement out of agriculture. Improved education, labor mobility and consequent contact with other life styles, and expanded communications systems, interact to generate a shift in occupational preferences away from agricultural pursuits. Even when job opportunities exist, economic and social costs are involved in securing employment away from home either on a temporary or permanent basis. The growth of labor unions tends to keep wages above the level which would equate supply and demand in the labor market. Unionized employees benefit; however, rising wages induce employers to consider adopting capital-using and labor-saving production techniques.¹

As already noted in Chapter V, credit transactions in rural areas tend to be localized. The links between central banking systems and rural lenders are few and relatively weak. Consequently, lending is largely constrained by the availability of local funds. While the channels for moving private capital into the agricultural sector are not well-developed, neither are mechanisms for transferring capital to other sectors of the economy. Some transfers take place through merchant-traders, tax payments, and rents to absentee landlords. However, in many areas, facilities for mobilizing individual savings for use within and outside of the agricultural sector are not available. For example, increased demand for credit in the nonagricultural sectors, as reflected

¹Of course, the situation is usually much more complicated. The price of capital goods to be substituted for labor must be taken into account. Considerations of quality control, labor-management relations, and labor skills provided by union members are additional factors.
in rising interest rates, does not stimulate an internal movement of surpluses and hoards from the agricultural sector if savings institutions and rural banks neither exist nor are integrated with the central banking system.

**Marketing margins** Few data are available on the margins accruing to marketing middlemen. The roles these middlemen play have been previously described. The question of the superfluity of middlemen revolves around their remuneration as compared with the utility or value-added to the commodity as a result of their activities. Utility is created as goods are transported to areas of consumption, processed, graded, bulked, and distributed through time. If fewer middlemen can provide the same services at the same or less cost to the consumer, then some middlemen are redundant. Social and economic costs accrue to those who are displaced. This is one of several externalities that economic development usually generates. However, lower marketing margins provide opportunities for increasing producers' returns while providing agricultural commodities to consumers and manufacturers at lower costs.

A reduction of the monopolistic and(or) monopsonistic gains represented in Figures 6.4-6.6 results in higher prices paid to producers and lower prices charged to wholesalers or final consumers. As long as these marketing powers persist, increases in quantities demanded and supplied; that is, rightward shifts of both curves, tend to increase the margin accruing to the merchant-trader. If the market mechanism operates properly, additional resources should be drawn into the marketing system thereby increasing the level of competition and reducing the marketing margins of most participants. To the extent that higher mar-
ket prices for producers stimulate private investment, increased production, and larger marketings, the inability of the marketing system to absorb these increases may subsequently dampen market prices and, in turn, producers' incentives.

Marketing "surpluses" are augmented by turning the terms of trade against the producer; i.e., by lowering the prices he receives relative to what he pays. This is tantamount to forced saving on the part of producers and capital extraction from the firm and, perhaps, the agricultural sector. While this may be the role of the agricultural sector in initiating and sustaining general economic development, it is not sufficient because two factors have been ignored. First, how does the merchant-trader utilize the net flows of capital from agricultural producers? Second, is general economic development accelerated by capital movements out of the agricultural sector, especially at early stages of development? The answer lies in whether the producer or the merchant-trader makes the most productive use of these capital resources and in the effect on producers' incentives and objectives as capital is extracted from the agricultural sector. Adverse terms of trade may induce the producer to tend to withdraw from the market economy and concentrate on subsistence-oriented production, leaving a portion of his resources temporarily unemployed.

As long as marketing decisions are tied to credit advances, opportunities for realizing abnormal returns by middlemen persist. If marketing margins are excessive, Bauer (6.5) asserts that this is only temporary. Additional middlemen will enter, competition will increase, and individual middlemen margins will be minimized. Alternatively, pro-
ducers can bypass the middlemen and sell directly to the consumer. Of course, this is dependent upon an awareness of existing market conditions. Those who must market through creditors and landlords do not benefit from the increased competition. In addition, social ties and personalized services create opportunities for market margins in excess of those which would result under more competitive conditions (6.7, 6.10).

Product differentiation The heterogeneity of quality among products marketed and the relatively-small, individual marketings require a large number of first-stage middlemen to engage in bulking and some grading activities. This need also provides employment opportunities for a number of people who otherwise would be unemployed or more seriously underemployed. The lack of standardization of quality grades and the application of reliable grading procedures in the marketing system have two potentially-detrimental consequences. First, when prices received and paid do not reflect quality differentials, both producers and consumers are penalized.\(^1\) Resource allocation and consumption decisions tend to be economically inefficient. Second, since wholesalers cannot rely on maintenance of standardized grades, purchases must be made through a series of middlemen. That is, wholesalers cannot place orders to sources of supply for specified amounts and grades at particular prices with assurances that such deliveries will be made. This constraint certainly inhibits longer-term planning on the part of wholesalers and retailers (6.9, 6.10).

\(^1\) Actually, if market prices reflect something approaching average quality, producers of lower quality outputs realize a positive externality in terms of higher prices received.
Equalization of prices Where an efficient market is operative, market prices for similar qualities of a good should differ among alternative markets only by transportation cost differentials. Rising market prices due to excess demand in one region will induce a movement of goods from relatively-surplus areas where lower market prices prevail. If this price plus unit transportation costs is less than the market price in the region of excess demand, producers and marketing middlemen will find it profitable to transfer goods into the latter area. Similar reasoning applies to labor and capital movements. As wages and interest rates rise in the growth centers of the economy, additional resources should be attracted and the price rise dampened. As resources leave the areas of relatively low wages and returns on capital, the supply curves for these resources would tend to shift leftward thereby, ceteris paribus, raising wages and interest rates in those localities.

Jasdanwalla (6.16), in commenting on groundnut marketing in a particular area in India, concludes that intra-regional price differentials were primarily due to locational factors, producers' decisions as to time and place of marketing, and marketing obligations arising out of credit advances. She indicates that these considerations "... had their origin in factors external to the market as such or peculiar to the cultivators themselves. ..." (6.16, p. 104). Consequently, she concluded that price differentials were not due to market imperfections or inefficiencies. But this is a rather tenuous conclusion which, at the most, has only a static application. The preponderance of marketings were made at the time of harvest. Higher prices were received by those who could store and market at a later date. However,
the lack of storage facilities within the marketing system and (or) the obligation to market with those advancing credit, both resulting in differential prices to producers, are rather explicit examples of market imperfection, if not inefficiency. The system is inefficient since many producers are forced to sell when prices are low. The opportunities for returns through market speculation accrue to the owners of storage facilities.\(^1\) Prices fluctuate within the season and from year to year. This is generally detrimental to both producers and exporters. The system is imperfect because indebted producers are not free to market their output where they can obtain their best price advantage.\(^2\) In addition, little is known about marketing efficiency at subsequent stages of the marketing system.

**Public Investment in the Economy's Infrastructure**

Public investment in the existing infrastructure is often implemented to generate a complex of pressures and incentives designed to be instrumental in mobilizing domestic resources, attracting foreign capital, and increasing resource productivity. For example, the building of a road to a region previously inaccessible by public transportation may induce settlement of the region and employment of previously-untapped re-

\(^1\)It is not known to what extent the increase in market prices reflects storage costs and allowance for risk or whether returns in excess of these considerations are obtainable.

\(^2\)Among indebted producers, around 25 percent of borrowings by producers of all sizes of land holdings were obtained from trader-money-lenders. The actual percentages varied from 22.3 percent to 47.4 percent for producers having holdings ranging up to 80 acres. Among those operating in the 10-80 acre groupings, the majority of borrowings were made from cooperative credit societies and land mortgage banks. Credit from these institutions was not tied to marketing obligations (6.16).
sources. If already populated, transportation facilities offer opportunities for increased access to output, input, and consumer goods markets which have implications for resource mobility and production incentives. ¹ In this case, the investment in transportation facilities can be viewed as an instrument variable. A favorable impact on communication and marketing facilities will likely be a secondary result. If education facilities are unchanged, they serve as a parameter in this program to stimulate developmental process.

It is intuitively apparent that given the objectives to be pursued by the government ² or national policymaker, an optimum government program for investment in social overhead capital facilities exists. The problem is to determine this optimum program subject to constraints such as (1) The limited amount of funds available for investment, (2) The availability of administrative resources to construct and implement the program, (3) The necessity to integrate and coordinate this program with other measures undertaken by the government, and (4) The availability of reliable data for planning purposes. Furthermore, considerations of political and social stability must be taken into account. To some extent, these should be reflected in the policymaker's objectives. Where economies of scale provide an economic rationalization

¹In this connection, Neumark comments, "... it can hardly be overemphasized that lack of transport and related marketing facilities present the most considerable obstacle to the exploitation of the latent opportunities for the development of interregional trade in Africa" (6.27, p. 47).

²Government objectives are partially discussed in Chapter VII, "Government Programs and Policies".
for investment in relatively few but large-scale projects such as fertilizer plants and agronomic research farms, political pressures may effectively force the government to modify economic considerations and construct a series of small-scale operations which are more widely spread throughout the countryside. Also, since international airports, heavy machinery and ostentatious public buildings are viewed as characteristic of relatively-developed countries, nationalistic pressures may motivate governments to invest in these ventures in an attempt to provide visible evidence that the gaps between these two classes of countries are narrowing. Thus, national planners must engage in an assessment of the costs and benefits associated with alternative government investment programs of varying magnitudes and duration of time.

The impact of the infrastructure and modifications through public and private investment on resource use and productivity have already been alluded to in the preceding discussion.1 The "spread effects" emanating from this infrastructure condition a number of phenomena influencing economic activity. Quite apparently, the strength and scope of these "spread effects" vary with the stage of economic development, the existence of complementary programs, and nature of the resource base, including the population component.

The thesis advanced here is that primary responsibility for the creation and operation of an infrastructure generating pressures and incentives facilitating economic progress must be borne by the government.

1 The magnitude, composition, and quality of a country's infrastructure can be improved through appropriate investment in these facilities. Conversely, deterioration with deleterious effects on economic activities can arise through lack of maintenance and public regulation.
ment, whether central or regional. This responsibility is expensive both in terms of financial and administrative resources. Furthermore, a balance between public and private initiative must be pursued whether national planning is done on a centralized or decentralized basis.

Returns to private investment

Two factors are operative which discourage private investment in the infrastructure of the economy. First, few individuals possess or have access to the financial resources necessary to construct a dam and irrigation facilities or to implement an educational system. Second, the inability to capture the costs and benefits of private investment, such as in reclamation and conservation measures, which become externalities to other producers in the area reduce the attractiveness of this type of investment. One exception, already noted, which is essentially unaffected by these two factors is the relative ease with which producers and family members can enter the area of petty marketing. Not only is this form of activity labor-intensive which provides an outlet to labor seasonably or chronically underemployed, but relatively little capital is necessary and the personal skills involved are not demanding and are acquired relatively easily.

As a result of public investment, some producers have improved opportunities for augmenting net returns through a reallocation of re-

1Capital requirements are relatively high with high capital/output ratios for building railroads, paved highways, and communications media. However, the construction of roads adequate for animal and bicycle transportation and the construction of bunds and terraces are or can be projects which are relatively labor-intensive in nature. Despite the unpretentiousness of the latter, they nevertheless constitute modifications of the economy's infrastructure resulting in a potentially-positive effect on agricultural productivity.
sources within the firm and through private investment in the firm. The impact on private investment can be discussed with reference to Figure 6.7.\(^1\)

Additions to capital stock are now viewed from the macro-economic viewpoint. Consequently, the supply curve for capital goods, \(S\), slopes upward because of rising costs in producing these goods. The MEI curves slope downward because of the rising costs of capital goods and diminishing physical returns to increments of investment, both tending to reduce net economic returns to investment.

---

\(^1\)A discussion of the nature of the curves and the mechanics of making investments to the capital stock in succeeding time periods was presented with reference to Figure 5.2 in Chapter V.
From a macro-economic viewpoint, the MEC curve for the agricultural sector; i.e., the aggregation of firms within the sector, is dependent upon the existing agricultural infrastructure. Thus, the government is able to modify the slope and position of the MEC curve through judicious investment programs designed to affect the rate of investment and capital accumulation in the agricultural sector. If MEC results with government investment, ceteris paribus, the rates of investment and capital accumulation are unchanged. However, $K^*$ representing the optimal capital stock has increased. If it is possible to twist the MEC curve and change its position as with MEC, both the rate and absolute amounts of capital accumulation can be varied. If the MEC curve were twisted counter-clockwise, relative to $MEC^0$ and $MEC^1$, the rate of capital accumulation would be accelerated and, in turn, the length of time necessary to reach $K^*$ would be reduced. Furthermore, government investment in the capital goods industries could affect the shape of supply schedule for capital goods, $S$. This would alter the corresponding family of MEI curves and the rate at which private investment is undertaken. If $S$ is horizontal up to the capacity constraint, the rate of investment is invariant; if $S$ rises sharply, so does the rate of investment. In Figure 6.7, $i_o$ is also an instrument variable through which the government can affect $K^*$ and the level of investment.  

1 The effectiveness of using $i_o$ as an instrument variable by affecting the interest rate or structure of interest rates through monetary policies is dependent upon the degree by monetization of the economy and the strength of the linkages between the central bank or central monetary authority and existing credit institutions throughout the economy; i.e., the development of the monetary system as one component of the overall infrastructure of the economy.
Need for an Efficient Marketing System

The marketing mechanism potentially performs an important role in stimulating and sustaining developmental processes. It can be viewed as an instrument variable and the leading sector in economic development.\(^1\) At times, however, the marketing system is viewed either as performing a passive role or as essentially adapting in the right direction and proportion as economic change takes place (6.9, 6.26). This is partially an outgrowth of the contention that marketing is unproductive. But as has been noted, the activities of marketing agents create utility of time, form, and space. Where utility has been created, a productive act has taken place.

The need for a marketing system arises when labor specialization is underway so that each producing unit is no longer entirely self-sufficient. In addition, the creation and growth of export markets require development of an indigenous marketing system which can supply export goods on a competitive basis. Now the need for an efficient system comes into focus. The export demand is for particular goods, at designated qualities, and at specified price-quantity relationships. An efficient marketing system would channel this information to potential producers. Even if some producers can produce the export crop at a price which covers their per unit costs, a partial shift of resources to cash crops may not be rational. First, allocating resources to cash crops may mean that producers are unable to produce enough food.

\(^1\) Barber comments, "Where access to markets has permitted the sale of agricultural surpluses, the African has apparently intensified his efforts as a farmer, produced more, and sold a surplus for cash" (6.3, p. 251).
to meet their own consumption requirements. Thus, if other producers in the marketing area cannot fill this excess demand for food at cost less than or equal to the producer's net income from growing cash crops, the producer will choose to produce food not cash crops. The marketing system must be able to move goods from areas of "surplus" production to "deficit" areas at a cost such that sufficient effective demand in the latter areas is able to absorb these "surpluses". High middlemen margins and transportation costs attendant to moving these goods, ceteris paribus, reduce effective demand in the "deficit" areas.

Second, if food consumption requirements can be met and additional income can be generated through producing a cash crop, the utility from this additional net income must be greater than the disutility of additional work plus allowance for any risks involved. That is, the amount of utility obtainable through increases in income depends upon the demand for income. Such demand, in turn, is largely a function of desired expenditures for consumer goods. At this point, another aspect of an efficient marketing system is introduced. This aspect is the efficiency with which wholesalers and retailers operate in the distribution of consumer goods, both imported and indigenously-produced. Evidence has been cited earlier of the effect of the availability and variety of consumer goods on producers' activities and, implicitly, their demand for additional income. The costs at which such goods are made available to consumers is obviously important. Obversely, the reliable transmission of consumers' preferences to wholesalers and retailers is necessary for the procurement and efficient distribution of these goods.
The importance of low-cost food and agricultural raw materials in sustaining general economic development, the potential market for consumer and producer goods among the masses of rural people if they are able to realize higher per capita real incomes, and the potential flow of resources from the agricultural sector to support other sectors of the economy all suggest the need for an efficient marketing system. Reductions in per unit transport costs and marketing margins, improved information on inter-regional supply-demand conditions, and the availability of improved production inputs at costs which make them accessible to large numbers of producers all tend to raise returns to producers and keep costs to consumers relatively low. Higher monetary returns to producers, ceteris paribus, increase their purchasing power for consumer and producer goods. Lower food costs tend to increase the real income of consumers. Given a relatively high income elasticity of demand for food in most less-developed areas, higher real incomes also increase the demand for agricultural commodities. Reduction in transport and marketing costs also improve the competitive position of agricultural commodities in the export market. Competiveness is extremely crucial here because of the importance of generating foreign exchange earnings for procuring capital and consumer goods for domestic consumption.

To maximize individuals' objectives, the market mechanism must reliably transmit consumers' and resource owners' preferences and producers' demand for production resources. Inaccurate transmission of consumers' preferences distorts resource allocation decisions for both agricultural producers and manufacturers. The efficient operation of resource or factor markets improves the possibility of resources moving
to their best uses. This is essential for coordinating the growth of the economy. An efficient market system also facilitates longer-term planning on the part of all participants in the economy, including national planners.

Market reform alters the distribution of income in the economy. Since the marketing middlemen are often considered to be unproductive even though earning a return, their elimination is considered essential and desirable. Yet, their incomes represent forms of capital accumulation. From the standpoint of overall economic development, the question arises as to whether this capital, in the form of the middlemen margin, is used more effectively by marketing middlemen or by producers who realize higher incomes as marketing costs decline. The answer depends upon the effect on incentives and individuals' objectives. As has been noted, however, in many areas middlemen in the first stage of the marketing process are also agricultural producers realizing supplemental incomes. If marketing middlemen are to be reduced through reform measures, provision must be made for absorbing the services they provided. For example, in their role of providing credit to producers, their elimination requires that producers be able to secure credit elsewhere. Their role of transmitting market information must be assumed by government extension personnel and improved communications media. Their role of bulking, grading, and transporting the initially-small quantities marketed must be assumed by other personnel or machines. The absorption of services provided by the middlemen is not without economic and social cost to the society in question. The monetary costs of reform are evident. The displacement of a large number of middlemen who, at least in-
Initially, cannot secure alternative employment also involves social and perhaps political costs. These costs must be weighed against the potentially higher unit returns to producers and lower costs to consumers.
Literature Cited


Factors affecting the economic and social well-being of agriculturalists in less-developed countries and agriculture's contribution to general economic expansion

by

Roger Wayne Hexem

Volume 2 of 2

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Major Subject: Agricultural Economics

Approved:

Earl O. Heady
In Charge of Major Work

Karl C. Forp
Head of Major Department

Frank F. Myer
Dean of Graduate College

Iowa State University
Of Science and Technology
Ames, Iowa

1971
# TABLE OF CONTENTS

## CHAPTER VII. GOVERNMENT PROGRAMS AND POLICIES

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Price Policies</td>
<td>331</td>
</tr>
<tr>
<td>Acreage response to output price relationships</td>
<td>334</td>
</tr>
<tr>
<td>Acreage response to prices plus additional independent variables</td>
<td>339</td>
</tr>
<tr>
<td>Yield response to price relationships</td>
<td>357</td>
</tr>
<tr>
<td>Quantities marketed as a function of market prices</td>
<td>364</td>
</tr>
<tr>
<td>Public price supports, ceilings, and subsidizations</td>
<td>370</td>
</tr>
<tr>
<td>Monetary and Fiscal Policies Affecting the Agricultural Sector</td>
<td>386</td>
</tr>
<tr>
<td>Monetary policies</td>
<td>388</td>
</tr>
<tr>
<td>Fiscal policies</td>
<td>390</td>
</tr>
<tr>
<td>Personal income tax</td>
<td>393</td>
</tr>
<tr>
<td>Property taxes</td>
<td>399</td>
</tr>
<tr>
<td>Turnover taxes</td>
<td>402</td>
</tr>
<tr>
<td>Tax on production inputs</td>
<td>405</td>
</tr>
<tr>
<td>Import and export taxes</td>
<td>407</td>
</tr>
<tr>
<td>Marketing boards</td>
<td>408</td>
</tr>
<tr>
<td>Agricultural Extension Services</td>
<td>410</td>
</tr>
<tr>
<td>Other Public Programs and Policies</td>
<td>412</td>
</tr>
<tr>
<td>Literature Cited</td>
<td>419</td>
</tr>
</tbody>
</table>

## CHAPTER VIII. VALUES, ATTITUDES AND OBJECTIVES OF AGRICULTURALISTS AS PRODUCERS AND CONSUMERS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion</td>
<td>425</td>
</tr>
<tr>
<td>Hinduism</td>
<td>430</td>
</tr>
<tr>
<td></td>
<td>433</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Islam</td>
<td>436</td>
</tr>
<tr>
<td>Buddhism</td>
<td>438</td>
</tr>
<tr>
<td>Traditional African religion</td>
<td>440</td>
</tr>
<tr>
<td>Civil-religious hierarchy in Latin America</td>
<td>443</td>
</tr>
<tr>
<td>Extended Family</td>
<td>445</td>
</tr>
<tr>
<td>Other Values and Attitudes Influencing Individuals</td>
<td>452</td>
</tr>
<tr>
<td>Objectives</td>
<td>467</td>
</tr>
<tr>
<td>Savings</td>
<td>478</td>
</tr>
<tr>
<td>Investment</td>
<td>481</td>
</tr>
<tr>
<td>Nonproductive investment</td>
<td>483</td>
</tr>
<tr>
<td>Productive investment</td>
<td>485</td>
</tr>
<tr>
<td>Literature Cited</td>
<td>489</td>
</tr>
<tr>
<td>CHAPTER IX. INTEGRATIVE APPROACH TO AGRICULTURAL DEVELOPMENT</td>
<td>495</td>
</tr>
<tr>
<td>Production</td>
<td>497</td>
</tr>
<tr>
<td>Outputs and valuations</td>
<td>498</td>
</tr>
<tr>
<td>Working capital constraint</td>
<td>498</td>
</tr>
<tr>
<td>Land constraint</td>
<td>501</td>
</tr>
<tr>
<td>Implicit production function</td>
<td>501</td>
</tr>
<tr>
<td>Marginal conditions for economic efficiency</td>
<td>502</td>
</tr>
<tr>
<td>Exchange Economy</td>
<td>505</td>
</tr>
<tr>
<td>Case 1: Planned Production Equals Planned Consumption</td>
<td>509</td>
</tr>
<tr>
<td>Case 2: Actual Production Exceeds Planned Production of $q_n$</td>
<td>512</td>
</tr>
<tr>
<td>Case 3: Actual Production is Less Than Planned Production of $q_n$</td>
<td>518</td>
</tr>
</tbody>
</table>
Case 4: Production in Terms of Exchange Values With "Surpluses" Generated by Several Producers
Larger quantity of goods available for consumption
Change in the terms of trade
Degree of exploitation by the merchant-trader

Case 5: Introduction of Government Programs
Public investment in the form of food assistance
Public investment in the infrastructure of the agricultural sector
Public pricing policies

Case 6: Economic Decisions in Terms of Market Conditions With Intertemporal Private Investment
Saving and lending decisions
Investment decisions

Partial Equilibrium in the Input Market
Net suppliers of $q_2$, $q_3$, and $q_4$
Landless laborers and net suppliers of $q_1$
Producers with positive excess demand for credit, $q_4$, for use in procuring $q_1$, $q_2$, and $q_3$

CHAPTER X. FRICTION POINTS OF AGRICULTURAL DEVELOPMENT: SUMMARY
Production
Working-capital constraint
Tenure Arrangement
Opportunity cost component, $\mu$
Consumption
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price elasticity of demand for direct consumption, g</td>
<td>578</td>
</tr>
<tr>
<td>Income elasticity of demand for direct consumption, h</td>
<td>580</td>
</tr>
<tr>
<td>Private Investment</td>
<td>582</td>
</tr>
<tr>
<td>Initial investment cost</td>
<td>582</td>
</tr>
<tr>
<td>Estimated net returns</td>
<td>583</td>
</tr>
<tr>
<td>Discount factor, $\rho$</td>
<td>583</td>
</tr>
<tr>
<td>Length of planning horizon, $n$</td>
<td>584</td>
</tr>
<tr>
<td>Summary</td>
<td>585</td>
</tr>
<tr>
<td>LITERATURE CITED</td>
<td>590</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>605</td>
</tr>
<tr>
<td>APPENDIX A: TABLES</td>
<td>606</td>
</tr>
<tr>
<td>Literature Cited</td>
<td>614</td>
</tr>
<tr>
<td>APPENDIX B: KRISHNAN'S FORMULATION FOR PRICE ELASTICITY OF MARKETED SURPLUS</td>
<td>615</td>
</tr>
<tr>
<td>APPENDIX C: ALTERNATIVE FORMULATIONS FOR PRICE ELASTICITY OF QUANTITIES MARKETED</td>
<td>619</td>
</tr>
<tr>
<td>APPENDIX D: DERIVED SHORT-RUN DEMAND FOR LABOR AND CAPITAL</td>
<td>625</td>
</tr>
</tbody>
</table>
CHAPTER VII. GOVERNMENT PROGRAMS AND POLICIES

The concern by governments of less-developed areas for stimulating economic development is reflected in the emphasis given to national planning for growth and development. National planning and consequent mobilization and guided allocation of resources are viewed as the means for accelerating economic progress and lessening the economic gap with the relatively-developed countries. Devising a plan indicates a concern for rationality. This rationality is expressed in terms of maximizing planning objectives subject to resource and technical constraints and to political feasibilities.

National plans are of varying ambitions ranging from public exhortations and minimal investment programs to the centrally-planned economies of Communist countries. Planned development is expensive in terms of capital resources and administrative inputs, both considered to be relatively scarce in less-developed areas. Conversely, emphasis on a laissez faire approach to economic growth has been costly in terms of lagging growth rates, adverse foreign trade positions, and wide disparities in the distribution of wealth and income. Coupled with high population growth rates, these factors have interacted to impede general economic expansion in many countries. The shortage of reliable data limits the scope of planning. Poorly-conceived and poorly-implemented plans are rarely able to produce the results which planners have at least partially conditioned people to expect. Planners can attribute the inability to achieve publicized objectives to some exogenous force, but successive plans will likely be viewed with increased skepticism.
The success of implementing and sustaining government measures is contingent upon the existence of a stable government. In the absence of stability, the consequent uncertainty surrounding future economic activity has adverse effects on private and foreign investment, on willingness to participate in government programs, and on the capacity and motivation to engage in long-term planning, both on the national and individual-firm levels.

Democratic processes theoretically provide individuals and individuals' representatives with the means for expressing policy preferences. However, strict parochial interest are not likely consistent with national and regional provisions of a developmental plan which abstracts from political and social considerations and focuses primarily on economic targets. This does not preclude subsequent consideration of individual economic and social well-being, however. These aspects can be dealt with through policies of taxation, transfer payments, and national welfare programs. Stating the situation alternatively, a trade-off or substitution may exist between economic merits and political stability. This has been apparent in some land reform programs where political expediency or necessity resulted in re-distribution of land into a large number of economically-unviable parcels of land--at least unviable over longer periods of time.

The politics and economics of change are necessarily intricate and intertwined. Considerations of social justice and lengths of planning horizons further complicate efforts of national planners to effect plans and policies which are administratively feasible, economically sound, and politically acceptable. Since few governments have the re-
sources to involve nearly all economic entities in developmental programs, national planners must select those sectors and geographic regions which will be most responsive to government instrument variables and which will operate as "leading sectors" in developmental processes. Certain geographical regions or groups of individuals in some regions may be temporarily "forgotten" in that government programs focus on the most responsive areas and where short-term returns are highest. Spreading resources so thinly that nearly everyone is involved usually precludes generation of those externalities and economies of scale important to stimulating private initiative. However, since social and economic costs will subsequently be involved in eventually integrating these groups more fully into the economic system, planners must also take these future costs into account. The dispersion of communications media reduces the possibility and rationality of temporarily "forgetting" individuals and areas.

The government can play a number of roles in influencing economic growth and development. Loosely, the government attempts to guide the fingers of Adam Smith's "Invisible Hand" so as to realize planned objectives. Public investment in the infrastructure of the economy to affect economic incentives and resource mobility was discussed in the preceding chapter. Monetary and fiscal policies provide means for influencing the growth and direction of economic activity. Sectoral policies such as land reform, provision for rural credit, price support programs, and expansion of export markets have a potentially-favorable impact on sectoral growth. Again, however, sectoral policies require capital and administrative resources which have opportunity costs.
For example, a unit of capital may be used in constructing an irrigation system, in expanding education facilities, or in importing capital goods for industrial uses. Thus, sectoral programs should be coordinated with other public policies in an attempt to maximize the return on resources over time. Yet, there is an inherent danger in the government's undertaking of these roles. This danger is that individuals rely too much on the government so that individual initiative and enterprise necessary for complementing government activities is not forthcoming.

**Public Price Policies**

To the extent that producers and consumers respond to price incentives and changes in price relationships, the government has a means for influencing producers' production patterns, quantities marketed, and demand for consumer and producer goods. The direction and scope of pricing policies depend on the extent to which the existing state of economic activity differs from a preferred but feasible state. These preferred situations are usually associated with implicit or explicit national plans which have target objectives in terms of domestic food and fiber supplies and import-export balances. For coordinated and integrated developmental plans, the failure to realize planned production and market supply levels tends to inflate domestic food and fiber prices. In the absence of trade restrictions, price rises may be dampened by reduced exports and increased imports which increase supplies available for domestic consumption. That is, higher internal prices attract imports and decrease the opportunities for exports. The foreign exchange position, however, tends to deteriorate which, in turn, reduces the
country's capacity to import needed capital goods--capital goods which are integral to implementing and sustaining the development plan.

If producers are responsive to rising market prices, especially if production costs tend to increase at a slower rate, increased production and larger quantities marketed would dampen price advances. Several questions are introduced at this point; a sampling follows. First, the question of the impact of changing market conditions on resource allocation and production decisions arises. For example, as market prices vary, to what extent are these variations reflected in prices received and paid by producers? These latter prices are the ones relevant to producers. What is the producer's capacity for adjusting farm operations in response to changing price conditions? Such capacity varies with whether the adjustment is of a short-run nature or on a longer-term basis. Second, the question of aggregate production response versus a response to changing relative economic conditions is raised. That is, if the profitability of each output is raised by the same degree so that relative profitability of outputs is unchanged, is there an increase in the output level of each commodity as the result of using additional variable inputs or are the previous input-use levels maintained, absolutely and relatively? Again, the period of adjustment under consideration must be specified in that more opportunities for private investment and adjustment of firm operations exist as the planning period is lengthened. Third, most producers retain a portion of their output for direct consumption. Therefore, as economic incentives vary, a production response may result and, in turn, a response in the quantities offered for marketing. Increased production
and direct consumption and consequent improved physical well-being may have a positive influence on subsequent production. However, in terms of supplying the food needs of noncultivators and export demand, the quantity marketed is the important phenomenon. The level of marketings is conditioned by existing consumption levels and by producers' objectives.

Several studies have attempted to provide an empirical basis for answering these questions. Others attempt answers on an a priori basis. An increasing amount of effort has been devoted to examining the degree of responsiveness in production patterns as price relationships vary. Relatively less is known about the responsiveness in terms of quantities marketed. The production response studies are usually based on time-series data and relate to adjustment in cropping patterns rather than aggregate production response. In some cases, the time-series data on prices represent a confounding of positive public price policies and of changes due to variations in market supply-demand conditions independent of public pricing policies.

Considering a single commodity, output is the product of area and yield, as in Equation 7.1 where

\[ O = A \cdot Y \]

or

\[ = a (P) \cdot y (P:X) \]

\[ O = \text{Output} \]

\[ A = \text{Area planted} \]

\[ Y = \text{Yield per unit of area} \]

\[ P = \frac{P_o}{P_j} = \text{Ratio of price received for output to an index of input prices} \]
X = Environmental factors

Both area and yield are a function of P. That is, \( A = a(P) \) where \( a \) represents the functional relationship between \( A \) and \( P \). Similarly, \( y \) is the functional relationship between \( Y \) and \( P \). Differentiating Equation 7.1 with respect to \( P \), Equation 7.2 is derived. Multiplying Equation 7.2 by \( \frac{P}{O} \), the price elasticity of output is represented by the sum of the price elasticity of area and price elasticity of yield.

\[
\frac{dO}{dP} = \frac{da}{dP} y(P;X) + \frac{dy}{dP} a(P)
\]

(7.2)

\[
e^O_P = e^A_P + e^Y_P
\]

(7.3)

In addition to altering price relationships, public price policies often reduce price uncertainty. For example, price supports and price floors lessen the possible range of prices producers confront. On a longer-term basis, uncertainty surrounding continuation of public price policies likely affects private investment decisions.

Bauer and Yamey (7.3) cite an example of positive response to price incentives among cocoa and palm oil producers in Nigeria. To encourage the production of higher grades of these two commodities, marketing boards instituted substantial price differentials for different grades.

Market grades and corresponding price differentials were announced in

---

1 Using \( dP \) in Equation 7.2 indicates that the price change is extremely small. Few producers in any country would respond to such price changes. The use of derivates here is for heuristic purposes to examine the qualitative impact of price changes. The use of \( \Delta P \), reflecting discrete price changes, is more meaningful.

2 The conclusions apply on to palm oil produced by smallholders. The data provided by Bauer and Yamey (7.3) do not include production from plantations.
advance of the production and marketing season. In addition, marketing boards agreed to buy all quantities offered them at not less than previously-announced prices. In effect, producers were guaranteed a price floor for all they produced and marketed. The period studied was 1947/48 to 1952/53. Bauer and Yamey concluded that the average grade produced and marketed rose substantially during this period.¹ During the last three years of the period studied, prices for cocoa were increased considerably over previous levels. However, total purchases by marketing boards declined. The authors do not comment on this phenomenon. During the other years, prices and total purchases of cocoa moved in the same direction. Palm oil prices and total purchases moved in the same direction during the entire period. Bauer and Yamey reinforce their conclusion regarding producer response to price incentives by adding:

"Whenever higher prices were announced or even generally anticipated for the following season, producers and intermediaries withheld supplies in the closing months of the previous season, while supplies were rushed forward when a reduction was announced or anticipated" (7.3, p. 805).

The response imputed to price differentials in the study is partially discounted by Hogg (7.18). He criticizes Bauer and Yamey (7.3) for ignoring other policies attendant to implementation of the price differentials. Hogg notes that extension or educational programs incorporating printed matter, demonstration plots, and field experiments were employed. In addition, transportation subsidies and expenditures

¹The average quality of cocoa marketed was raised by marketing well-fermented cocoa rather than only drying the beans. Palm oil kernels were cultivated more carefully and harvested more timely. The price differentials encouraged the use of hand-pressing machines rather than traditional methods. The former improved both the quality and extraction rates of palm oil (7.3, p. 801).
for improving the transportation system affected the number of producers who could profitably respond. Bauer and Yamey (7.4) only acknowledge that improved transportation tended to lessen the amount of quality deterioration of palm oil enroute to marketing points. Their contention that other measures had little or no influence on producers' behavior is not intuitively convincing.

A similar response among groundnut producers in northern Nigeria to establishment of price differentials for a particular grade of groundnuts is discussed by Hogendorn (7.17). To encourage the marketing of whole nuts, a price differential for this grade was implemented. Initially, the response, in terms of the proportion of marketings qualifying for the differential, was low. Two successive yearly increases in the price differential, however, were associated with 40 percent and then 98 percent of the groundnuts marketed qualifying for the special grade and corresponding price differential.

Acreage response to output price relationships

A few studies have been completed to estimate the aggregate response of producers in adjusting cropping patterns as relative prices of crops vary. The estimating procedure employed is that of simple regression analysis where the dependent variable is the relative acreage of the crop under study and the independent variable is the lagged price of the crop relative to a lagged index of prices of principal competing crops. The mathematical formulation of this relationship is given in Equation 7.4. $A_k$ is the acreage of the crop.

1 The studies employing multiple regression analysis, including independent variables in addition to output price relationships, are discussed in the following section.
studied while the $A_{i\neq k}$ are acreages of competing crops. The $p_k$ and $p_{i\neq k}$ are interpreted similarly while $t=1$ to the end point of the time-series data.

\[
\begin{bmatrix}
\frac{A_k}{n} \\
\sum_{i=1}^{n} A_{i\neq k}
\end{bmatrix}_t = f \begin{bmatrix}
\frac{P_k}{n} \\
\sum_{i=1}^{n} p_{i\neq k}
\end{bmatrix}_{t-1} \quad (i, k = 1, \ldots, n) \quad (7.4)
\]

Relative acreage, as the dependent variable, is used as a proxy for planned cropping patterns where these patterns are a function of expected or anticipated prices for alternative, competing crops. The use of acreages abstracts from the direct influence of weather conditions on yields and production and from the impact of prices on the intensity with which nonland inputs are applied to land; i.e., per acre yields when the influence of weather has been removed. The degree of responsiveness in altering cropping patterns is influenced by a number of factors, some of which are not included in Equation 7.4:

1. The number of alternative crops which can be grown by the producer and the ease with which inputs can be shifted among crops is important. The length of time necessary for adjustment has a direct effect on the degree of short-run response versus response over a longer period of time. As the number of feasible crops increases, the cropping pattern is expected to be more responsive to changing price relationships;

\footnote{As noted in Chapter II, the planned output configuration is a function not only of prices received and paid but also estimates of the MPP of the inputs. In estimating these MPP's, past and anticipated weather conditions are important factors especially where dryland farming is prevalent.}
(2) Even though alternative crops are feasible, many low-income, small-scale producers are inclined to gear production decisions to meet consumption requirements. For example, where an inedible, cash crop can profitably be grown, producers growing the crop and using the income to purchase necessary consumption goods in the market place confront price uncertainty from two sides. Uncertainty surrounding market conditions for the cash crop and, in turn, a major proportion of his monetary income exists. The cash crop is often an export crop subject to substantial price variations. In addition, the producer confronts the uncertainty of prices he must pay for his food items and other consumer goods. When the producer receives low prices for the cash crop and must pay relatively-high prices for consumer goods, his economic vulnerability increases. Resorting to credit, or increased use of credit, introduces another potential set of problems. Consequently, many producers do not gear cropping patterns to anticipated or existing market prices when producing for direct consumption is their major objective;¹

(3) In addition to productivity considerations, acreage response is affected by access to markets, transportation costs, and by tenurial arrangements. Furthermore, using relative prices as the independent vari-

¹The extent to which time-series data on acreages devoted to various crops include the land cropped by the peasant producers likely varies with the quality and comprehensiveness of the country's system for conducting agricultural censuses and collecting annual data. The land of larger producers is more likely to be included. They are also the ones who usually account for a major proportion of all land cultivated and quantities supplied to the market and are the most sensitive to changing market conditions. Consequently, this class of producers is weighted more heavily in any time-series data.
able does not take into account variations in input prices and any technological change which affect production decisions. Finally, indices of wholesale prices or prices received by producers do not give any indication of public price policies reducing price uncertainty where such uncertainty affects production decisions nor of other public policies subsidizing or taxing the costs of production inputs. Variations in wholesale prices may not be accompanied by similar changes in prices received by producers where the latter are important for production decisions.

A number of studies investigating producer response to changes in price relationships and some noneconomic factors are reviewed below. The study results are summarized in Table 7.1a.¹

Clark (7.10) analyzed data on jute and rice prices and acreage and production of jute in East Bengal for the 1931/32 to 1953/54 period. The jute and rice prices reflected unweighted seasonal average of prices paid to producers and retail prices, respectively. Clark noted that rice was the principal crop grown while jute, as a cash crop, could also be readily produced. The multiple correlation between the two prices and jute acreage was 0.825 which was essentially identical to the multiple correlation of 0.829 between the prices and jute production. This similarity suggests that prices were nearly equally effective in explaining about 68 percent of the variation in both production and acreage, i.e., $(0.82)^2 \approx 0.68$. Clark derived a price elasticity of production at $+0.60$ with respect to the average jute price

¹Table 7.1b represents a specification of the various independent variables used in deriving the price elasticity of area estimates.
Table 7.1a. Estimates of price elasticity of crop area for various crops and geographic regions corresponding to varying time periods and estimating procedures, as specified

<table>
<thead>
<tr>
<th>Crop and geographic area</th>
<th>Price elasticity of area</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SR</td>
<td>LR</td>
</tr>
<tr>
<td><strong>RICE:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Pakistan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Summer + winter)</td>
<td>.03&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.09&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>(Summer only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 districts&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.12&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>(Summer + winter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Summer only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td>.31&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.59&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Thailand</td>
<td>.18&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.31&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Regions:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>.04-.57&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>.06-1.04&lt;sup&gt;b,d&lt;/sup&gt;</td>
</tr>
<tr>
<td>(mean)</td>
<td>.23</td>
<td>.30</td>
</tr>
<tr>
<td>Central</td>
<td>.02-.62&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>.07-3.12&lt;sup&gt;b,d&lt;/sup&gt;</td>
</tr>
<tr>
<td>(mean)</td>
<td>.18</td>
<td>.32</td>
</tr>
<tr>
<td>Western Highlands</td>
<td>.07-.50&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>.07-.46&lt;sup&gt;b,d&lt;/sup&gt;</td>
</tr>
<tr>
<td>(mean)</td>
<td>.23</td>
<td>.22</td>
</tr>
<tr>
<td>Peninsula</td>
<td>.29-.34&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>.29-.30&lt;sup&gt;b,d&lt;/sup&gt;</td>
</tr>
<tr>
<td>(mean)</td>
<td>.32</td>
<td>.30</td>
</tr>
<tr>
<td>Java-Madura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(wet)</td>
<td>.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>(dry)</td>
<td>.08&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
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</tbody>
</table>

<sup>a</sup>Simple model.

<sup>b</sup>Distributed lag model.

<sup>c</sup>These districts are the nine important jute-growing areas.

<sup>d</sup>Range of estimates derived for provinces within regions.
<table>
<thead>
<tr>
<th>Period</th>
<th>R²</th>
<th>Independent variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948/49 - 1962/63</td>
<td>.64</td>
<td>A</td>
<td>(7.21)</td>
</tr>
<tr>
<td>1948/49 - 1962/63</td>
<td>.54</td>
<td>A</td>
<td>(7.21)</td>
</tr>
<tr>
<td>1940-63</td>
<td>.89</td>
<td>C</td>
<td>(7.5)</td>
</tr>
<tr>
<td>1940-63</td>
<td>.29-.96^d</td>
<td>C</td>
<td>(7.5)</td>
</tr>
<tr>
<td>1940-63</td>
<td>.08-.95^d</td>
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<td>(7.5)</td>
</tr>
<tr>
<td>1940-63</td>
<td>.38-.72^d</td>
<td>C</td>
<td>(7.5)</td>
</tr>
<tr>
<td>1940-63</td>
<td>.36-.75^d</td>
<td>C</td>
<td>(7.5)</td>
</tr>
<tr>
<td>1951-62</td>
<td>.73</td>
<td>D</td>
<td>(7.34)</td>
</tr>
<tr>
<td>1951-62</td>
<td>.99</td>
<td>D</td>
<td>(7.34)</td>
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</table>
Table 7.1a (continued)

<table>
<thead>
<tr>
<th>Crop and geographic area</th>
<th>Price elasticity of area</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SR</td>
<td>LR</td>
</tr>
<tr>
<td>Regency (wet + dry):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krawang</td>
<td>.03&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Wonosobo</td>
<td>.56&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Djember</td>
<td>-.03&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>.15&lt;sup&gt;a&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.04&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Regions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Luzon</td>
<td>.13-.27&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.62-2.15&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bicol</td>
<td>.38&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>West Visayas</td>
<td>.91&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
<td>3.52&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cagayan Valley</td>
<td>negative&lt;sup&gt;b&lt;/sup&gt;</td>
<td>negative&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>WHEAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Irrigated)</td>
<td>.08&lt;b&gt;</td>
<td>.14&lt;b&gt;</td>
</tr>
<tr>
<td>(Unirrigated)</td>
<td>--</td>
<td>.22&lt;a&gt;</td>
</tr>
<tr>
<td>West Pakistan</td>
<td>.1-.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>CORN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td>.23&lt;b&gt;</td>
<td>.56&lt;b&gt;</td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provinces:</td>
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<tr>
<td>Nakhornsawan</td>
<td>1.92&lt;b&gt;</td>
<td>1.92&lt;b&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Based on results from second-trial regression.

<sup>b</sup>Estimates for irrigated production in seven districts.

<sup>g</sup>The time period corresponding to the derived estimates is not specified. The time span indicated is that used for deriving the price elasticities of cotton area.
<table>
<thead>
<tr>
<th>Period</th>
<th>$R^2$</th>
<th>Independent variables</th>
<th>Source</th>
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<tbody>
<tr>
<td>1951-62</td>
<td>.85</td>
<td>D</td>
<td>(7.34)</td>
</tr>
<tr>
<td>1951-62</td>
<td>.58</td>
<td>D</td>
<td>(7.34)</td>
</tr>
<tr>
<td>1951-62</td>
<td>.80</td>
<td>D</td>
<td>(7.34)</td>
</tr>
<tr>
<td>1910/11 - 1940/41</td>
<td></td>
<td>E</td>
<td>(7.30)</td>
</tr>
<tr>
<td>1953/54 - 1963/64</td>
<td></td>
<td>E</td>
<td>(7.30)</td>
</tr>
<tr>
<td>&quot;</td>
<td></td>
<td>E</td>
<td>(7.30)</td>
</tr>
<tr>
<td>&quot;</td>
<td></td>
<td>E</td>
<td>(7.30)</td>
</tr>
<tr>
<td>1914/15 - 1943/44</td>
<td>.85</td>
<td>F</td>
<td>(7.27)</td>
</tr>
<tr>
<td>1914/15 - 1945/46</td>
<td>.50</td>
<td>G</td>
<td>(7.27)</td>
</tr>
<tr>
<td>1933/34 - 1958/59</td>
<td>.25</td>
<td>H</td>
<td>(7.12)</td>
</tr>
<tr>
<td>1914/15 - 1943/44</td>
<td>.62</td>
<td>I</td>
<td>(7.27)</td>
</tr>
<tr>
<td>1950-63</td>
<td>.20</td>
<td>J</td>
<td>(7.5)</td>
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</table>
Table 7.1a (continued)

<table>
<thead>
<tr>
<th>Crop and geographic area</th>
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<th>Dependent variable</th>
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<tr>
<td></td>
<td>SR</td>
<td>LR</td>
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<tr>
<td>Lopburi</td>
<td>1.58&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.81&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Nakhonrathsima</td>
<td>.27&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.41&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Phetchbun</td>
<td>4.47&lt;sup&gt;b&lt;/sup&gt;</td>
<td>14.17&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Philippines</td>
<td>.12&lt;sup&gt;a,e&lt;/sup&gt; negative</td>
<td>negative&lt;sup&gt;b,e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Regions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Luzon</td>
<td>negative&lt;sup&gt;b,e&lt;/sup&gt;</td>
<td>negative&lt;sup&gt;b,e&lt;/sup&gt;</td>
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<tr>
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<td>negative&lt;sup&gt;b,e&lt;/sup&gt;</td>
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<td>West Visayas</td>
<td>.03&lt;sup&gt;b,e&lt;/sup&gt;</td>
<td>.04&lt;sup&gt;b,e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cagayan Valley</td>
<td>.17&lt;sup&gt;b,e&lt;/sup&gt;</td>
<td>.43&lt;sup&gt;b,e&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>BAJRA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td>.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.36&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>JOWAR</strong></td>
<td></td>
<td></td>
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<tr>
<td>Punjab (undivided)</td>
<td>--</td>
<td>-.58&lt;sup&gt;a&lt;/sup&gt;</td>
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<td><strong>BARLEY</strong></td>
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<td>.50&lt;sup&gt;b&lt;/sup&gt;</td>
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<td><strong>GRAM</strong></td>
<td></td>
<td></td>
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<tr>
<td>Punjab (undivided)</td>
<td>--</td>
<td>-.33&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td><strong>CASSAVA</strong></td>
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<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rayong Province</td>
<td>1.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.09&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>COTTON</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American varieties</td>
<td>.72&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.62&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local varieties</td>
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<td>1.08&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>West Pakistan&lt;sup&gt;h&lt;/sup&gt;</td>
<td>.41&lt;sup&gt;a&lt;/sup&gt;</td>
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<sup>h</sup>Estimates for the eight major cotton-producing districts.
<table>
<thead>
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<th>$R^2$</th>
<th>Independent variables</th>
<th>Source</th>
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<td>(7.5)</td>
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<tr>
<td>1950-63</td>
<td>.73</td>
<td>J</td>
<td>(7.5)</td>
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<td>1910/11 - 1940/41</td>
<td></td>
<td>K</td>
<td>(7.30)</td>
</tr>
<tr>
<td>1946/47 - 1963/64</td>
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<td>(7.30)</td>
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<td>1947/48 - 1963/64</td>
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<tr>
<td>1914/15 - 1945/46</td>
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<td>M</td>
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<td>1914/15 - 1943/44</td>
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<td>N</td>
<td>(7.27)</td>
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<td>(7.5)</td>
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<td>(7.27)</td>
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<td>1933/34 - 1958/59</td>
<td>.70</td>
<td>T</td>
<td>(7.12)</td>
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Table 7.1a (continued)

<table>
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<th>Crop and geographic area</th>
<th>Price elasticity of area</th>
<th>Dependent variable</th>
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<tr>
<td>Egypt</td>
<td>.37&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Ratio of cotton area to competing crops area</td>
</tr>
<tr>
<td>SUGAR CANE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab (undivided)</td>
<td>.17&lt;sup&gt;b,i&lt;/sup&gt;</td>
<td>.30&lt;sup&gt;b,i&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>.34&lt;sup&gt;j&lt;/sup&gt;</td>
<td>.60&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Irrigated sugarcane area</td>
</tr>
<tr>
<td>JUTE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Bengal</td>
<td>.60&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Jute production</td>
</tr>
<tr>
<td>Bengal, Bihar and Orissa</td>
<td>.65&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Ratio of jute area to competing crops area</td>
</tr>
<tr>
<td>Bengal</td>
<td>.75&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.68&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>East Pakistan</td>
<td>.36&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Ratio of jute area to rice + jute area</td>
</tr>
<tr>
<td>9 districts&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.42&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>i</sup>Relative price lagged one year.
<sup>j</sup>Relative price lagged two years.
<table>
<thead>
<tr>
<th>Period</th>
<th>$R^2$</th>
<th>Independent variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913/14 - 1937/38</td>
<td></td>
<td>U</td>
<td>(7.44)</td>
</tr>
<tr>
<td>1915/16 - 1943/44</td>
<td>.44</td>
<td>V</td>
<td>(7.27)</td>
</tr>
<tr>
<td>1931/32 - 1953/54</td>
<td>.68</td>
<td>W</td>
<td>(7.10)</td>
</tr>
<tr>
<td>1911/12 - 1938/39</td>
<td>.25</td>
<td>X</td>
<td>(7.45)</td>
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<td>1911/12 - 1938/39</td>
<td>.30</td>
<td>X</td>
<td>(7.45)</td>
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<td></td>
<td>.65</td>
<td></td>
<td>(7.45)</td>
</tr>
<tr>
<td>1948/49 - 1962/63</td>
<td>.54</td>
<td>Y</td>
<td>(7.21)</td>
</tr>
<tr>
<td>1948/49 - 1962/63</td>
<td>.65</td>
<td>Y</td>
<td>(7.21)</td>
</tr>
<tr>
<td>A</td>
<td>Lagged price ratio of (summer) rice to jute.</td>
<td></td>
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<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Lagged price ratio of rice to six alternative kharif (summer) crops, lagged yield ratio similar in construction to the price ratio, and lagged rice area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>All equations include the lagged relative price of rice and lagged rice areas. The equations vary according to the inclusion of relative yield of rice, variations in prices and yields, and population.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Lagged and deflated price of rice, seasonal rainfall, and time in all equations. For Java-Madura (wet), the standing area of rice at the end of the prior dry-season rice crop is included; for Java-Madura (dry), the standing area of the prior wet-season rice crop is added.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Lagged price ratio of rice to a single, major competitive crop; lagged yield ratio of rice to a single crop; lagged wage rate for hired agricultural workers; and t as a trend variable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Lagged price ratio of wheat to index of ten alternative crops, lagged total irrigated area of all crops, and lagged irrigated wheat area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Lagged price ratio of wheat to gram, lagged yield ratio of wheat to gram, and rainfall.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Lagged price ratio of wheat to sugarcane.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Lagged price ratio of corn to six alternative kharif (summer) crops and lagged corn area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>All equations include the lagged relative price of corn. The other equations vary relative to additional variables included. See C above.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Same as E above, but substitute corn for rice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>The dependent variable is the ratio of unirrigated area under bajra to the unirrigated area in all kharif (summer) crops.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Lagged price ratio of bajra to six alternative kharif (summer) crops, lagged irrigation and bajra area, and rainfall.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
N  Lagged price ratio of jowar to bajra, lagged irrigation area, and rainfall.
O  Lagged price ratio of barley to wheat, rainfall, and lagged barley area.
P  Lagged price ratio of gram to wheat and rainfall.
Q  Lagged relative price and proxy variable for price variation.
R  Lagged price ratio of cotton (American) to six alternative kharif (summer) crops, lagged irrigation area, and lagged cotton (American) area.
S  Lagged price ratio of cotton (local) to six alternative kharif (summer) crops, lagged yield ratio similar in construction to the price ratio, and lagged cotton (local) area.
T  Lagged price ratio of cotton to index of rice, bajra, jowar, corn and sugarcane.
U  Lagged price ratio of cotton to competing crops.
V  Lagged price ratio of sugarcane to six alternative kharif (summer) crops and lagged sugarcane area.
W  Lagged average jute price.
X  Lagged price ratio of jute to rice plus ten other crops, all prices at the wholesale level. The lagged jute area ratio is added for the distributed lag model.
Y  Lagged price ratio of jute to (summer)rice.
lagged one year at the mean of the data. The price elasticity of production with respect to the lagged rice price was of the same magnitude but negative. Clark added that variations in the yields per hectare did not appear to be a function of economic factors, although he did not test this relationship. Also, a "cobweb" effect appeared operative between jute production and the lagged jute price.

In a similar study, Hussain (7.21) estimated acreage response functions for rice and jute in East Pakistan for the 1968/69 to 1971/72 period. For rice, the proportion of rice acreage to rice plus jute acreage was regressed on the lagged, relative price of rice to jute. For jute, the proportion of jute to jute plus rice acreage was the dependent variable while the lagged, relative price of jute to (summer)rice was the independent variable. Several regression equations were derived. The price elasticity of rice acreage for the 17 districts was estimated to be +0.03 at the data mean. In a subset of the data representing only the nine principal jute-growing regions where competition between jute and rice production was expected to be strongest, the estimated price elasticity increased to +0.05. When the data on (summer)rice which is most seasonally competitive with jute was used rather than (summer)- plus (winter)rice, the estimated elasticities increased to +0.09 and +0.12 for the 17 and 9 regions, respectively.

The price for rice was that corresponding to the summer(rice) crop only.

Hussain explicitly notes that the derived elasticities are actually the price elasticity of rice to total rice and jute acreage. He adds "... the variation in total area is sufficiently small that the price elasticity of this ratio may be taken as a good approximation of the price elasticity of rice acreage" (7.21, p. 99, footnote 8).
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"... the variation in total area is sufficiently small that the price
elasticity of this ratio may be taken as a good approximation of the
price elasticity of rice acreage" (7.21, p. 99, footnote 8).
Consequently, cropping patterns were more sensitive to changes in the relative prices of (summer) rice and jute.

Since jute was a cash crop while rice was the principal food crop for direct consumption, the price elasticities of jute acreage were expected to be above those for rice. The derived elasticities supported this contention. The price elasticities of jute acreage were estimated to be +0.36 and +0.42 at their respective means for the 17 and 9 districts, respectively. Hussain (7.21) adds that no statistically significant relationship between the lagged rice/jute price ratio and rice yields was observed. That is, an increase in the rice/jute price ratio was associated with an increase in the relative amount of rice acreage not in more intensive cultivation of rice.

Stern (7.45) derived estimates of the price elasticity of jute acreage for selected provinces in India-Pakistan prior to partition. The price data represent wholesale price quotations. Again, the dependent variable reflecting jute area as a proportion of total area planted to competing crops was postulated to represent planned production patterns in response to the lagged, relative prices of these crops. Two

1Stern (7.45) notes that an interpretation of the price elasticity of the acreage ratio may be complicated by changes in the total area under cultivation. That is, sufficiently large changes in total area relative to changes in the area of the crop being studied may sufficiently outweigh the latter so that values of the dependent and independent variables move in opposite directions. Earlier Hussain (7.21) pointed out in his study that total area did not appreciably change.

Where the total area changes, such change is usually attributable to a number of factors in addition to variations in relative prices. If price changes represent the principal force, changes in total area reflect an aggregate production response in contrast to reallocation of an essentially fixed number of land units among competing crops.
crop combinations were considered: (1) Jute to rice and (2) Jute to rice plus ten other competing crops. Two geographical areas were considered: (1) Bengal, and (2) Combination of Bengal, Bihar, and Orissa. For the combined area, the derived elasticities were +0.57 and +0.65 for the two-crop combinations, respectively. That is, when additional competing crops were introduced into the regression analysis, the proportion of land area devoted to jute production appeared to be more responsive to changes in lagged, relative prices. This increase in elasticity was not evident for the derived estimates for Bengal which were +0.76 and +0.75 for the two-crop combinations, respectively. The R², i.e., the amount of variation "explained" by the independent variable, was relatively low for each acreage response function estimated. When a distributed lag model including the lagged ratio of jute area to area of competing crops was used to analyze the Bengal data, short- and long-run prices elasticities were derived to be +0.68 and +1.03, respectively.

Stern (7.44) completed an earlier study of similar design to estimate the acreage response by Egyptian producers to changing price relationships. The area and price ratios were expressed in terms of cotton to the combination of wheat, maize, rice and barley. With relative prices lagged one year, the price elasticity of the cotton area ratio was found to be +0.37. Stern also derived arc elasticities for consecutive years. These values ranged from -2.5 to +3.9. In Stern's judgment, a price elasticity between +0.4 and +0.6 was perhaps most representative for the 1900 to 1938 period under study.
Falcon (7.12) examined the acreage adjustments made by wheat and cotton producers in West Pakistan in response to changes in the relative prices of the two crops to prices of competing crops. For the 1933/34 to 1958/59 period, the derived price elasticity of the cotton acreage ratio was found to be +0.41 for the eight major cotton-producing regions. The competing crops included in the regression analysis were rice, baja, jowar, corn and sugarcane. The effect of price relationships on wheat area varied with the nature of wheat-growing conditions. In the dryland area, relative prices were of little importance in explaining cropping patterns. However, the correlation between fall-planted acreage and rainfall was 0.7. Falcon adds that

"... regardless of relative prices between wheat and the other fall crops, 65 percent of the total area went into wheat production" (7.12, p. 588).\(^1\)

In the irrigated regions where wheat and sugarcane are competitive crops, the price elasticity of wheat acreage to the lagged wheat/sugarcane price ratio was estimated to be +0.1 to +0.2. Falcon further notes that the return from sugarcane was perhaps double that of wheat so that the income differential was sufficient to induce more production

\(^1\)According to Falcon (7.12), the relative constancy of the proportion of wheat acreage was due to: (1) Wheat, pulses and barley are planted to over 90 percent of the total acreage. Wheat is the major food grain in home consumption and pulses and barley are often inter-tilled with wheat as a hedge against adverse weather affecting wheat production. Falcon adds that prices are incidental to production decisions and absolute acreages vary primarily with total acres under cultivation; and (2) While oilseeds can be grown as cash crops, the differential in income, at most 10-15 percent, is not sufficient to induce a movement away from wheat into oilseeds where producers must later purchase wheat in the market. The uncertainty regarding oilseeds prices and retail prices for wheat induces cultivators to produce more food grains than cash crops.
of this cash crop. He does not comment on the location of markets for cash crops and the attendant marketing and transportation costs. In summary, consumption requirements and water availability appeared to be the principal factors affecting cropping patterns in this area during the 1933/34 - 1958/59 period.

**Acreage response to prices plus additional independent variables**

Aggregate rice acreage and production functions have been estimated for producers in the Java and Madura regions of Indonesia by Mubyarto and Fletcher (7.34). Separate estimates were derived for the wet- and dry-monsoon areas. Since the former accounts for over 80 percent of the total rice production in Java and Madura, the estimates for the dry-monsoon area are not discussed here. Ostensibly, the lagged price variable represents the price received by producers but deflated by an index of prices paid for selected consumer goods. The rice acreage function for time period \( t \) also includes variables representing rainfall in period \( t \), the "standing area" of rice grown in the previous dry season, and time as a trend variable. The period studied is 1951-62.

The derived elasticity with respect to the lagged price was +0.05 for

---

1 The authors (7.34) note that the Indonesian government has attempted to exercise close control over the prices and distribution of rice. The program, which was discontinued in 1964, was designed to require a minimum delivery of rice to the government at a fixed price. The limited success of the program was primarily due to the fact that the government price was usually considerably below the free market price. Another study is cited in which the program was considered to have reduced price instabilities and marketing margins. If this program was operative during the 1951-62 period, the derived price elasticities may have been affected. A measure of price stability, lower marketing margins, and some reduction in uncertainty associated with the fixed government price even though it was usually below the market price likely affect producers' decisions.
the combined Java-Madura area but the estimate was not statistically significant. In estimating the rice output function, the "standing area" variable was omitted. The $R^2$ was .88 and the derived price elasticity was +0.33 which was statistically significant at the 10 percent level.¹

Acreage response functions were also estimated for five regencies in the Java-Madura area. Due to data limitations, the dependent variable, rice acreage, represents annual acreage for wet plus dry crops. Lagged and deflated prices, rainfall, and time are the independent variables. For three of the five regencies, the price elasticity is not statistically significant and one of the three is negative. The other two price elasticities are positive and statistically significant. For the Wonosobo regency, the price elasticity was derived to be +0.565 which was also statistically significant at the 5 percent level. The authors attribute this relatively-high elasticity to two factors: (1) Corn is generally preferred to rice in consumption; and (2) Corn production recently increased considerably through higher use-levels of fertilizer and improved cultivation practices. Thus, producers in this regency had two reasons for being more sensitive to changes in the deflated rice price.

Acreage response functions have been estimated for rice and corn in the Philippines by Mangahas, Recto, and Ruttan (7.30). Three sets of regression equations involving three different methods of introducing

¹The authors (7.34) do not discuss the likelihood of problems of multicollinearity among the independent variables.
lagged output price relationships were derived.\textsuperscript{1} The other independent variables were: (1) Lagged factor-price index represented by the lagged wage rate for hired agricultural workers; (2) Lagged technology index represented by the lagged index of the ratio of the yield of rough corn or rice to the yield of the competitive crop or crops; and (3) Time as a trend variable. Both simple, i.e., "nonadjustment" models, and distributed lag models were used in running the three sets of regressions. Separate regressions were run for the prewar and postwar periods for the Philippines and only for the postwar periods for selected regions within the Philippines.

For estimating the price elasticity of rice area, the authors found the simple models using the second-trial combination of output prices to provide the best estimates. For the Philippines, the price elasticity for the prewar period was derived to be +0.15 which was only significant at the 40 percent level. For the postwar period, a negative price elasticity was derived. For the particular regions studied, the price elasticities ranged from +0.09 to +0.58.\textsuperscript{2} Also, the rice area was significantly influenced by factor prices in one region, 

\textsuperscript{1}In the first-trial set, the lagged output price, either corn or rice, and the lagged index of all alternative crops were introduced as separate variables. In the second trial, the lagged output price and the lagged price of the most-competitive crop were introduced as a price ratio. In the third trial, the lagged output price and the lagged price index of all competing crops were introduced as a ratio.

\textsuperscript{2}The price elasticity for one region was negative. The authors note that in this region an influx of people has been associated with substantial expansion of the area under cultivation. They conclude that changes in the rice area were most affected by either technology or the trend variable causing the price coefficients to be not meaningful.
technology in six of the seven regions, and by the trend variable in four regions.

The magnitude and sign of the derived price elasticities vary with the trial runs and with the simple versus the distributed lag models. For the Philippines, as an aggregate, none of the estimates was statistically significant. However, the elasticities were slightly higher for the postwar period. Long-run elasticities were also higher than the short-run estimates. A number of the price elasticities for particular regions were found to be negative.

The price elasticities derived for rice were generally higher than those for corn. In addition, the authors (7.30) noted that on the basis of the regional estimates, the price elasticity for corn is highest in the areas in which strong commercial markets operate. The same holds true for rice where commercial markets and(or) extensive irrigation development exists.

Khrishna's (7.27) work on deriving acreage response functions for several crops in the Punjab has served as the principal impetus to attempts to quantify producer response in less-developed areas. Prior to his work, assertions relative to producer response were based primarily on intuition or a priori arguments. Krishna uses an "adjustment" or distributed lag model patterned after the models developed by Nerlove (7.36). The dependent variable is always in terms of crop area. The lagged price variable is introduced as the ratio of the post-harvest price of the crop being studied to a single alternative crop or to an index of post-harvest prices of alternative crops. The nature of the price ratio varies with the crop under consideration. The other...
independent variables were: (1) Relative yield of the crop studied; i.e., relative to a single crop or to an index of yields of alternative crops, (2) Lagged, total irrigated area by year; (3) Rainfall term; and (4) Lagged crop area of the crop being investigated.

Through prior analysis, Krishna determined which of these independent variables, in addition to the lagged price ratio, should be introduced in the estimating equations for specific crops. For example, in estimating the area response for American varieties of cotton, the lagged irrigation area and previous year's area planted to these varieties were used. Rainfall was introduced for the dryland crops such as wheat, barley, and millets. For irrigated wheat, the lagged irrigation area and previous year's irrigated wheat area were used.

The derived regression coefficients for the price variable and the price elasticities indicate a generally positive producer response in adjusting cropping patterns to price variations. All the price coefficients and elasticities are positive with the exception of jowar and gram. As indicated in Table 7.1a, the short- and long-run price elasticities are much higher for cotton, as a cash crop, than for the food and feed grains. Also, long-run elasticities for each crop are substantially above those for the short-run. With the exception of barley and gram, all of the price elasticities are statistically significant.

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1 Krishna (7.27) states that jowar is an inferior grain crop. That is, as per capita real incomes increase, less jowar is demanded for consumption. The converse also holds true.
In comparing the importance of price relative to the other independent variables, Krishna (7.27) observed that price alone was the important "explainer" for maize and sugarcane. In terms of elasticities,\(^1\) irrigation area was more important than price for American cotton, bajra and irrigated wheat; yield was more important than price for rice; and in the case of unirrigated wheat, barley, and gram, rainfall was more important than price.

Behrman's study (7.5) of producer response in Thailand is based on a modified Nerlovian dynamic supply model. The estimating model is written in implicit form in Equation 7.5. The dependent variable, \(A_t^d\), represents the desired planted area of the crop studied in time period \(t\). The independent variables are interpreted as follows:

\[
A_t^d = f(p_t^e, Y_t^e, \sigma_{p_t}, \sigma_{Y_t}, N_t, M_t) \tag{7.5}
\]

\(p_t^e\) = Relative price of the crop being studied which producers expect to realize during \(t\)

\(Y_t^e\) = Crop yield expected by producers during \(t\)

\(\sigma_{p_t}\) = Ratio of the standard deviation of prices of the crop to the standard deviation of the index of prices for alternative crops, both standard deviations being based on prices prevailing in the three preceding production periods

\(\sigma_{Y_t}\) = Standard deviation of actual yields of the crop realized in the three preceding production periods

\(^1\)Krishna (7.27) also derived elasticities of crop acreage with respect to irrigated area, relative yield, and rainfall for selected crops. These are not shown in Table 7.1a.
\( N_t \) = Farm population in the area being studied

\( M_t \) = Annual malaria death rate per 100,000 inhabitants of the area under study.

The importance of expected prices and yields on producers' decisions is apparent. Behrman (7.5) indicates that \( \sigma_{pt} \) and \( \sigma_{yt} \) are included as proxies for variances of producers' subjective probability distributions relative to prices and yields. For producers, particularly subsistence-oriented producers, large variations in yields and prices generate a good deal of uncertainty with respect to income and the relationship of actual production to consumption requirements, including required payments in kind. That is, as \( \sigma_{pt} \) and \( \sigma_{yt} \) increase for the crop in question, ceteris paribus, producers would be expected to alter cropping patterns in favor of crops in competition with this crop.

The term \( N_t \) is included to reflect a tendency for producers to gear production plans to consumption needs for the principal food grains consumed. That is, increases in \( N_t \) would be associated with a decision to increase the planted area of the principal crop which is consumed directly.\(^1\) The term \( M_t \) is included to reflect changes in malaria control where improvements would tend to expand the total cultivable area and would favorably affect the area planted to those crops most prevalent in areas most susceptible to malaria.

Since \( p_t^e \) and \( y_t^e \) variables are not observable, the area response models are rewritten in terms of lagged price and yield variables which are historically observable. Similarly, the models are written

\(^1\)Behrman (7.5) includes \( N_t \) in the area response model for rice but not for cassava, corn, and kenaf.
in a reduced form so that $A_t = \text{actual area planted for the crop being studied in } t$ is substituted for the unobservable $A_t^d$. The estimates for coefficients of the parameters of the models are derived through the use of maximum likelihood estimators. A selected number of the derived short- and long-run elasticities of area planted are listed in Table 7.1a.

**Yield response to price relationships**

The price elasticity of area component of Equation 7.3 was discussed above. Relatively-fewer estimates of the price elasticity of yield, $\varepsilon_Y$, are available. Since $P = \frac{P_o}{P_j}$, changes in the relative output/input price relationships affect the sign of $dP$. If $P_o$ increases relative to $P_j$, ceteris paribus, producers find it profitable to increase the use-levels of at least some of the $j$ inputs. As additional labor, fertilizer, and irrigation water inputs are used, yield and output are expected to increase.

The estimates derived by Mubyarto and Fletcher (7.34) and by Behrman (7.5) are presented in Table 7.2a. The derived elasticities for rice are positive but of relatively-low magnitude. The estimates are quite variable for corn and kenaf.

Clark (7.10) states that agricultural practices and costs of production for jute were relatively constant in East Bengal during the period in his study. He adds that variations in jute yields were

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1 The derived price elasticities are not always comparable in form to $\varepsilon_p^A$ expressed in Equation 7.3.

2 Table 7.2b represents a specification of the various independent variables used in deriving the price elasticity of yield estimates.
Table 7.2a. Estimates of price elasticity of crop yields for specified crops and geographic areas corresponding to varying time periods and estimating procedures, as specified

<table>
<thead>
<tr>
<th>Crop and geographic area</th>
<th>Price elasticity of yield</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SR</td>
<td>LR</td>
</tr>
<tr>
<td><strong>RICE:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Java-Madura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(wet)</td>
<td>.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>(dry)</td>
<td>.06&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loei Province</td>
<td>.28&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.28&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>CORN:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nakhornratsima</td>
<td>.60&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.15&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Phitsnulok</td>
<td>6.07&lt;sup&gt;b&lt;/sup&gt;</td>
<td>28.4&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>KENAF:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 provinces&lt;sup&gt;d&lt;/sup&gt;</td>
<td>.09-.81&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>.10-.81&lt;sup&gt;b,c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Simple model.

<sup>b</sup>Distributed lag model.

<sup>c</sup>Range of estimates derived for individual provinces.

<sup>d</sup>The four provinces are Ubonratthani, Khon-kaen, Srisaket, and Roi-et.
<table>
<thead>
<tr>
<th>$R^2$</th>
<th>Independent variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>.89</td>
<td>A</td>
<td>(7.34)</td>
</tr>
<tr>
<td>.80</td>
<td>B</td>
<td>(7.34)</td>
</tr>
<tr>
<td>.52</td>
<td>C</td>
<td>(7.5)</td>
</tr>
<tr>
<td>.75</td>
<td>D</td>
<td>(7.5)</td>
</tr>
<tr>
<td>.63</td>
<td>E</td>
<td>(7.5)</td>
</tr>
<tr>
<td>.40-.96$^c$</td>
<td>F</td>
<td>(7.5)</td>
</tr>
</tbody>
</table>
Table 7.2b. Specification of respective independent variables associated with elasticity estimates in Table 7.2a

A  Lagged and deflated price of rice, rainfall, standing rice area at end of December of the previous dry season, and time.

B  Same as A except substitute standing rice area at the end of August of the previous wet season.

C  Lagged relative price of rice, lagged rice area, farm population, and annual rainfall.

D  Lagged relative price of corn, lagged corn area, proxy for price uncertainty and annual rainfall.

E  Same as D plus proxy for yield uncertainty.

F  All equations include lagged relative price of kenaf and lagged kenaf area. The equations vary as to the inclusion of proxy variables for price and yield uncertainty.
primarily random with environmental conditions rather than economic variables being the principal factor.

In regressing cotton yields on the lagged price ratio of cotton to alternative crops, the $R^2$'s derived by Falcon (7.12) were extremely low. That is, the price variable "explained" extremely little of the variation in cotton yields. Rather, Falcon states that lack of incentives, physical unavailability of inputs, capital rationing, uncertainty, and ignorance of better production practices were the determining factors. Because of these factors, the lack of yield response to changing relative prices cannot be imputed as economic irrationality on the part of producers.

In his study of rice and jute production in East Pakistan, Hussain (7.21) notes that inputs other than land and labor are not widely used. Consequently, variations in prices of variable inputs other than labor have little effect on input-use levels. He concludes that no statistically significant relationship exists between the lagged rice/jute price ratio and rice yields. Increases in the price ratio are associated with larger areas planted to rice and not to more-intensive cultivation of rice.

Mangahas, et al. (7.30) estimated yield-response equations for rice and corn. However, the coefficients of the relative price variable were nearly all rejected because they were found to be negative or not statistically significant even at rather high probability levels. They add that,
"These results may have been due mainly to large differences between actual yields and intended yields, caused by unforeseen weather or other exogenous factors affecting yield" (7.30, p. 691).

Quantities marketed as a function of market prices

Production and resource allocation decisions are directly conditioned by consumption requirements and (or) anticipated market prices or exchange values. After resources have been committed, the effect of changes in market price expectations on output levels can, for some crops, be reflected in the intensity of weeding operations and use-levels of irrigation water. As the crop matures for harvesting, producers can decide whether or not to harvest. This decision applies primarily to the production of nonedible, cash crops where producers are often located at some distance from marketing outlets so that transportation costs and reliability of market information are important factors in harvesting and marketing decisions. That is, the expected net returns may not be sufficient to induce the producer to harvest the crop. Of course, market uncertainties, transportation costs, and marketing margins affect producers at all locations from marketing centers. However, these uncertainties tend to increase with distance from the marketing point. Finally, once the crop has been harvested, the producer-consumer faces the decision of whether to consume or market, at least for edible commodities.

This relation between quantities marketed and changes in market price, presumably the price received by the producer, has been the subject of discussion for several years. The controversy centers on whether quantities marketed are inversely related to prices received
so that a downward-sloping supply function exists or whether the converse relationship holds. But the controversy has been muddled by writers referring to noncomparable situations and/or not being very explicit about the conditions they are attempting to describe and evaluate. Some studies are based on a priori arguments; others are supported by data.

For those proponents of an inverse relationship between quantities marketed and prevailing market prices, the point of departure is the assumption of a relatively-fixed demand for cash by producers such as \( \overline{D}_c = p_n q_n \). As the market price received increases, the quantity of \( q_n \) that must be marketed so as to obtain \( \overline{D}_c \) is reduced. See Figure 7.1. The converse also holds.

Figure 7.1. Inverse relationship between price and quantity marketed for obtaining \( \overline{D}_c \)
In Figure 7.1, the $D_c$ curve is a rectangular hyperbola with a price elasticity of quantity marketed equal to negative unity. If external financing, savings, or hoards are not used to at least partially satisfy $D_c$, the quantity which must be marketed has first claim on production realized. The quantities available for consumption are a residual. As this residual is chronically inadequate for many small-scale producers, they must resort to financing or credit in kind in order to sustain consumption patterns. The above viewpoint is best articulated by Mathur and Ezekiel (7.32), Khatkhate (7.25), and Neumark (7.37). Mathur and Ezekiel and Neumark are explicit in stating that this market behavior is applicable to producers operating in "... an intrinsically nonmonetized economy operating on the margins of subsistence to the monetized world around..." (7.32, p. 399) and in "... an embryonic exchange economy..." (7.37, p. 48). Because pro-

One of the earlier proponents of a perverse market supply function was Boeke (7.7, pp. 29-30) who considered this phenomenon representative of Eastern society as compared with Western society. For a discussion of a perverse market supply function for rubber by native growers in the Netherlands Indies, see Boeke (7.6, p. 49). This perverse relationship for rubber marketings appears to be adequately but conditionally refuted by Joosten (7.23). Joosten concludes, "If the peasant farmer has alternative opportunities no perverse supply curves are to be expected in the case of cash crop commodities. In this connection it is interesting to note that the statistical data on the production of the great rubber estates tend to exhibit a perverse supply curve...The rubber estates had no alternatives" (7.23, p. 102). The condition imposed by Joosten is that the peasant has alternative production opportunities.

This perversity is also noted by Chaturvedi (7.8, p. 20) and Bansil (7.1, p. 30), both on an a priori basis.
ducers operate in this environment of limited contact with forces of change so that the essentially traditional production and consumption patterns are sustained, the demand for cash to pay rent and taxes and to purchase a limited number of consumer goods is assumed to be nearly invariant. Implicitly, the price elasticity of substitution between those commodities produced and directly consumed and those purchased as consumer goods is zero. The income elasticity of demand for these consumer goods is also assumed to be zero.¹

Only Mathur and Ezekiel (7.32) adduce evidence to support their proposition of a downward-sloping market supply function. Their evidence is the following:

"In an investigation conducted under the auspices of the Gokhale Institute of Politics and Economics in the Akola and Amraoti districts of the state of Maharashtra in India during 1955-56 and 1956-57, it was found that while prices increased by about 33 percent between the two years, sales decreased by about 7.5 percent. This was in spite of the fact that total production had increased by about 38 percent" (7.32, footnote 4, p. 397).

Presumably, Mathur and Ezekiel are referring to food grains production and sales. However, Dandekar (7.11), after consulting with Mathur, states that the co-authors were actually referring to all farm products rather than food grains only. Furthermore, Dandekar cites another analysis of the same data made by Mathur (7.31) which indicates that prices and quantities marketed moved in the same direction for wheat,

¹Mathur and Ezekiel assert that the income elasticity of demand is only close to zero. This follows from their statement that "It is probably likely that an increase in food consumption will be accompanied by some increases in the consumption of non-food consumer goods for which an increase in cash income will be necessary" (7.32, p. 398).
jowar, and other cereals. Since these are food grains, the results are contrary to Mathur and Ezekiel's proposition of a perverse market supply function for food grains.

Mathur and Ezekiel (7.32) reinforce their proposition by asserting that producers save in kind rather than in monetary terms. That is, any output in excess of the amount necessary to satisfy \( D_c \) and customary consumption patterns is placed in contingency stocks as a hedge against adverse production and market price conditions. Furthermore, as market prices fall so that a larger quantity of \( q_n \) must be marketed, a portion of increased marketings comes from contingency stocks. The increased marketings tend to drive market prices even lower until rightward shifts in the market demand curve lessen the downward pressure on prices and a temporary equilibrium is realized. The demand curve shifts to the right because falling food grains prices raise producers' real incomes.

Although Mathur and Ezekiel (7.32) are explicit that the market behavior they postulate applies to semi-subsistence farmers operating in an essentially-nonmonetized economy, their evidence of perverse marketing behavior is based on data reflecting the aggregate effect of marketing decisions by producers of all size holdings. The percent of total marketings attributable to various farm size groupings was given in columns (2) and (4) of Table 6.1. Referring to column (2), which is

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1Dandekar (7.11) further notes that the price elasticities of market supply are negative for cotton and groundnuts. He concludes that because these two crops account for 50 and 10 percent, respectively, of total sales of farm products, a perverse market supply relationship for all farm products resulted, as was observed by Mathur and Ezekiel.
in terms of total value of all agricultural marketings, producers operating less than 15 acres of land in India accounted for 46.4 percent of all marketings. Mathur and Ezekiel do not state what size of holdings characterizes semi-subsistence producers. However, the relatively-large proportion of the total value of marketings attributed to small-scale producers who act in the manner postulated by Mathur and Ezekiel may tend to generate a perverse market supply relationship.

 Implicitly, Mathur and Ezekiel (7.32) do not admit any effect of changes in market prices on production decisions and quantities produced. For example, rising market prices requiring less to be marketed and permitting more to be consumed do not have a favorable impact on production. However, this is rather consistent with the economic environment they postulate. However, the authors state, "... when the per capita income of the farmer rises above the level at which the farmer's food grain needs are more or less satisfied, the inverse relationship between price and marketed surplus will be less likely to hold and the existing instability in the food grain market will probably be considerably reduced" (7.32, p. 400). The authors do not discuss how or when per capita incomes increase. Consequently, it is not possible to impute their postulated market supply behavior as being of a short-run or long-term nature. Presumably, this behavior persists as long as per capita production of food grains remains below per capita "food grains needs". Despite the scattered successes of the so-called "Green Revolution", the extremely high population growth rates, especially in rural areas, suggest that substantial increases in per capita production of food grains will only be a longer-term phenomenon in many
less-developed areas.

Krishnan (7.29) relaxes the Mathur-Ezekiel assumption of a fixed demand for cash and constructs a short-run behavioral model describing the relationship between aggregate marketing of food grains by producers-consumers and market prices. The point of departure is that quantity of food grains produced, \( \bar{Q} \), which can be consumed or marketed.\(^1\) Krishnan uses a demand function incorporating constant price and income elasticities, Equation 7.6, which is appropriate for a time period confined to the production year.

\[
\bar{r}Q = AP^{-\alpha \cdot (QP)^{\beta}} \quad (7.6)
\]

\[
M = (1-r) \bar{Q} \quad (7.7)
\]

The terms in Equations 7.6 and 7.7 are interpreted as follows:

- \( r \) = Proportion of net food grains produced that are directly consumed
- \( P \) = Food grains price
- \( \alpha \) and \( \beta \) = Price and income elasticities of demand, respectively
- \( PQ \) = Income or value of the endowment of food grains
- \( A \) = A constant

\[
M_e = - (\beta - \alpha) \frac{r}{1-r} \quad (7.8)
\]

Equation 7.7 represents the amount of \( \bar{Q} \) which is marketed. As \( P \) varies, so do producers' income, \( \bar{QP} \), and \( \bar{r}Q \). The price elasticity of quantity

\( \bar{Q} \) may also include any contingency stocks which are potentially marketable. Krishnan (7.29) notes that \( \bar{Q} \) is net of seed requirements, etc. Presumably, et cetera includes any payments in kind.
of quantity marketed is given in Equation 7.8. Since the term \( \frac{r}{1-r} \) is always non-negative, the sign of \( M_e \) depends upon the relative magnitude of \( \beta \) and \( \alpha \). If the price elasticity of demand, \( \alpha \), is greater than the income elasticity of demand, \( \beta \), \( M_e \) will be positive indicating that, ceteris paribus, prices and quantities marketed move in the same direction. If the converse holds, \( M_e \) is negative and a perverse price-quantity marketed relationship holds. Krishnan quantifies Equation 7.8 by substituting \(-\alpha = -0.3584\), \( \beta = 0.5216 \), and \( r = .65 \). With these data, the derived \( M_e = -0.303 \). That is, with small changes in \( P \), given \( \bar{x}, \bar{P}, \) and \( \bar{Q} \), price and quantity marketed move in opposite directions. He carefully points out, however, that he is dealing with a short-run phenomenon and that any effect of price variations on production have not been taken into account. His model and analysis are only appropriate when \( Q \) is assumed. Furthermore, as economic development proceeds, both \( \frac{r}{1-r} \) and \( \beta \) decline. Conversely, the absolute value of \( \alpha \) increases. Consequently, \( M_e \) is expected to eventually be positive but with a low value. In the extreme where all food grains are marketed such that \( r = 0 \) and food is purchased as processed goods, \( M_e = 0 \). That is, the market supply function is perfectly inelastic and price changes have no effect on quantities marketed. This result necessarily follows from the implicit assumption in Krishnan's model that

---

1 The derivation of \( M_e \) is given in Appendix B. A similar derivation is made when \( Q \) is disaggregated into two food grain commodities. This is a more meaningful construct since it reflects the impact of a change in the relative prices of the two goods on consumption and marketing decisions.

2 The elasticity estimates were derived in an earlier study by Krishnan which is cited in (7.29). The estimate of \( r = .65 \) is based on results from the All-India Rural Credit Survey (8.59).
food grains can only be consumed or marketed. The possibilities of storage and utilization as livestock feed are not admitted.

Bardhan (7.2) has recently completed an econometric study of the market supply function for food grains in twenty-seven villages in the Indian states of Punjab and Uttar Pradesh. Multiple regression analysis was used to assess the impact of six independent variables upon the dependent variable, the latter designated as the percent of total production of food grains sold. The dependent variable reflects both cereals and pulses. Payments in kind represented one of the six independent variables. The remaining five variables follow:

\[ X_1 = \text{Food grains production (in maunds) per adult unit of the cultivating population of the village} \]

\[ X_2 = \text{Derived average price of food grains in a village} \]

\[ X_3 = \text{Value of commercial crops produced, not including food grains, per adult unit of the cultivating population} \]

\[ X_4 = \text{Value of milk and milk products per adult unit of the cultivating population} \]

\[ X_5 = \text{Index of concentration of cultivated acreage in a village} \]

Essentially two sets of regression were completed. The first included all cultivators in the village surveys. The second set included only those who were in a relatively-good position in terms of land hold-

---

\(^1\)The average food grain price for each village was derived by dividing the total value of food grains production by the total physical output. The regressions were also run using another average price derived by dividing the total value of food grains sales by the total volume of sales. In general, the average price based on sales resulted in larger negative regression coefficient for \( X_2 \), a higher \( R^2 \), and larger negative price elasticity of percentage "marketed."
ings and annual incomes. The individual village surveys were conducted at differing times over the 1954-61 period. Four villages were surveyed twice. Each village survey related to the economic activities for a single year.

Only the importance of $X_1$ and $X_2$ in explaining $Y$, the dependent variable, will be discussed here. Consider $X_1$ first. In all regressions, the derived regression coefficient for $X_1$ was positive and was statistically significant at the 1-5 percent level. That is, increases in per capita food grain production were associated with an increase in the percent of total food grains produced which are marketed. In the regression including all cultivators surveyed, the production elasticity of percent marketed was estimated to be about .8. With the regression subsets of cultivators having ten cultivable acres or more and those having ten or more acres plus annual incomes of Rs. 1,000 or more, the production elasticities dropped to .6 and .4, respectively.

Similarly, the magnitudes of the $X_1$ regression coefficients were reduced. Consequently, among those cultivators in relatively good economic positions, the effect of per capita food grain production on percent marketed was less than when those producers in poorer economic positions were included in the analysis.

\footnote{For example, one regression run was only for cultivators with "operational holdings" of ten acres or more. A further subset was used: those cultivators having ten acres or more which generated an annual income of Rs. 1,000 or more, net of outlays for cultivation costs. Bardhan indicates that this net income figure "may be regarded as above the subsistence minimum for the period under consideration" (7.2, p. 57).}
The derived regression coefficients for $X_2$ were negative for all regressions completed. The coefficient was statistically significant at the 1-5 percent level when all cultivators were included. It was significant at the 10-25 percent level when the subsets based on acreage and income considerations were analyzed. Thus, increases in the derived average price of food grains, ceteris paribus, were associated with reductions in the quantities of food grains marketed and an inverse market supply function was expected to be operative. But, as already noted, these results were based on survey data covering only one crop year. The price elasticity of proportion marketed was about -.6 for the sample of all cultivators. For those having ten or more acres and at least Rs. 1,000, the price elasticities increased to -.33 and -.45, respectively.\(^1\) That is, for those in relatively better economic positions, the perverse response to price changes is expected to diminish.

As Bardhan (7.2) points out, even though rising prices apparently cause the income effect to outweigh the substitution effect so that more food grains were consumed and quantities marketed reduced, higher prices may be an incentive to private investment and increased output. On the basis of the data, as analyzed, improved economic positions tend to lessen the strength of the inverse price relationship. Further, the results apply to the aggregate marketings by producers surveyed and for a particular region of India. The activities of individual producers are not discernible. The results need not apply to other regions of India.

\(^1\)Intuitively, the latter subset, i.e., those having 10 or more acres and at least Rs. 1,000, would be expected to be associated with a higher price elasticity; i.e., a less-negative elasticity, than the subset not having any income constraint. The derived elasticities do not support this contention.
As with Khatkhate, Neumark, and, to a lesser extent, Mathur and Ezekiel, Khusro (7.26) attempts to describe on an a priori basis the aggregate market behavior of producers as the market price varies. Khusro argues for a normal market supply function; i.e., one where prices and quantities marketed move in the same direction. His initial remarks emphasize the aggregate responses of Indian farmers to government pricing policies affecting output and input prices. This suggests a situation where Krishnan's (7.29) short-run \( Q \) is not valid. Yet, when Khusro demonstrates the effect of a price decline on quantity marketed, as in Figure 7.2, he is evaluating consumption and marketing decisions while production is invariant.\(^1\) That is, \( AZ \) is the given production of food grains. Consequently, Khusro is also considering a short-run, decision-making situation.

\(^1\)Figure 7.2 is Khusro's Figure III (7.26, p. 277).
Curve RR' represents the diminishing marginal utility associated with increases in direct consumption of food grains produced.¹ The marginal utility of income from sales is denoted as S'S. The intersection of RR' and S'S at point D represents the point at which utility is maximized. Accordingly, AE and EZ of the total food grain production are consumed and marketed, respectively. Khusro then postulates that the government imposes a controlled price which is lower than the "free market price" implicit in S'S. The new MU sales curve, designated as s's, lies below S'S. With the lower market price, each level of marketing results in lower sales revenue. Implicitly, other prices are invariant so that the lower income reduces purchasing power and fewer consumer goods can be obtained. Consequently, each level of marketing now provides less utility. The new point of utility maximization is at G. With the lower market price, consumption has been increased by EF while marketings have been reduced by this amount. The changes in price and quantity marketed have been in the same direction, and a normal market supply function exists.

Khusro's (7.26) analysis has one important limitation which he acknowledges. That limitation is the assumption that the utility derived from direct consumption is independent of the utility indirectly derived through sales revenue or income. When this assumption is relaxed, shifts in S'S in Figure 7.2 induce shifts in RR' and vice versa. Consequently,

¹It is not clear why the MU is presumably zero at point R'. The point at which MU is zero is likely much closer to point Z. This ambiguity does not affect Khusro's argument as he presents it.
a stable point of utility maximization is indeterminate. The qualitative assessment of price movements upon changes in quantities marketed is also indeterminate.

As noted earlier, Khusro referred to producer's response to government price policies. Implicitly, this response is both in terms of production realized and of quantities marketed. Consequently, the assumption of a given production level is no longer appropriate when attempting to assess the impact of market price changes on quantities marketed.

Krishna (7.28) developed a construct for estimating the price elasticity of market supply for a single crop. The construct incorporates the effect of price changes on both consumption and production. The basic formulation is given in Equation 7.9 where M, Q, and C are the quantities of wheat marketed, produced, and consumed, respectively. Shocking Equation 7.9 with respect to P, the relative price of wheat, Equation 7.10 is obtained. Equation 7.10 is restated in terms of elasticities in Equation 7.11 where \( r = \frac{Q}{M} \), \( b \) = price elasticity of production, and \( d \) = total elasticity of home consumption with respect to \( P \).

Based on estimates available for the various components of Equation 7.11, Krishna derives estimates of \( e \), the price elasticity of quantity of wheat marketed in the Punjab.

\[
M = Q - C \quad (7.9)
\]

\[
\frac{dM}{dP} = \frac{dQ}{dP} - \frac{dC}{dP} \quad (7.10)
\]

\[
e = rb - (r-1)d \quad (7.11)
\]

\[1\] The construct and interpretations are developed in Appendix C.
See Table 7.3. The estimates are all positive as long as price elasticity of the substitution effect on consumption is negative. See Appendix B. However, both Nowshirvani (7.38) and Behrman (7.5) correct an error in Krishna's formulation. See Appendix 3. Using the ranges of values for the parameters, as cited by Krishna (7.28, p. 83), the minimum and maximum values for the estimated price elasticities of marketings for the three different formulations are given in Table 7.3.

Table 7.3. Minimum and maximum values for the estimated price elasticity of quantity of wheat marketed based on three different estimating procedures

<table>
<thead>
<tr>
<th></th>
<th>m = .1</th>
<th>m = .5</th>
<th>m = .9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krishna</td>
<td>2.30 to 5.56</td>
<td>.12 to .78</td>
<td>.08 to .26</td>
</tr>
<tr>
<td>Nowshirvani</td>
<td>-2.74 to 5.56</td>
<td>-.22 to .74</td>
<td>.07 to .56</td>
</tr>
<tr>
<td>Behrman</td>
<td>-2.56 to 6.03</td>
<td>-.19 to .85</td>
<td>.07 to .26</td>
</tr>
</tbody>
</table>

When relatively-small proportions are marketed, such as m = .1 → .5, some of the derived elasticities are negative indicating that a perverse market supply function may be operative under these conditions. Therefore, when the effect of price changes on production as well as on direct consumption is admitted, the occurrence of a backward-sloping market supply function cannot be ruled out. This conclusion is based on the effect of small price movements and given the estimates of the parameters used.
Mubyarto and Fletcher (7.34), using the uncorrected Krishna formulation, derived estimates of the price elasticity of rice marketings in Java-Madura. Based on their estimates that $b = .1$ and $d = .5$, the price elasticities are $-3.5$ and $-.3$ when 10 percent and 50 percent are marketed, respectively. Similarly, Mangahas, et al. (7.30) use the Krishna model to derive estimates of the price elasticities of rice and corn marketings in the Philippines. Since they do not have estimates of $d$, their elasticities reduce to $e = rb$. They point out that this is a low estimate since the second term in Equation 7.11 is expected to be negative. Since they set $d$ equal to zero, the error observed by Nowshirvani and Behrman does not enter into their derived estimates. The estimates for $b$ were given in Table 7.1 for several regions of the Philippines. The values for $r$ vary among regions ranging from $.37$ to $.65$ for rice and $.19$ to $.40$ for corn. Out of the 18 regions for which estimates of $e$ are derived, only three are negative. The positive values range from $.18$ to $1.28$ for rice and $.17$ to $2.5$ for corn.

Finally, Behrman (7.5) uses his construct, as in Equation C.20 in Appendix C, to estimate the price elasticity of rice marketings for Thailand. But since he assumes that $g = h = 0$, his estimating formulation reduces to $e = rb$. The derived short-run values for $e$ are around $.4$.

At the beginning of this section, it was noted that those attempting to determine the nature of the market supply function base their conclusions on differing situations. Yet, whether the quantity pro-

\footnote{Behrman states, "Regardless of what factors underlie the results which were obtained no significant relative price or income response in Thai per capita domestic rice consumption has been supported statistically . . ." (7.5, p. 313).}
duced is fixed or variable, the possibility of a perverse market supply function for aggregate marketings exists.

Public price supports, ceilings, and subsidizations

Public price policies have a differential impact on producers. In the case of price supports designed to raise and(or) stabilize producers' incomes, the level of benefits realized is essentially proportional to the level of marketings. Subsistence-oriented producers, tenants required to market to their landlords, and debtors required to market to their creditors are little affected, if any, by the prices supported in the market. The relative levels at which prices are supported affect the relative profitability of competing crops and, in turn, production patterns. Much of the data in Table 7.1 lend support to this postulated behavior, at least among producers of cash crops.

Supported prices reduce the price uncertainty producers confront when making production and private investment decisions. This, of course, assumes that prices are announced in advance of the production period. But supported prices are also associated with a guarantee that the government will actually purchase these commodities if the market price falls below the announced price. Consequently, the government must allow for financial and administrative resources for purchasing and storing these commodities. Not all commodities are easily storable, especially in tropical climates. Therefore, spoilage and quality deterioration are additional costs that must be considered. However, the accumulated stocks can serve as contingencies for adverse production periods and as buffer stocks to be released on to the market when market prices rise too high. Price variability is reduced and food and fiber
costs to consumers are kept from rising.

Public subsidization of input costs can be used to encourage the use of fertilizers, improved seeds, and pesticides. Referring to the capital constraint in Equation 2.9, \( K^0 - \sum_{j=1}^{m} p_j q_j \), as some of the \( p_j \) are reduced, more \( q_j \) are obtainable with \( K^0 \). As with price supports, the subsidization of input prices primarily benefits the market-oriented producers--those who are the largest purchasers of inputs in the market. If the levels at which the \( q_j \) are used increase, a major proportion of the increase in production would be expected to appear in the market. The rightward shift in the market supply curve would tend to keep market prices down. Consumers and exporters would benefit. Producers participating in the market but not using the price-subsidized inputs would be penalized by the lower prices they receive. In addition, the public must assume the costs of the subsidies; these funds have opportunity costs.

The use of price ceilings to keep market prices from rising benefit consumers, manufacturers using agricultural commodities, and exporters. On the other hand, if the price controls are set at too low a level, production and quantities marketed may be reduced. Consequently, while consumers prefer the low prices, the quantity supplied may be insufficient to meet the demand and some rationing program must be implemented.
Monetary and Fiscal Policies Affecting the Agricultural Sector

The importance of the agricultural sector, both in terms of number of people employed and proportion of national income originating within the sector, has already been noted. The contribution of the agricultural sector to general economic expansion is, of course, conditioned by growth within the sector itself. Higher per capita real incomes may be associated with higher absolute levels of savings with some transfers to other sectors of the economy, the potential for higher direct and indirect tax revenues, and an expanding market for consumer and producer goods. Conversely, higher per capita incomes, through output increases and(or) price advances, may result in a decrease in the quantities of agricultural commodities marketed. Evidence of this behavior was noted in the previous section. Even assuming that the price elasticity of quantities marketed is positive, government policies may be implemented in an attempt to increase the magnitude of this elasticity.

A net transfer of income out of the agricultural sector may be effected by turning the terms of trade against producers, by implementing more rigorous tax policies, and by creating institutions to facilitate saving which can be used for private investment elsewhere in the economy. In economic systems based on Communistic principles or where remnants of feudal systems are still operative, output and income transfers are effected through marketing quotas and compulsory deliveries. However,

1The relative emphasis given to income transfers through the marketing mechanism or through compulsory transfers is the crux of Owen's (7.40) discussion of the Marshallian and Marxian approaches to capital transfers within the economy. Compulsory deliveries to the government have been required in several Asian countries having capitalistic-oriented economic systems (7.47). In a vein similar to Owen, Schultz (7.42) uses the terms "market approach" and "command approach".
turning the terms of trade against agriculturalists, increasing the tax burden, and raising marketing quotas may act as disincentives to increasing output levels and undertaking private investment in the firm. Consequently, the increased need for larger transfers of income to the government and to other sectors of the economy must be balanced against the possibility of a reduced rate of growth of agricultural output and marketings. Reduced per capita real, disposable incomes result in many low-income producers having neither the financial capacity nor incentive to expand productivity. A partial withdrawal from the monetized economy may also result, especially for subsistence-oriented producers.

As is apparent, the effectiveness of monetary and fiscal policies in stimulating and guiding economic activity at preferred growth points depends on the infrastructure of the economy and its stage of economic development. Where activities of the banking system are primarily confined to the relatively urban areas, increases in the money supply through the central bank system have a relatively minor impact on the money supply in rural areas. Where the degree of monetization in the economy is low, the administrative structure for assessing and collecting taxes is weak, and the opportunities for tax evasion are widespread, governments cannot rely on personal income taxes as a principal source of public revenues. Yet, such revenues are necessary for implementing national development plans and alleviating bottlenecks retarding developmental processes.
Monetary policies

Monetary policies are designed to affect the money supply and, in turn, interest rates and the general price level. The "quantity theory of money", expressed in Equation 7.12, is a useful point of reference.

\[ MV = PT \]  

(7.12)

The terms have the following interpretations:

- \( M \) = Money supply; the quantity of money in circulation
- \( V \) = Velocity or turnover of money in transactions, expressed in "number of times" per year or period of time under consideration
- \( P \) = The average price level of all transactions
- \( T \) = The number of transactions or the volume of goods and services exchanged against money during this period.

Economic expansion brought about by private, public, or foreign investment and by increased monetization of the economy increase the magnitude of \( T \) in Equation 7.12. As investment funds are committed and hoards mobilized, \( M \) and to some extent \( V \) increase. Since \( T \) does not increase at the same rate as \( M \), i.e., a lag exists between expending investment funds and consequent economic activity, \( MV > PT \). Prices are forced up and inflationary tendencies may result. While a mild amount of inflation may not cause alarm or may even be desirable if profits are increased and reinvested in the economy, substantial inflation tends to dampen the incentive for productive investment by both indigenous and foreign investors. The attractiveness of purchasing real estate, investing in metals and jewelry, and transferring capital abroad increases. Rising production costs are disadvantageous when attempts are made to maintain or improve the foreign trade position. A weak currency
tends to discourage both saving and investment.\(^1\) Without adequate foreign exchange safeguards, capital needed domestically flows into foreign banks and investment projects abroad. The problems of developing government budgets and national plans are accentuated by fluctuating prices and economic uncertainty.

Increased monetization of the economy and the availability of more consumer and producer goods may tend to raise \(V\) as money previously held as hoards is brought into circulation. But the principal means of dampening the price increases is through increasing \(T\), the volume of goods and services being produced in the economy.

Depending upon the structure of the banking system, variations in \(M\) can be effected by purchases and sales of government securities, by altering discount rates, by new issues of money, and by foreign exchange controls. But the dispersion effects of changes in \(M\) are affected by the location of banks associated with the central banking system.

\(^1\)The expectational elasticity of future prices concept reflects the impact of expected price changes on consumption, saving, and private investment decisions. This elasticity is defined as the ratio of the percent change in expected prices to the percent change in actual prices. For example, if the expectational elasticity equals 1.0, future prices are expected to increase at the same rate as in the past. If the expectational elasticity exceeds 1.0, future prices are expected to rise at a rate higher than current price increases. Unless monetary incomes are expected to increase at a rate higher than the increase in the general price level, future real incomes are expected to fall. In anticipation of this eventuality, consumers are motivated to increase current consumption at the expense of saving. This behavior, in turn, tends to accentuate inflationary tendencies. Similarly, expectational elasticities not equal to 1.0 generate price uncertainties and cloud business prospects surrounding private investment.
Since the majority of these banks are primarily located in relatively-urban areas, the effect on the money supply in rural areas is usually not pronounced. The effect is felt through any increases in funds secured by cooperatives, marketing middlemen, professional moneylenders, and landlords who, in turn, lend at least a portion of these funds to cultivators and noncultivators in rural areas. An increase in loanable funds may not depress interest rates charged. Rather, interest rates may be maintained while larger loans and/or loans to more individuals are made. Additional credit availability may have some beneficial impact on private investment but not as much as if interest rates were also lowered.

The "pluralistic" economic structure of most less-developed countries; i.e., the tendency for growth points within and among sectors to surface, generates differential demands for money. Yet, rural areas having growth points are relatively disadvantaged since individuals often do not have access to the lower cost, institutional credit. The establishment of rural branches of commercial banks, agricultural banks, and marketing and credit cooperatives would provide additional channels through which money reaches demanders in nonurban areas. Some channels and links already exist; the problem is to increase this number and to strengthen the linkages. Not only can additional funds flow to these areas but local savers have increased outlets for any monetary "surpluses" generated, savings which can be lent locally or transferred to other sectors of the economy. That is, an improved mechanism is available for increasing the mobility of capital within the economy.

One section of Chapter V dealing with agricultural credit discussed the links between urban and rural money markets.
The effectiveness of monetary policy is also affected by other components of the economy's infrastructure. Improved communications, transportation, and marketing facilities favorably affect the flow of inputs, including capital, and commodities produced. For example, public investment in an irrigation system in a relatively-remote area would be expected to increase agricultural output and per capita incomes. In Equation 7.12, $T$ would be increased while $V$ is relatively constant. If $M$ is essentially unchanged, $P$ would tend to fall. On the other hand, if additional marketing outlets are opened either through more traders coming to the market center or producers transporting their goods to other markets, the money supply in this area of economic activity is essentially increased. That is, additional traders bring money with them. As $M$ is increased, the decline in $P$ is lessened and producers are able to realize higher marketing revenues. Finally, $V$ may be increased as communication and transport facilities are improved.

In summary, the effectiveness of monetary policies depends upon the level of monetization in the economy and the structure and distribution of the banking system. Monetary stability is crucial to sustaining developmental processes. Fiscal measures are also important in stabilizing the value of local currencies and the cost of living and production indices.

Fiscal policies

Fiscal policies take the form of programs of public taxation and public expenditures designed to influence the direction of economic activity and the distribution of wealth and income in the economy. The major portion of this discussion will focus on taxation policies;
however, a few comments will be made on public expenditures. In Chapter VI, the need for public investment in social overhead capital was discussed. Such investment is necessary to remove some of the structural bottlenecks in the economy. The tendency may be to view the importance of such investment by utilizing the concept of the "multiplier".

If income equal \( Y_0 \) in \( t_0 \), investment in \( t_1 \), \( I \), raises income in \( t_2 \) to \( Y_1 = Y_0 + I \), assuming \( Y_0 \) is sustained. Defining \( b \) as the marginal propensity to consume, \( I \) in \( t_1 \) is income of which \( bI \) is expended or consumed in \( t_2 \). Consequently, income in \( t_2 \) is \( Y_2 = Y_0 + I + bI \), assuming that \( I \) and \( Y_0 \) are sustained in \( t_2 \). In a similar manner, \( Y_t = Y_0 + I + (b + b^2 + ... + b^{t-1})I \). This geometric series can be reduced, as in Equation 7.13. Since \( b < 1.0 \), as \( t \) becomes sufficiently large, \( b^t \rightarrow 0 \)

\[
Y_t = Y_0 + \frac{(1 - b^t)}{(1-b)} (I)
\]

(7.13)

\[
Y_t = Y_0 + \frac{1}{1-b} (I)
\]

(7.14)

and Equation 7.14 results. The term \( \frac{1}{1-b} \) is designated as the "multiplier". If \( b = .9 \), the multiplier has a value of 10. If \( I = 100 \) units, \( Y_t - Y_0 = 1000 \) which is the additional income generated by \( I \).

Implicit in the formulation is an assumption of constant prices. But more importantly, the assumption that \( bI \) is expended in \( t_1 \) is based on another implicit assumption that sufficient consumer goods become available for purchase so that prices are not forced upward. Therefore, the use of the "multiplier" presumes the absence of structural bottlenecks in the economy so that inputs and commodities flow freely within and among sectors. Where transportation, marketing, and communications facilities seriously retard this flow, use of the "multiplier" is in-
appropriate. Such is the case for most, if not all, less-developed countries.

Government revenues are necessary for underwriting the costs of maintaining the government system and for implementing development programs. Such revenues are raised through a variety of tax devices.\(^1\) The alternative is deficit spending. The feasibility of alternative tax devices depends upon the comprehensiveness of an administrative structure for assessing and collecting taxes and on the stage of economic development of the society.\(^2\)

Since agriculture is the principal sector in most less-developed countries, this sector also provides a major fraction of tax revenues. In the absence of higher output and income levels, an across-the-board increase in taxes results in reduced consumption and(or) savings levels. But if this forced saving is at the expense of consumption levels, labor efficiency and productivity may be impaired. For these same individuals, an increase in taxes reduces their capacity for private investment and for an improvement in their economic well-being. The question arises as to whether the tax funds are used more productively by the individual producer or by the government. A partial answer follows: as long as per

\(^1\)Generating public revenues through marketing quotas and compulsory deliveries is essentially a direct tax on producer-consumers, though not specifically designated as taxes.

\(^2\)Referring to Equation 7.14, since the term \(b\) in the multiplier \((1/1-b)\) is the marginal propensity to consume, an increase in the tax level would be expected to lower \(b\) and, in turn, reduce the value of the multiplier. To the extent the tax structure is progressive, a mechanism exists for partially stabilizing economic activity.
capita consumption levels remain low, if the tax increments were returned to the producer, an increase in consumption rather than private investment is likely. This follows from physical requirements and a high income elasticity of demand for food. Low returns to private investment would accentuate this behavior. What is needed is a tax program which has a differential impact on taxpayers so that private initiative is not discouraged while the government obtains funds necessary to defray the costs of programs stimulating and complementing private initiative. The difficulties in devising such a program are quite apparent. For example, given the numerous uncertainties facing producers, what is the appropriate level of profits the risk-taker should be permitted to earn? As uncertainties increase, profit margins must usually also increase before additional private investment is made. In this situation, a progressive tax on profits would dampen investment incentives. Conversely, tax relief in some areas may stimulate economic activity and future tax remittances to the government.

The need for a comprehensive tax program is reinforced by the unequal distribution of wealth and income found in most less-developed countries. That is, tax programs are one means for redistribution of income. Given the high marginal propensities to consume among low-income groups, a redistribution of income in their favor would stimulate

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1 Joan Robinson states the problem more clearly: "But for the most part, the mass of their people are living below the minimum of subsistence necessary for working efficiency. The problem can be stated in a straightforward manner in terms of the need to provide for an increase in necessary consumption while restraining unnecessary consumption" as quoted in Myrdal (7.35, p. 2097).
the market for consumer and producer goods, including imported goods.\textsuperscript{1}

Wai (7.49) provides some interesting insights as to the levels of taxation among various countries, classified according to per capita income level. The variation is quite large within income groupings, but government revenue as a percent of national income tends to be higher among the "high" income countries.\textsuperscript{2} The median percentage is 25.0 for the "high" income countries and 15.2 and 13.7 for the "medium" and "low" income countries, respectively.\textsuperscript{3} Within the "low" income countries, the percentages which are based on 1959 data range from 23.7 for the United Arab Republic to 7.7 for India. The comparable figures for Western European countries are in the 20-30 percent range, with the exception of Switzerland at 8.1 percent. The lower, apparent

\textsuperscript{1}In this connection, Bauer writes, "Many branches of the consumer goods industries, the development of which is ultimately closely linked to agricultural advance, have been working below capacity for some years. This is the result of several factors. These include the extremely low productivity of agriculture and its consequent failure to provide a growing market for industrial output" (8.9, p. 57).

\textsuperscript{2}Government revenue includes all taxes, transfer payments, surpluses of government trading associations, interest and dividends received, sales of public assets, and repayments of loans.

\textsuperscript{3}The three income groupings are based on per capita annual incomes greater than $500, $200-500, and less than $200. Wai (7.49) adds that revenues from local governments are not included in the median percentages. For example, he estimates that the 7.7 percent for India would be doubled if revenues from local governments were included.
The incidence of taxation among the "low" income countries is likely due to a number of factors. First, low per capita incomes, realizing that these are only averages, reflect a low capacity to pay taxes especially where inflation drives up the cost of living. Second, the relatively-low degree of monetization of the economy in some countries or areas within countries provides a low tax base for income taxes and turnover taxes on commodities sold and purchased. The difficulties of identifying and valuing commodities and services is apparent. Third, the administrative mechanism for assessing and collecting taxes affects both the scope and intensiveness of taxation and, in turn, the effectiveness of tax policies. Even more fundamental is the need for appropriate legislation which can be enforced. The politically powerful have either a direct or indirect self-interest in supporting legislation which provides them tax loopholes and exemptions with few penalties for tax evasion (7.13, 7.16, 7.35).

Not only are potential government revenues reduced but tax avoidance by the elite certainly does not encourage tax compliance by the nonelite.

As noted in the previous footnote, taxes generating local government revenues are not included. Furthermore, information on who bears or pays the taxes is not available. Where a relatively-small group accounting for a proportionately larger amount of national income are not taxed or are able to evade taxes, the tax burdens of those paying taxes would be considerably higher than the percentages indicated above.

In this connection Myrdal states, "... in colonial times taxation was looked upon as an instrument of exploitation and that resistance to paying taxes was often part of the nationalist struggle for independence. Although that day is long past, the idea that taxes should be paid according to the intention of the legislator has never become part of the mores of the business community. Tax offenders are seldom prosecuted; when they are and are found guilty, the punishment is very mild and no publicity attends it" (7.35, p. 2100).
Two broad distinctions in tax policies of "low" income countries relative to those of "high" income are discernible (7.35, 7.49). Most "high" income countries place relatively more emphasis on direct taxes such as income and property taxes. The median percentages for direct taxes as a percent of total central government revenue for 1959 were 43, 29, and 20 percent for the "high", "medium", and "low" income countries, respectively (7.49). The second distinction is that lower income countries obtain a major portion of their tax revenues from taxes on foreign trade and from other indirect taxes which can be shifted to other individuals.\(^1\) For the "low" income countries, taxes on foreign trade as a percent of all government revenue ranged from 20 percent for countries of the Near East to 50-60 percent for Ghana and Central American countries (7.49).

A few of the more prevalent types of taxation are discussed below along with their qualitative impact on producer-consumers.

**Personal income tax** In a sense, personal income taxes are a form of forced saving. This tax represents a claim on income earned, usually net income. The immediate consequence of imposing or raising this tax is that the profits or return to management is reduced. If an allowance for tax is built into the firm's cost structure, the cost curves are shifted upward reducing profits realized, ceteris paribus. When profits are reduced, the capacity for saving and(or) private invest-

\(^1\)The following situation is noted in Thailand: "Under the present tax system, tax on foreign trade accounts for about one-half of total government revenue while income tax constitutes less than 10 percent. There is no property tax, and the rate of land tax is relatively low compared with that in neighboring countries. Professional incomes remain practically untouched" (7.46, p. 173).
ment is also reduced. This reasoning is often used as the basis for arguing against progressive income tax. But as Goode (7.16) and others have noted, the relatively wealthy in many less-developed areas are often conspicuous for their nonproductive investments and expenditures rather than for productively reinvesting earned profits. Higher taxes for these individuals need not adversely affect economic activity. Furthermore, a portion of taxes from rural areas may be indirectly returned to producers in the form of public investment in the infrastructure of the economy which raises the productivity of agricultural inputs and opens new marketing outlets for agricultural commodities and consumer goods.

An increase in taxes, ceteris paribus, is associated with a decrease in disposable, personal incomes. If individuals are to maintain their level of living, either external financing must be obtained or incomes must be raised through increased output, lower production costs, or off-farm income from hiring out labor or engaging in small-scale processing and marketing activities. If the demand for income increases, as in Figure 8.5, through using more labor inputs and necessary complementary inputs, the firm's output level may be increased. If the marketing and demand structure is such that market prices are not lowered as the aggregate output is increased, gross incomes and perhaps net incomes

1Some of the attributes of investment behavior by landlords was noted in Chapter III. Chapter VIII includes a discussion of factors other than net returns affecting decisions for private investment.

2For example, taxes on rubber exports in Malaya were used to subsidize replanting costs as relatively unproductive trees were removed from production (7.52).
are increased. However, producers must have access to the necessary complementary inputs.

Since income taxes are usually paid in cash, an increase in taxes is equivalent to an increase in the demand for cash. Abstracting from external income, the increased demand for cash is met by increased marketings or through credit financing. Indebtedness or a higher debt burden often has a deleterious effect on the borrower's future economic well-being. Increased marketings while output levels are invariant are only possible through reductions in consumption or inventories. For the subsistence-oriented, reducing per capita consumption must be juxtaposed with the potentially adverse consequences for personal health and labor productivity. Higher present marketings often mean that these individuals must repurchase the same commodities at a later date, usually through credit from local merchants and money-lenders. The producer gets it from both sides: he must sell when market prices are relatively low and purchase when prices are high plus repay credit costs.

Even where income taxes are attempted to be levied according to the individual's ability to pay, the problems of enforcing compliance and determining income levels are sizeable. The peasant who may be illiterate and unaccustomed to keeping a system of accounts is not in a position to provide records indicating his income. A large proportion of the edible commodities produced is consumed directly. Another portion is bartered rather than sold in the market. The difficulties in determining his income are apparent. At the other extreme, high income individuals are more aware of means of evading taxes and have
the political and economic influence to escape the major brunt of their implicit tax load.

Finally, devising and implementing an effective income tax program requires a large input of administrative resources. The reliance on local collectors alters social relationships in the villages. This newly-found power by tax collectors often generates opportunities for preferential treatment and often extracurricular tax collections. Furthermore, the low per capita incomes and consequent large number of relatively-small tax receipts to be collected must be weighed against the costs of such collections. An alternative form of taxation may be both more physically and economically feasible.

**Property taxes** Property taxes are declining in relative importance as a source of public revenue (7.49, 7.50). In the agricultural sector, at least at low stages of economic development, land is the principal form of wealth and property taxes are nearly synonymous with land taxes. Yet, property taxes have some appealing features, some of which potentially function as instrument variables in conditioning economic activity.

Property is tangible and more easily identifiable than income. However, the problem of valuation as a tax base remains. In some areas, the absence of land markets complicates problems of determining market values as a tax base. The capitalized value of current income imputed to land or the potential capitalized value associated with the highest use of land requires data on existing and potential costs and returns. When land values are assessed on the basis of income from land, production costs are taken into account. Exemptions for family size and
costs of private investment may be admitted to further reflect the producer's ability to pay. The inherent danger in land taxes is that they become regressive. For example, if taxes are only based on a percent of the capitalized value of per acre output, producers' incentives for increasing output and income are stifled, particularly for small-scale producers. Conversely, problems associated with taxing that output which is directly consumed are partially avoided.

Land and other property taxes may be viewed as a fixed cost. That is, they must be paid regardless of the income accruing to the property. Such taxes are built into the cost structure by increasing the level of total and average fixed costs, as in Figure 3.1. Such taxes reduce net profits, ceteris paribus. In tenancy systems, land taxes can be easily shifted to either cash or crop-share tenants by increasing the rents they must pay and, in turn, reducing their net incomes.

The taxing of Ricardian rent and the rent associated with Henry George's "single-tax" concept is essentially a tax on capital gains; i.e., an accretion of land values due to positive externalities from population growth and(or) economic growth. Taxing at least a portion of

\[1\text{Assuming that a lump-sum land tax is levied, the effect of this type of tax on input allocation and production conditions can be handled as in Equation 2.35. Where the cultivator's land taxes vary with the value or productivity of different land tracts, these differential taxes affect the relative costs of using land inputs and, in turn, production decisions and cropping patterns. Under such circumstances, property taxes are not fixed but variable.}\]

\[2\text{Where tenancy legislation has been enacted, the government has, in principle, a means for influencing the extent to which taxes are shifted to tenants (7.50). However, as already noted in Chapter III, such legislation is often ineffective and(or) loosely enforced. Also, the landlord has other means for raising rents even though the nominal rent is at or below the legislated ceilings.}\]
this increment to wealth need not affect production incentives (7.50). At times, land taxes have been proposed as an inducement to use land more intensively where such profitable opportunities exist (7.16, 7.50).¹ Land taxes are increased to the point where cropping patterns are altered and idle, but productive land, is brought into production. Similarly, land previously used in an extensive manner, such as in pastures and some tree crops, may now be forced into more intensive uses. Even abstracting from the problems of determining the highest-use levels and the structure of taxes which will motivate or force this behavior, three other factors are important. First, the implicit assumption is made that producers have access to those complementary inputs necessary for more intensive land cultivation. This assumption is not too restrictive for most large landowners. Second, the increase in taxes may be largely passed on to tenants without any significant modification in cropping patterns. However, even if previously idle land is now cultivated by sharecroppers, new employment opportunities have been generated and as rents are paid to the landlord, the supply of agricultural commodities in the marketing system increases. Third, the opponents of property taxes have the political power to block or effectively weaken any proposed tax legislation. Higher tax levels may induce absentee landlords and large landowners to sell their land or to participate more actively in the firm's operations. Furthermore, an increase in land taxes would tend to discourage land purchases as a hedge against inflation and as a means for enhancing one's social and political status. Investment in land for

¹Situations of misuse and underutilization of land were noted in Chapter III.
such purposes is nonproductive investment from the standpoint of economic development.

Some of the problems of devising and implementing a progressive land or property tax have already been noted. In addition to political obstacles and shiftability of these taxes to tenants, a large input of administrative inputs for assessing and reassessing land valuations would be necessary.

**Turnover taxes** Turnover taxes are a tax on commodities entering the marketing channels. These taxes, along with export taxes, have replaced land taxes as a major source of public revenue from the agricultural sector. There are several advantages of this type of tax (7.47):

1. The difficulties and costs associated with cadastral surveys for use in assessing land taxes are avoided;
2. The taxes are assessed and collected with relative ease;
3. The tax structure can be readily altered as production and incomes vary from year to year; and
4. The producers who are primarily subsistence-oriented are in effect given a tax exemption since they have only limited participation in the market.

Turnover taxes are easily passed on to the producer in the form of a lower price for the commodities he markets and (or) a higher price charged the final consumer. If the tax is selective in that differential rates are applied to commodities, the relative profitability of producing these commodities and the relative costs in consumption are altered so that supply and demand conditions are altered. But this may be consistent with public policy to encourage the production of some goods.

Where producers sell or barter goods on a personal basis outside of the regular marketing system, turnover taxes are easily avoided. Collection is facilitated where the major portion of the crop is sold to a few large wholesalers and processors or through marketing cooperatives.
relative to others.

The qualitative impact on output levels can be assessed with the use of Equation 7.15. The term $R(q)$ represents total revenue and $C(q)$ and $F$ are the variable and fixed costs, respectively, while $q$ is the output level and $\pi$ denotes profits. The turnover tax, $t$, is subtracted from $R$ so that $r^* R(q)$ is the total revenue actually received by the producer where $r^* = (1-t)$.

$$\pi = r^* R(q) - C(q) - F \quad (7.15)$$

$$\frac{d\pi}{dq} = r^* R'(q) - C'(q) = 0 \quad (7.16)$$

Upon taking the first derivative of Equation 7.15 with respect to $q$, Equation 7.16 is obtained. The total differential of Equation 7.16 is given in Equation 7.17 and Equation 7.18 follows after rearranging the terms. The denominator of the right-hand term is negative since $R'(q) > 0$, $R''(q) = 0$ for the producer who is a price-taker and $C''(q)$ is positive since the MC curve is assumed to be upward sloping and the rate of change, $C''(q)$ is positive. Multiplying Equation 7.18 by minus one, $\frac{dq}{dr^*} > 0$ so that when $dt$ is reduced and, in turn, $dr^*$ increased, the quantity produced increases and vice versa.

$$r^* R''(q) dq + R'(q) dr^* = C''(q) dq \quad (7.17)$$

$$\frac{dq}{dr^*} = \frac{R'(q)}{r^* R''(q) - C''(q)} \quad (7.18)$$

\footnote{This was previously developed as Equation 2.58.}
If the turnover tax is borne by the consumer rather than the producer, the increased cost to the consumer, ceteris paribus, reduces his real income and the demand curve for the commodity in question shifts leftward with both the market price and quantity which clears the market falling. In the aggregate, total revenue to producers falls. Turnover taxes are relatively easy to collect since they can be levied at marketing and retailing points. However, since they apply only to commodities entering marketing channels, no tax is levied on that production directly consumed. In addition, turnover taxes tend to be regressive. The small-scale producer who markets relatively-small quantities absorbs the same per unit tax on commodities marketed as the commercial or marketed-oriented producers. Conversely, since the small-scale producer directly consumes a major portion of his output, no tax is levied on these goods. The market-oriented producer who purchases a relatively-large proportion of his consumer goods in the market is subject to taxation on these transactions.

**Tax on production inputs** While the "tax-added" cost of such inputs as fertilizers, machinery, and improved seeds would seem to generate additional public revenue, the second-round effects likely discourage this form of tax in less-developed areas. Referring to the working capital constraint in Equation 2.9, \( K^0 = \sum_{j=1}^{m} p_j q_j \), as the \( p_j \) increase the quantity of \( q_j \) which can be purchased is reduced. Applying fewer variable inputs to the land, ceteris paribus, results in reduced output. As production falls, the aggregate supply curve is expected to shift leftward. The market price and, in turn, consumers' cost of living and producers' production costs are forced upward. In-
flationary tendencies may be set into motion.

When the tax is placed on improved inputs, a lesser quantity of $q_j$ can be obtained as long as $K^o$ holds. However, the higher productivity of these inputs may reduce per unit production costs to the cultivator and the quantities offered for marketing may be maintained or increased. In either case, imposing a tax on production inputs discourages use of such inputs. Furthermore, differential tax rates affect the relative costs of using inputs and, in turn, patterns of input allocation. That is, this form of tax can be used for not only generating public revenue but for directing input use and production configurations.

**Import and export taxes** The importance of taxes on foreign trade as a component of total government revenue has already been noted. The impact of export taxes depends on the direction in which they are shifted. If the producer bears the tax with the export offer price unchanged, the lower returns on the export crop relative to competing crops motivates producers to alter cropping patterns in favor of the latter. Consequently, the quantity offered for export is expected to fall. If the tax is shifted forward to the international consumer, the rise in the export offer price tends to place the exporter at a competitive disadvantage. That is, if the tax is sufficiently high, the export crop is priced out of the international market.

Export taxes, whether levied on a specific or ad valorem basis, do not reflect production costs and differential net returns to pro-

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1 The qualitative impact of variations in export taxes which are borne by the producer is the same as that outlined earlier for turnover taxes.
ducers. Similarly, such taxes do not reflect the producer's ability to pay. Since export taxes are usually specific in nature and borne by the producer, they are regressive. The per unit tax is the same for all producers, regardless of scale of operations.

In the case of taxes on imported goods, consumers pay the tax in the form of higher prices. The real incomes of consumers are lowered. In the case of producer goods, total production costs are forced upward. The terms of trade are turned against producers. Manipulating the terms of trade as a means of transferring income or capital from the agricultural sector to the government or other sectors of the economy is conditioned by two important factors: (1) The degree of participation in the market or monetized economy; and (2) The strength of market participation as reflected by the rate at which individuals enter and withdraw from the market economy.

Higher prices for imported goods may provide temporary protection for import-substitution industries which are attempting to grow and survive. The imposition of taxes, however, invites the danger of retaliation on the part of other countries participating in international trade. Taxes on foreign trade can be varied as economic conditions in world markets change. In the case of ad valorem taxes, when export prices fall, government revenues can be maintained only if export taxes or exports are increased. When prices fall and tax levels are increased, the producer is penalized twice. When the price of export crops has fallen relative to nonexport crops, producers are motivated to shift resources to the latter. Consequently, considerable reliance on import and export taxes as a major source of government revenues makes the
government's revenue position vulnerable to fluctuations in world trade. Countries exporting a small number of commodities are in an especially precarious position. Diversification of exports would tend to stabilize export earnings and public tax revenues. Since exports and imports are channeled through relatively-few ports, these taxes are often the easiest to collect.

Marketing boards The use of marketing boards is another public instrument to affect economic activity. Although functions relating to quality control in assembling and processing goods for export markets and dispensing technical information are important, the principal objective of marketing boards is to stabilize prices and, in turn, producers' incomes of those commodities covered by board activities. Another important objective is the generation of board profits or reserves to finance public expenditures on the economy's infrastructure and for production loans to growers. Furthermore, a number of marketing middlemen are eliminated (7.47).

Monetary reserves are accumulated during periods of relatively-high prices when the differentials between prices received by producers and export prices are high. Since producers' incomes are not raised correspondingly, they are, in effect, taxed. Conversely, during periods of lagging export prices, producer prices are supported at higher than market levels so that producers' monetary incomes are nearly

1 The amount of the tax is equivalent to the difference between the producer and export prices after transportation, processing, and marketing costs have been deducted plus some allowance for the producer's contribution to the price stabilizing fund (7.47).
maintained. The cost of income maintenance is financed by board profits or reserves accumulated in the past.

Immediately following World War II, marketing boards were at least partially successful in dampening inflationary pressures associated with potentially rising export incomes which would be used to demand relatively limited quantities of imported manufactured goods (7.9, 7.24). While prices were partially stabilized, producers realized prices substantially below export prices. The monetary reserves which consequently were accumulated, in excess of operating expenses of the boards, were used to underwrite the costs of development projects especially in Ghana, Nigeria, and Uganda through board projects or through loans and grants to public programs (7.9, 7.24, 7.47). The financial contributions of marketing boards to development programs were reduced as export prices became less favorable in the late 1950's and as governments placed more emphasis on variable export taxes as a source of revenue.

A similar situation existed in Burma were public investments have been primarily financed by profits earned by the State Agricultural Marketing Board on rice. Since this organization has a monopoly on rice exports, substantial profits have been realized by the price differentials between prices paid producers and export prices. Profits from these activities have ranged from 25 to 40 percent of total government revenue (7.48, p. 25). Government control of rice exports in Thailand also resulted in sizeable profits, a major portion of which was channeled into government revenue (7.46).¹ Government control of rice exports was discontinued in 1955 and emphasis was shifted to use of export taxes. The tax level varied with export prices. Prices to domestic consumers were kept relatively low (7.46).
Whether a country's economic development has been furthered through the operation of marketing boards is open to conjecture (7.24). Sufficient evidence is not available. The contributions of boards to dampening inflation and generating funds for public uses have been noted. The question is whether this "taxing" of producers is preferable to letting producer incomes vary with export prices.\(^1\) The consequences for saving, private investment, and personal enterprise on the part of producers are subject to debate.

If marketing boards are to be economically successful, they must be implemented when export prices are low so that necessary reserves for operating expenses can be accumulated as export prices increase (7.49). In addition, sufficient control over private marketing is necessary to eliminate private sales which would undermine the board's monopoly position.

Agricultural Extension Services

Extension personnel are generally viewed as the transmitters of information relative to costs and returns of improved inputs, alternative production techniques, and economic outlook data for use by producers. More generally, they have three broad functions: (1) To perceive and diagnose problems confronting the producer whether such problems deal with technical aspects of production, securing credit, or gaining access to remunerative marketing outlets; (2) To devise means for alleviating or solving these problems; and (3) To communicate and

\(^1\)Kamarck (7.24, p. 126) gives a summary of the criticisms leveled against marketing boards by the East African Royal Commission.
to persuade producers to adopt these recommended means. They essentially act as consultants to producers or producer organizations so that the latter can more rationally accommodate their decision-making processes to a changing environment. The general responsiveness of producers to changing price and profit situations was borne out in the previous section on public pricing policies. This responsiveness, however, does not imply that producers, especially subsistence-oriented producers, have the capability to acquire or digest technical information on improved inputs and cultivation practices. Competent extension agents can fill that need. But the flow of information need not be unidirectional. Extension workers are, theoretically, in the best position to communicate the needs and potentials of producers to regional and national planning groups. The effectiveness of extension personnel is contingent upon a number of factors, some of which are listed below:

(1) As representatives of the government, their creditability and motives are regarded with various degrees of suspicion (7.20, 7.41, 7.52). Producers living in relatively-isolated villages are more

\[\text{While this suspicion is expected to be more pronounced among low-income, subsistence-oriented individuals the following quotation relative to the Community Development Program in India adds another dimension: } \ldots \text{ high caste people (are likely) to be suspicious of any program sponsored by the government, and to fear that any cooperation on their part will contribute to the ultimate destruction of their cherished status and their advantageous economic position. Therefore, they oppose the Community Development Program; it is seen as a palliative to gain their confidence in order to undermine their social, ritual, and economic status'}, \text{ as quoted in Myrdal (7.35, p. 1343). A similar point is made by Hoselitz (7.20, p. 411).} \]
skeptical. If extension services are provided through a local co-operative or through cooperation of a village leader, individuals contacted are likely more receptive.¹

(2) They need to have a working knowledge of agricultural operations and of existing patterns of economic and social relationships.² They also need information to extend.³

Contrary to the tendency to view the information provided by extension personnel as relating to improved inputs and new cultivation practices, a considerable potential exists for increasing productivity through communicating information on existing production techniques (7.9, 7.22, 7.35). Consequently, within a range of production increases,

¹According to Rahim, "Field research conducted by the Academy (Pakistan Academy for Rural Development) revealed that in a village certain persons occupy 'strategic positions' in the communication network, and to these persons other villagers went for information and advice. These 'central persons' or 'opinion leaders' have one characteristic in common: they maintain regular contacts with sources of information and influence in the town and other places outside the village" (7.41, p. 420). A similar phenomenon among tribal and communal groups was noted in Chapter III.

²In this connection, Kamarck writes, "... when the colonial powers departed, the (extension) services they had established were still in their infancy. Paradoxically, while political independence has improved the African farmers 'receptivity to the services' advice, the departure of 'expatriates' before Africans had been trained to replace them has weakened the effectiveness of the services" (7.24, p. 114).

³Johnston (7.22) makes this point relative to extension activities in Africa where agricultural research, particularly research on food crops, has been on such a small scale that only a limited amount of information is available for transmission. The concentration of research activities in the tropics on improving export crops is mentioned by McPherson and Johnston (7.33). However, Johnston (7.22) also notes the rapidity with which cash crops such as cotton and cocoa have been adopted. Extension workers and other government programs were instrumental in promoting the spread of cash crops production. The tardiness with which relevant information flows from research institutions is also mentioned by Rahim (7.41).
the limited flow of information from current research need not seriously impede agricultural expansion. Certainly, the discovery of higher-yielding inputs and superior production practices would complement this expansion. Where demonstration is possible, the effectiveness of transmitting such information is improved.\(^1\) Even where improved inputs and information are forthcoming from indigenous research institutions, their applicability is limited by differing soil and climatic conditions and by variation in social systems. Even though the proposed change is technically feasible, extension agents do not always give sufficient consideration to economic feasibility (7.22, 7.24, 7.33).\(^2\)

The ingenuity necessary for making adaptations to local conditions is particularly scarce in most developing countries.

(3) The number of producers in the area serviced by the extension representative must be manageable. Otherwise, the agent must spread his expertise and time too thinly and lose some of his effectiveness.

Local participation in initial discussions and planning of extension

\(^1\) Whyte and Williams (7.51) note some of the problems of input availability and need for complementary, technical information in Peru. For example, the extension agent explains the merits of using insecticides and the mechanics of application, but does not have the insecticide nor applicators to demonstrate its use. Some producers are persuaded to experiment, but when the insecticide arrives, the extension agent is not present to assist or supervise the actual use. Consequently, application rates for some were too high so that crops were damaged or too low so that no tangible results could be observed.

\(^2\) Furthermore, in Africa producers are included to think in terms of returns to his labor rather than the extension agents' stress on increasing the technical yields per unit of land. Consequently, producers may favor extensive over intensive cultivation (7.24, pp. 114-5).
projects helps to ensure their acceptance and rapid adoption. At the same time, the extension representatives are perhaps encouraged to re-think the economic and social feasibility of their programs as applied to specific localities and cultures. Repeated visits to the same villages and same producers not only convey an appearance of genuine interest but provide the representative with an opportunity to monitor producer operations. Where producers are collectively bound by a cooperative, communal organization, or confidence in a village leader, the extension agent may spend the major portion of his time with these organizational or social leaders, in effect, employing them as his assistants, thereby permitting the agent to indirectly contact a larger number of producers. Of course, the effectiveness of such an arrangement would depend upon the competence and willingness of these leaders to absorb and transmit the information provided by the extension agent.

(4) Finally, while the work of extension personnel may be a necessary ingredient to stimulating agricultural productivity, it definitely is not sufficient. That is, competent extension agents may

1 The papers by Singh (7.43) and Holmberg (7.19) emphasize this point that insufficient local involvement in early stages contributed to the failure or limited success of proposals which were clearly in the economic interests of producers.

2 See Rahim (7.41) for a discussion of techniques used for disseminating information to members of cooperatives in Comilla, East Pakistan.

3 The conservative or traditional orientation of tribal societies was modified somewhat by British and Belgian colonialists through encouraging formal education of tribal chiefs and their sons so as to make these current and subsequent leaders more receptive to change (7.24).
effectively explain the merits of a nontraditional input or a new cash crop; but if the producer has a high-risk aversion, does not have access to necessary financing, does not have the managerial capability, or does not have a strong ego-focused image of change,\(^1\) the recommendations offered will not be implemented and the cultivator will continue traditional production practices.\(^2\) Furthermore, where tenurial insecurity encourages exploitative cultivation practices and discourages private investment, few producers are interested in soil conservation and investment in productivity-increasing inputs whose benefits are realized over a period of time. These individuals have a strong time preference for current income. Inadequate transportation and marketing facilities reduce net returns to increments of labor and capital and dampen the producer's economic incentive to change. Finally, where belief in magic and reliance on patron saints for promoting economic well-being is strong, recommendations by extension agents will carry little weight.

Implicit in (4) above is the fact that the benefits of extension programs primarily accrue to landowners and particularly those having

\(^1\)As used by Hirschman (8.33) and discussed in Chapter VIII. Briefly, individuals having an ego-focused image of change think in terms of improving their relative position and are not strongly constrained by the lack of group approval or by the absence of positive-sum outcomes to the group.

\(^2\)Even if individuals have a strong orientation towards personal gain, altering planting times and disease and pest control programs require the cooperation of surrounding producers.
sizeable land holdings (7.35). These are the individuals who are more literate and more market-oriented, and who have a greater capacity, both in terms of financing and in adjusting activities within the firm, for introducing change. Few benefits are realized by sharecroppers and landless laborers.

As noted above, a number of factors interact to condition the rate at which change occurs. Not only must the economic feasibility be convincing, but proposed changes are more attractive when they can be grafted on to existing personal relationships and work patterns without largely disrupting the latter. For example, where land tracts are relatively small and noncontiguous, digging irrigation wells and constructing modest irrigation systems require cooperation of several landowners. While certain changes may be associated with positive-sum outcomes, the costs and benefits are not equally shared by all participants. Consequently, the differential net returns affect relative

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1Myrdal (7.35) in writing about the community development programs in India, notes that activities of the agricultural extension service had a side effect detrimental to other objectives of the government. Relative to the peasant landlord group, Myrdal states, "At least some of the members of this politically influential group--mainly those who cultivated the land themselves--learned that money can be earned by the modernization of agriculture and that liberal aid can be obtained from the government for this purpose. Having absorbed that lesson, peasant landlords are less disposed than even to agree that their holdings should be broken up for the benefit of less fortunate villagers. Because it preceded rather than followed the completion of land reforms, the extension program has impeded ceiling legislation, tenancy reform, and attempts to foster cooperative farming . . . Although Indian leaders profess to want to see agriculture assume a more 'socialist pattern', their own community development program has the effect of making agricultural practice more capitalistic" (7.35, p. 1345).
economic positions and, in turn, relative social and local political positions. Recognizing these eventualities, extension agents should anticipate the longer-term consequences of change. While Goldschmidt (7.15) emphasizes this point as a potential deterrent to adopting change, Frankel's (7.14) orientation is that such changes are necessary concomitants of economic change. That is, economic and social consequences cannot be segregated but both interact and are necessary for initiating and sustaining change. These reservations are most important for villages and societies at low points on the continuum of agricultural development. Fully market-oriented producers and operators of plantation systems are not constrained by social pressures for conformity. As noted in Chapter III and elsewhere, large landowners are often opposed to change because of the danger of altering economic and social relationships with their sharecroppers and landless laborers in favor of the latter groups.

A portion of Chapter VI was devoted to investment in the infrastructure of the economy. Including a discussion of extension services in this chapter does not imply that expenditures on extension activities is not an investment in the economy's infrastructure. Such expenditures are as much an investment as developing transportation and marketing facilities and building schools and banking systems.

Other Public Programs and Policies

Indirectly, the need for a number of other public measures has been observed. In Chapter III, the inhibiting nature of current tenure systems suggested the need for land reform. The constraining impact of
private credit markets in rural areas on producers' capability for improving their economic well-being and for private investment was examined in Chapter V. The importance of adequate transportation and marketing systems was outlined in Chapter VI. As should be apparent, relaxing one of these bottlenecks to agricultural development without removing other obstacles only partially alleviates the constraints on economic growth. For most developing countries, high rates of population growth are an additional impediment. The need is for agrarian reform; i.e., a coordinated program of alleviating obstacles simultaneously. However, few countries have the financial and administrative resources even if they have the will. They face the ubiquitous economic problem: allocating scarce resources among competing, though often mutually supporting, means so as to maximize objectives being pursued. Investment in roads, extension service systems, or rural credit institutions cannot be based only on a priori reasoning. Each potential allocation of financial and administrative resources must be subjected to at least an economic test of its merits relative to alternative uses.
Literature Cited


CHAPTER VIII. VALUES, ATTITUDES AND OBJECTIVES OF AGRICULTURALISTS AS PRODUCERS AND CONSUMERS

In the preceding chapters, the nature and role of the infrastructure affecting the operation of the economy were discussed. Within this framework, decisions affecting production, investment and consumption are conditioned by economic indicators such as relative price relationships and by social or noneconomic factors such as values and attitudes affecting producers' and consumers' objectives. The introduction of this dichotomization of economic and noneconomic factors is for purposes of convenience rather than for depicting reality. Where producers are primarily subsistence-oriented with limited participation in the money or exchange economy, the "prices" affecting resource allocation and production patterns are more indicative of attitudes toward consumption requirements. That is, the "prices" are implicit consumer valuations rather than the usual interpretation of prices as representing the values which equate market supply and demand. Another simple, but important, example will help to demonstrate the ambiguity of this dichotomization. Producers often resort to credit for financing production and consumption expenditures. The economic variable in this business transaction is the interest rate. However, the real interest rate is often a combination of the monetary rate plus an additional

1It is arguable that a discussion of these personal attributes is not within the sphere of most economists' professional competence. Inclusion of this chapter in the study does not imply expertise on the part of the writer. Rather, a limited survey of some of these factors offers additional insights into the human component of developmental processes.
cost to the borrower where the latter cost is a function of the relation­ship between borrower and lender. Because of his indebtedness to a merchant, trader or landlord, who may also be a relative--both an economic and social relationship--the borrower is effectively forced to continue purchases from the merchant at inflated prices, to sell to the trader in advance of the harvest season at a price much below the price at harvest, or to provide labor inputs and other services to the landlord. Conversely, relatives and preferred customers may be given price concessions and favorable terms for repayment. The point to be made is that the personal relationships between the two parties and their relative bargaining positions influence the terms under which credit is obtained.

The tendency to attack problems within the confines of and using the tools and concepts of one's own discipline is rightfully waning. Whereas research into the nature of social variables was considered to be within the purview of only psychologists, sociologists and social anthropologists with economists acknowledging some impact of these variables on their own discipline but not incorporating these factors into their own research, an interdisciplinary approach, often within

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Hagen puts this problem into perspective: "A number of economists who are students of economic growth make generous reference to the importance of noneconomic factors." Kaldor, Leibenstein, Rostow, Lewis, Hirschman, and Mason and "virtually all of the writers of texts on economic development are examples." Hagen adds, "But many of these treat these factors much as Mark Twain accused everyone of treating the weather. Having mentioned noneconomic factors, they then proceed to ignore them and discuss development as though only economic factors bring it about. The others (including present company) in essence say, 'Change in noneconomic factors must be taken into account, but I don't know what causes it'" (8.28, pp. 624-25).
the individual, to researching problems existent in less-developed areas is gaining momentum. ¹ This does not suggest that economists, most narrowly trained as economists, can or should attempt to convey competence in the other social sciences. Although these consequences are a result of specialization, interdisciplinary approaches to problem-solving should produce a hybrid product. The danger seemingly inherent in an essentially single disciplinary approach is for economists, for example, to impute the existence and nature of social variables on the basis of changes in observable economic phenomena. If following implementation of a program of government price supports at a higher than historically prevailing level or by introduction of a new cash crop producers respond positively by increased marketings, they are interpreted as being rational, nontraditional and market-oriented. The antonyms of these terms are applied if marketings do not change substantially. In actuality, however, the latter weak, aggregate response may be due to a number of factors. The lack of marketing outlets and(or) high transportation and middlemen costs, unawareness of opportunities, or lack of access to additional and nontraditional inputs effectively constrain the producer to his usual cropping and marketing pattern. Furthermore, such aggregates as changes in production and marketings disguise the activities of individual producers.

Another example to demonstrate the interrelationship of social and economic factors follows. As discussed in Chapter V, borrowers often have a preference for obtaining funds from local moneylenders even though

¹Included would be Myrdal (8.49), Hagen (8.27), Dumont (8.18), Adelman and Morris (8.2), Georgescu-Roegen (8.22), Sen (8.61), Whyte and Williams (8.66), and several papers in Wharton (8.65).
such sources levy comparatively high costs. Where borrowers have access to government banks and cooperatives which ostensibly provide funds at a lower cost but yet patronize moneylenders, borrowers may be viewed as being parochial and economically irrational. But the appeal of moneylenders is that they provide funds with no paperwork involved, on short notice, and usually without stipulations as to use by the borrower. Also, because of current indebtedness the borrower may be constrained to secure additional financing from his current creditor. Cooperatives often do not lend for consumption purposes. Banks are often located at a distance which in terms of transportation, lodging, and time raise the effective interest rate even if the prospective borrower has the necessary collateral which banks usually require.

A good deal of nonspecificity is associated with the context in which noneconomic variables are used. Given the heterogeneity of man's composition and his activities, the definition of the context in which such variables is used must necessarily be general in nature. For example, a value may be viewed as a standard of what is desirable against which anticipated or actual outcomes can be evaluated. Kluckhohn (8.40) defines a value as a:

"... conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available modes, means, and ends of action" (8.40, p. 395). "The essential thing about values is their referability to standards more perduring than immediate or completely 'selfish' or autistic motivations" (8.40, p. 430). 1

1Kluckhohn adds, "Pragmatically speaking, values are also more or less stable ways of resolving ambivalence. That is, actors (individuals) perhaps most often think about and refer to values when they are in doubt about alternative courses of conduct: when the long-run results of the possible (footnote continued on the following page)
Thus, values connote what is desirable, and since they do not change quickly, the value structure represents a stabilizing force in social and economic systems, particularly when economic systems are at low stages of development. But since values both affect and are affected by the economic variables, the value structure of a society is modified as the developmental processes gain momentum.

Attitudes are defined here as the individual's outlook or subjective estimation, whether rational or irrational, of his capacity to control or influence the forces which interact to affect his economic and social well-being; i.e., the realization of his value structure. In a sense, attitudes represent the dynamic component of the value structure which induces differential changes in values over time. For example, a producer may positively value raising his family's consumption levels through increased production. If, however, he perceives his role in shaping the production process as being purely passive; i.e., his attitude is that his well-being is exogenously determined by some supernatural force, his likelihood of raising production and consumption levels is diminished. Furthermore, he does not understand how if in fact he can break out of this essentially low-level equilibrium which tends to persist over time. His objective, in this example, would be something of the nature of attempting to appease and gain favorable stature with this supernatural force so that he will eventually be rewarded. Thus, objectives will be used in the context of representing (footnote continued from preceding page) selections of paths of behavior are not immediately obvious or scientifically demonstrable or when the pressures of personal motivation are strong on one side and social sanctions or practical expediency of some other kind strong on the other side" (8.40, p. 395).
summary statements of producers' values and attitudes which interact to determine his goals during the planning period. These goals will be stated in terms of constrained maximization problems where the constraints are the means available to the producer, his attitudes toward these means, and also some components of the value structure. Thus, the goals will be values or proxies for values and will also be constrained by other values.

To gain insights into the nature of these noneconomic variables, what Spengler (8.63) terms the "content of men's minds", a selected number is examined below. The categorizations are not distinct nor are they independent of one another. The principal focus here is how these phenomena are influenced by existing conditions and how they act, qualitatively, as "friction points" in retarding or facilitating economic development. But, changes in economic indicators are not synonymous with changes in social well-being. Change rarely has a positive-sum outcome so that everyone is better off, relatively or absolutely.

Religion

The emphasis in the recent past given to the role of the Weberian "Protestant Ethic" as a positive force stimulating the economic development of parts of Western Europe and of North America suggests that proselytization of non-Protestants in less-developed areas may be one of the keys unlocking economic development. Certainly, the personal attributes of thrift, hard work, and productive investment would be

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1 See Equations 2.19 and 9.1.
conducive to accelerating developmental processes, but they are by no means sufficient. Where producers have few resources, which they are currently using efficiently, but able to generate only a small "surplus", if any, and where few opportunities for productive investment exist, even if the capacity for investing is available, thrift and hard work can do little to raise the producer's level of living. Focusing on the producer's enterprise or indolence obscures the likelihood that some of his personal attributes are derived from the environment in which he operates. Apparent leisure and unproductive expenditures may be the consequence of a stagnant economic system which provides few rewards to additional labor and capital inputs. Furthermore, the physical capacity for work may be low. Where such conditions exist, religious beliefs and practices have little impact on economic well-being. Only when developmental processes are set in motion, for an individual or groups of individuals, does the facilitating or inhibiting nature of religious beliefs assume importance.

Of the noneconomic variables to be considered, religious beliefs and practices are likely the most resistant to change. Where they are inimical to economic and social change, additional obstacles to development exist. In *Asian Drama*, Myrdal writes:

"... religion usually acts as a tremendous force for social inertia. The writer (Myrdal) knows of no instance in present-day South Asia where religion has induced social change. Least of all does it foster realization of the modernization ideals--though, of course, appeals to religion on the 'higher' level can be used for, as well as against, those ideals, while cruder religious conceptions can be exploited to incite people to resistance or to demonstrations, riots and lynchings... But the religiously sanctioned beliefs and valuations not only act as obstacles among the people to getting the plan accepted and effectuated but also as inhibitions in
the planners themselves insofar as they share them, or are afraid to counteract them" (8.49, pp. 103-4).

Quoting Myrdal once more:

"In particular, social and economic stratification is accorded the sanction of religion . . . in general the inherited stratification implies low social and spatial mobility, little free competition in its wider sense, and great inequalities. This system of social relations is a product of history and is strongly supported by custom in traditional society; religious beliefs and valuations furnish the emotional support" (8.49, p. 104).

He adds, however, that the major world religions are not necessarily adverse to economic change and developmental processes. They are subject to varied interpretations with such interpretations often adduced to project and support particular points of view and programs of action. They are also amenable to diverse economic systems. Excepting Hinduism, they have a common thread of egalitarianism which provides a potential justification for economic and social reforms.

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1 Myrdal's statement is similar to the view expressed by Max Weber in his book, The Religion of India, as interpreted by Morris (8.47). In attempting to account for the lack of economic development in India and China relative to Western Europe, even though "capitalism and capitalistic enterprises" existed all through history in the former, Weber emphasized the spread of Hinduism as a force creating and sustaining the caste system. The attendant social and economic rigidities were the principal forces that precluded the evolution of a "capitalistic" system and the corresponding high rates of economic growth.

Srinivas in Goheen, et al. (8.25) comments that, "It is not unlikely that the failure of Indians to improve their material conditions lay in the social and political institutions of the country. The institution of caste tended to confine the loyalties of individuals to a group which become progressively smaller owing to the marked tendency to fission in the caste system" (8.25, p. 5). This phenomenon, in itself, would tend to dampen aspirational levels and the socially acceptable range of alternative economic activities.
Hinduism

If Myrdal (8.49) is correct in his evaluation of the effect of religion, the implications associated with the adverse features of religion for aspirational levels, occupations choice and resource mobility are quite apparent. However, economic success in terms of wealth accumulation or success in terms of craftsmanship within one's caste does not appear to be precluded (8.25). But wealth accumulation may or may not be influenced by another facet of Hinduism; i.e., the weight given to the importance of asceticism (8.6, 8.25, 8.62).\(^1\) If asceticism is practiced so as to limit income or "surplus" accumulation through, for example, abstention from work by various degrees, those following this practice would not contribute to development from an economic standpoint. On the other hand, if asceticism is translated into either deferring present consumption in favor of future consumption or by renouncing one's wealth after it has been accumulated, both forms of activity can have a positive impact on development. The former, as Singer in Goheen, et al. (8.25) suggests, implies an "ethic of austerity" so that asceticism is not an obstacle to economic development but is a phenomenon facilitating such development. The latter may be undertaken

\(^1\)The extremely influential Ghandi advocated a form of asceticism which is described by Singer: "Indian asceticism has traditionally been other-worldly . . . . The novel element in Ghandi's asceticism is to be found in his philosophy and program of social reform. His philosophy of nonviolence (ahimsa), of the simple life in self-sufficient villages, of the necessity of work and the dignity of manual labor, of service to neighbors, of social justice in the distribution of power and wealth, has breathed a vitality into traditional Indian asceticism which animated India's successful struggle for independence and which shapes much of the present government's domestic programs. Ghandi himself found the source of this social philosophy in Hindu religious traditions" (8.62, p. 84).
in the forms of intergenerational transfers of property; redistributions of wealth in favor of the poor; and by building a temple, excavating a tank, planting trees, or various other actions some of which are socially and economically useful (8.6, 8.25).

In his study, Morris (8.47) attempts to test the Weberian hypothesis that the effect of Hinduism on values and social structures has inhibited the economic growth of South Asia.\(^1\) Examining available historical evidence, he concludes that the caste system was not rigidly confining. Cooperation among different jati\(^2\) took place in both the modern and traditional areas. Intercaste mobility into the mason and handloom weaving jatis has been evidenced. In addition, caste members were not always found to have confined their activities to their particular caste. Even in the relatively tradition-oriented rural sector, "Castes 'traditionally' identified with specific occupations were often found in other activities, socially both higher and lower" (8.47, p. 606). Nor does Morris find evidence that the value

\(^1\)Morris, in interpreting Weber, states that "... the growth of modern industry was handicapped, it is contended, not only by the ritually limited supply of entrepreneurship but also by the enormous difficulties of recruiting labor .... The magical barriers to geographical mobility, to undertaking new occupations, to working in novel relationships with other castes, all served as inhibitions to the flow of craftsmen into industry" (8.47, p. 593).

\(^2\)According to Morris, the jati are subcastes. They are "... endogamous groups invariably confined to limited territories. The jati is the functional social unit in the countryside .... Only the jati embodies those notions of belief, bulwarked by specific concepts of pollution, which could have any systematic effect on economic behavior" (8.47, p. 603).
structure associated with Hinduism need have a depressing effect on economic activity. He suggests that Hindu theology is so varied that theological support can be found to "... rationalize or stimulate a variety of economic behaviors ranging from the most passive and otherworldly to the most aggressive and profit-maximizing" (8.47, p. 595). Morris, relying on the fieldwork of anthropologists, states that "... groups, just coming into the Hindu system or striving to raise their status, tend to be responsive to the values and practices of the dominant group in their immediate locality .... The implications of this recent work suggest once again that there are a number of 'Hindu' value systems to which groups can respond" (8.47, p. 596). Instead of explaining the differential growth of regions and activities within regions by the impact of Hinduism, Morris suggests that the really important factors were economic in nature—investment returns, tenurial arrangements, and the ability to take advantage of economic opportunities. Where economic activities were profitable, economic growth took place.2

1 The danger in citing the supposed dichotomy between Indian "spiritualism" and Western "materialism" is that these phenomena tend to be viewed as being mutually exclusive; i.e., that Indian "spiritualism" is incompatible with "materialism". Singer writes that in the traditional Indian pantheon (officially recognized gods of the people), material wealth and power have an important place. "Wealth and power are indeed considered as essential in the scheme of things as are the other three basic values: duty, liberation and pleasure. And this judgment is supported by the stories of the epics in which wealth and power, usually the reward of virtue, are ever present" (8.62, p. 82).

2 Also see Srinivas and Karve in Goheen, et al. (8.25). Berna concludes that entrepreneurship in modern Indian industry is more directly a function of access to capital, business experience and technical knowledge rather than considerations of caste tradition, and approval or disapproval of the social group. He adds, however, that the existing social structure strongly affects who is able to accumulate capital and to obtain the business (footnote continued on following page)
Islam

As with Hinduism, aspects of Islam can be adduced as having an inhibiting effect on economic and social change. What is not known is the strength of these beliefs, their pervasiveness, and their resistance to reinterpretation, especially by the younger members of society, as economic change is both perceived and experienced. The Islamic belief that all phenomena proceed from God lessens the individual's curiosity in understanding his environment and also suggests an individual inertia to change. This sustains, if not a fatalistic outlook, one which is heavily tradition-oriented (8.1, 8.55). The solutions to problems faced by man have been given by God and such solutions are embodied in the traditional structure of society. The adoption of exogenous changes is facilitated if such changes can be grafted on without essentially modifying the traditional structure. Swift (8.64), in writing about Malayan peasants, states that the folk religion emphasizes luck and a preordained determination of events. Official religion embodies the belief that this world is only temporary and that otherworldly rewards are not associated with worldly wealth and success. Furthermore, wealth accumulation may be detrimental to the quality of the afterlife. Even though peasants' stated preferences are not for wealth but for comfort and security, Swift adds that he would be surprised if peasants' beliefs and attitudes ever precluded them from taking advantage of an opportunity to significantly increase their wealth. Yet, these personality factors do condition economic behavior.

(footnote continued from preceding page) experience and technical knowledge (8.12, p. 358).
Kermani (8.39) notes that the constitutions of most Middle Eastern countries stipulate that all laws must not contradict Islamic principles. Usury and even charging of interest on loans are prohibited. As noted previously in Chapter III, Moslem law prescribes that inheritances, including land, must be divided among heirs, at least all male heirs (8.37, 8.49). Consequently, land units are subdivided and become successively fragmented.

The Moslem imams (high priests) with their political and religious powers have competed with central governments in influencing the economic development of the area. While Islam decrees complete equality of human rights, the high priests have merged with other minorities within the ruling group to help "... delay the region's social and cultural integration by constantly teaching the poverty-stricken majority of the virtues of patience and surrender" (8.39, p. 55). At the same time, the high priests realize the privileges accorded to other members of the upper classes. In addition to participating in political processes, they own large units of land and engage in business enterprises.

In his study of the Javanese town of Modjokuto, Geertz (8.21) comments on the impact of Islamic reform during 1912 to 1920 on economic activity among traders. Worldly pursuits now had religious sanction. Fatalism and appeal to magic were suppressed as a business ethic embodying self-determination surfaced. This rational pursuit of economic gain tended to increase traders' economic and social mobility. Geertz adds that although these modified beliefs are held primarily by trader-

1 Kermani (8.39) adds that a Moslem may not feel he has violated Islamic teachings by paying interest on credit. A more serious offense is that of receiving interest on money lent.
entrepreneurs, these individuals have a strong and consistent motivation to convert those individuals still adhering to the more traditional beliefs emanating from Islam.

Buddhism

Buddhism's orientation toward otherworldliness is not necessary in conflict with material success in this world (8.52, 8.56). In his discussion of capital, credit and saving among Lao peasants, Halpern (8.29) indicates that the Lao are not necessarily adverse to materialism but that their sense of fatalism is an inhibiting influence on their motivation for improving their economic well-being. Nevertheless, even though peasants are essentially subsistence-oriented, investments in jewelry and improved housing are valued. In addition, the "spread effects" of colonialism and the reduced relative isolation of villages have tended to modify peasants' attitudes toward producing for the market in order to obtain a larger number and variety of consumer goods. Pfanner (8.56) notes that among peasants in Lower Burma, social status is not associated with wealth accumulation. However, religious expenditures are socially valued. But, to sustain or increase these expenditures, a positive attitude toward increasing production and temporary wealth accumulation is necessary. Pfanner adds that adherence to essentially traditional production and consumption patterns is only partly an outgrowth of values stemming from Buddhism. Few favorable economic opportunities have been available. As these economic opportunities arise and(or) are perceived by producers, the rate of
adoption will exceed past levels. Increments to income, however, are largely expended for religious and ceremonial purposes (8.29, 8.56). Such expenditures provide psychic and social returns but do not contribute to generating a physical capacity and attitudinal structure favorable to stimulating growth processes. As noted previously, however, expansion of production and income is primarily valued in an indirect manner. Higher incomes permit increased religious expenditures; the latter is valued directly.

In relation to Wolf's (8.67) discussion of the role of "culture brokers", Pfanner comments that the Buddhist monk appears to have little influence on economic activities in the village:

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1 Pfanner (8.56) cites the case where the government encouraged village peasants to plant early-maturing varieties of rice so that groundnuts could be planted as a second crop. During the period 1959-1960, total gross income in the Mayin village was increased by 26 percent. However, a number of other factors contributed to this responsiveness to growing groundnuts. A market was assured, transportation facilities provided, and the new crop was amenable to traditional resources and production practices.

2 Wolf terms community leaders, local entrepreneurs, and national-oriented individuals from local communities as "culture brokers". He states, "Their basic function is to relate community-oriented individuals who want to stabilize or improve their life chances, but who lack economic security and political connections with nation-oriented individuals who operate primarily in terms of the complex cultural forms standardized as national institutions, but whose success in these operations depends on the size and strength of their personal following. These functions are of course expressed through cultural forms or mechanisms which will differ from culture to culture" (8.67, pp. 1075-1076).
Within certain limits the monk neither advances nor impedes economic innovations that have been introduced and, in keeping with the traditional performance expected of his role, generally remains neutral and indifferent to the activities involving agricultural extension or community development (8.56, p. 59).

Buddhism as a state religion can have a positive impact on developmental processes. According to Nash (8.52), the development-oriented elite in Burma are influential in both the religious and secular hierarchy. Since they affect the aspirations and motivations of the nonelite, they can play the role of the transmitters of a development-oriented, nationalistic ideology. "Buddhism is the vehicle of symbolic identification between the mass of peasants and the development-oriented urban elite" (8.52, p. 141). Nash suggests that this linkage may be instrumental in motivating Burmese peasants to place less emphasis on present consumption so that a greater capacity for capital accumulation can be generated. By implication, a smaller proportion of income would be expended on religious expenditures with more devoted to private investment or absorbed by the government through taxation and community development programs.

Traditional African religion

Traditional African religion, if such an all-inclusive categorization can be made, is varied and exhibits a general capacity to accommodate other religions such as Christianity and Islam as well as the secular changes resulting from economic growth (8.30, 8.32). Traditional be-

In contrast, a number of Laotian community development projects designed to provide needed irrigation water by drilling wells were unsuccessful. The wells were not maintained and fell into disuse. However, the two wells which were drilled on church grounds were not only maintained in repair but improvements were also made. The reason for this differential success has been attributed to the failure to secure the prior support of the Buddhist (footnote continued on next page)
liefs such as the power of magic, the role of spirits in influencing the physical environment, and the intertwining of ancestral spirits and land tenure systems, are not necessarily abandoned in this acculturation process. Rather, they tend to be temporarily suppressed or partially modified so as not to provide major obstacles to change, particularly economic change. In this respect, Fallers comments:

"Whatever features of traditional African life may stand in the way of more rapid economic development, an absorbing interest in achieving states of inner spiritual perfection is not among them. On the contrary, Africans seem to have, on a whole, a very utilitarian, matter-of-fact view of goods and services. . . . There is no evidence that in traditional Africa, economic concerns were rejected as spiritually unworthy. Far from viewing the biological man and his wants as base and unworthy of concern, there is a certain tendency for traditional African religions to make the health, fertility and prosperity of the living individual and the living community matters of central importance" (8.19, p. 115).

Of course, this favorable attitude toward physical well-being does not imply that production and exchange are the principal objectives of human activities. Rather, production and exchange are responsive to economic conditions and must take place within a social framework.

The control and use of land among Africans is affected by the recognition of ancestral rights to land. In addition to a personal attachment to land,¹ in some areas the "rights" obtained through inheritance forbid the sale or pledging of land. Even those who leave or abandon the land or transfer it generally retain some right or claim (footnote continued from preceding page) monks for these development projects. See Arensberg and Niehoff (8.5).

¹ Included would be such factors as the importance attached to first occupancy through ancestral rights, often involving mythical relationships with the soil; the desire to attract one's relatives to the land; the economic return from land; and prestige associated with rights to land (8.14).
to this land (8.14). Consequently, the ability to secure clear titles to land through individual transfer, land reform programs and government resettlement programs is doubtful (8.8, 8.13). Under these circumstances, the incentives for land transfer, population mobility and private investment in land are not favorable.

The importance accorded magic and the various spirits affects the conception and execution of individuals' decision-making processes. Where one's understanding of nature and production processes is found in the interaction of various spirits, producers believe they have little control over their environment. To ensure good crops and health, sacrifices must be made to the appropriate spirits. Not only can such sacrifices be expensive and time-consuming, in terms of opportunity costs, but such an attitudinal structure is not in itself favorable to individual economic planning and adoption of new production techniques. This does not imply that producers are unresponsive to favorable opportunities, but it does suggest a time lag in the adoption of new practices. If the desirability of practices is demonstrated in a convincing manner and producers have the means to adopt, the time lag may be extremely short.\(^1\) The tendency to interpret nature in terms of spirits is reduced or suppressed as natural science curricula are introduced and expanded in educational systems.

\(^1\)Hammond (8.30) provides some interesting insights into the cultural adjustments of the Mossi at the Niger Irrigation Project. He indicates that "... they fail to find the institutions upon which they have always depended for security; they find instead a natural environment governed by forces they do not know. Their water supply is no longer dependent upon the supernatural controls of the earth custodians but comes from a dam built by Europeans" (8.30, p. 252). Necessary production inputs and supervision by European agronomists were provided and the Mossi adapted themselves (footnote continued on following page)
Magic can serve other purposes. Magic may be the most effective means of social control in traditional areas. It can be used by both individuals in authority and by other members of the community to punish those who deviate from the customary ways of life in the community. Schneider, in his study of the Pakot of western Kenya, writes that, "Because magic is accepted as a stern reality, deviation is rare and undoubtedly carefully considered" (8.59, p. 159). However, the threat of being subjected to magic also induces those in authority to conform to accepted community behavior so that their relationship to the community is that of serving rather than innovating or commanding.

Civil-religious hierarchy in Latin America

In some Latin American communities, a socio-economic structure termed a "corporate" peasant community is found. Within this community, a civil-religious hierarchical structure is found which operates the public

(footnote continued from preceding page) relatively rapidly and easily. The new source of water did not induce the Mossi to alter their traditional beliefs in spirits. Rather, they took the view that "... the forces of the natural order are different in their new habitat and accordingly must be controlled in a different way. Finding the indigenous inhabitants ... to be zealous Moslems, the Mossi settlers have accepted Islam as the religion of their new country ... new arrivals rapidly embrace Islam as the system by which the supernatural forces governing their new environment can be manipulated" (8.30, p. 253).

1 Magic and witchcraft are used for similar purposes in some Latin American villages. See Wolf (8.68) and Nash (8.51).

2 Wolf (8.68) describes the "corporate" community as comprised of peasants mostly subsistence-oriented but with some market exchange. The social system, however, is bounded and with well-defined sets of rights and duties which prescribe and sustain traditional behavior.
life of the community in both religious and secular aspects. The system imposes obligations of wealth and time on the male members but rewards them with power and prestige within the community (8.51, 8.68). Wolf (8.68) states that the achievement of power is a matter of community decision rather than through the efforts of the individual. This is because prestige within the community is largely a function of upward movement within their hierarchy along a prescribed ladder of achievement. Since the positions are without pay, expensive in terms of expected obligations, and do not permit the holder to engage in any other remunerative activities, accumulated wealth is rapidly dissipated within this system. Such accumulated wealth, largely in terms of livestock and land, cannot be hidden from other members of the community. Where individuals are reluctant to undertake these positions, they are punished or are forced to leave the community. In either case, deviant behavior is discouraged and the social structure remains essentially intact.

The financial obligations attendant with these hierarchial positions reduce any income inequalities that are generated within the community; and, in turn, lessen the likelihood of any internal dissent which would threaten the continued existence of the community. While it would appear that this socially-enforced redistribution of wealth would discourage the incentive to accumulate such wealth, Nash states that "... the richer people vie for public recognition and as measures of their piety, for the opportunity to expend funds in the upkeep of a given saint for a year, with attendant festivals" (8.51, p. 293). The wealthier members assume office more frequently than the
poorer members of the community.

Extended Family

The impact of the extended or joint family on economic development has been given much speculation. The extended family is characterized by various degrees of comprehensiveness. In general, however, it represents a suppression of individual goals in favor of family goals. Personal gains are expected to be shared with other members of the family and vice versa. The most frequent criticism made of the extended family is that it stifles individual initiative to assume risks, to work hard, and to adopt innovations--attributes which are considered necessary for generating a class of entrepreneurs which will capitalize on the pressures and incentives growing out of the developmental processes. Hoselitz (8.36) cautions, however, that such a pessimistic role of the extended family is "... based upon the assumption of a basically, individualistic society, such as is said to prevail in the West" (8.36, p. 112). Hoselitz further adds:

"If we consider, on the other hand, that the traditional norms under which many persons in underdeveloped countries have come to regard their demands upon, and their duties toward, their extended families, we may perhaps understand that because of the prevalence of traditional norms different from those of the West, membership in an extended family may not be an impediment to the development of entrepreneurship or the willingness to work hard" (8.36, p. 112).

As will subsequently be indicated, the extended family system has both advantages and disadvantages. Thus, its impact on economic de-
velopment\textsuperscript{1} can only be assessed by examining, where possible, the operation of the system in particular situations. In addition, the extended family, like other social institutions, undergoes changes.\textsuperscript{2} A growing pressure of population on the family land holdings and the attraction of employment opportunities elsewhere act to modify the extended family system so as to be more compatible with evolving economic conditions.

In its most extreme form, members of the extended family pool all of their resources for common use by members subject to the judgment of the family patriarch. Individual business enterprise is replaced by members cooperating for a collective goal (8.27). In addition to considerations of mutual concern for collective survival, particularly when living near the subsistence level and when annual production is variable,\textsuperscript{3} the pooling of resources and an acceptable governing arrange-

\begin{itemize}
\item \textsuperscript{1} Bauer's (8.9) position is that the joint family system has beneficial economic and social consequences where the economy is at the subsistence or near-subsistence stage. Beyond this stage, however, the joint family system generally restrains economic growth.
\item \textsuperscript{2} Comhaire comments that "... those tribal communities far from being stagnant, were living organisms long before the advent of Europeans ... it is important to keep such a situation in mind, because institutions already tested that way should not be expected to give way without a fight under pressure of Western-inspired change" (8.17, p. 46).
\item \textsuperscript{3} Lewis (8.42) in his study of Tepoztlan in Mexico writes, "Families in Tepoztlan are strong and cohesive, held together by traditional bonds of loyalty, common economic strivings, mutual dependence, the prospect of inheritance, and, finally, the absence of any other social group to which the individual can turn. Cooperation within the immediate family is essential, for without a family the individual stands unprotected and isolated, a prey to every form of aggression, exploitation, and humiliation known in Tepoztlan" (8.42, p. 54).
\end{itemize}
ment can result in certain economies of size.\textsuperscript{1} Conceivably, the tendency toward land fragmentation is reduced, the combined assets offer a better collateral position for obtaining credit financing, and labor sharing at planting and harvesting permit a greater amount of land to be cultivated than the sum of holdings individually manageable.

In False Start in Africa, Dumont (8.18) is critical of the role of the extended family. He writes that, "By giving the greatest economic power to the heads of extended families, African society is confiding the levers of progress to the oldest people, often least receptive to modern techniques" (8.18, p. 134). Adoption of nontraditional techniques usually requires perception, innovative capacities, and the willingness to assume the risks associated with change. Dumont asserts that the family heads, usually the eldest member in the family, generally do not have these attributes.

A less-confining form of the extended family is perhaps the most prevalent form. Resources are not pooled for collective use. Rather, individual members retain ownership but share an affinity and social responsibility for the well-being of the less-fortunate members of the family. Criticisms of this familial arrangement seem to be based on the assumption that members receiving a transfer of wealth, ignoring for the moment the fact that assistance can be in the form of labor assistance and lending of draft animals, are "free loaders" who represent a continual threat to the ability of the more ambitious to improve

\textsuperscript{1}Belshaw's study of kin groups in Southeastern Papua provides some examples of cooperation to obtain certain economies (8.11, pp. 56-7).
their economic position. If this is the case, the criticisms seem totally valid, at least from an economic viewpoint. If, however, such financial assistance is more the form of a loan and is used productively by the recipient, these internal transfers represent a means of improving both individual and group economic positions. Not only do individuals provide assistance, they may themselves receive similar assistance at a later date. Also, attempts to improve the economic viability of the less fortunate is a means by which the same individuals will make fewer claims on the wealth of others in the future.

The importance of the mutual assistance aspect of extended family systems has already been noted. A few specific situations are briefly described below. Belshaw notes:

"Perhaps the most noteworthy characteristic of the situation in the Southern Massim is the key role that associations of kinsfolk play. In order to increase his output, even the most individualistic of entrepreneurs calls upon his kin for labor. They also supply him with raw materials and working capital. The wide ramifications of the kindship system and the possibility of following different lines of choice within it enable those who want to co-operate to do so, while others may stand out if they wish: in other words, there is room for personal preference in establishing effective economic relations" (8.11, p. 55).

1 Miracle (8.45) and, to a lesser extent, Bauer (8.10) and Herskovits (8.31) are of this opinion.

2 Berna (8.12) in a study of entrepreneurship in South India cites the financial assistance of family members and relatives that was provided to permit individuals to undertake business enterprises. However, he does not indicate that these individuals were members of an extended family system.

In a similar vein, Bauer cites the following positive aspect of the extended family system in Africa: "It often results in the pooling of family resources for such purposes as the education of promising children and setting up a family member in a trade or profession. In such circumstances it amounts to a circulation of capital within the family" (8.10, p. 8).
The system provides flexibility and a local source of inputs which is likely less costly than if labor and capital were obtained externally. Such activities also tend to reinforce the social organization of the communities.¹

Activities similar to those described above are undertaken by the Wolof of Senegal and Gambia (8.3). Labor requirements, especially for weeding and clearing fields, are high because only rudimentary tools are used. Cooperative work groups, delineated according to sex and age, provide labor inputs on a reciprocal basis. In addition, the work groups are called upon to construct and repair village property. In addition to labor-sharing, the Wolof provide assistance to lessen the heavy burden of ceremonial expenditures among kin members. Money, livestock, grain, or kola nuts are provided; the amounts provided by individuals differ with social class and age. The alternative is to secure assistance from local traders who charge high rates of interest. Ames (8.3) notes that the cooperative work group is already making a marked contribution in the production of both cash and subsistence crops. Perhaps, more importantly, the existing social and economic structure can serve as the foundation for additional enterprises and services (8.3, p. 236). Cooperative marketing and purchasing institutions, an expansion of the internal credit facilities, and programs of economic planning can be grafted on to or integrated into the framework of cooperation that presently exists.

¹Also see Lewis' (8.42) comments on life in Tepoztlan, Mexico and Comhaire (8.17) for the role of the extended family in Leopoldville.
Ottenberg's (8.54) study of the Ibo in Nigeria provides additional examples of group and family assistance to members both within and outside the village. Prestige is accorded individual initiative, enterprise, and wealth accumulation. Members of his family and lineage provide assistance in the form of land resources and financial loans to enterprising individuals whereby the former acquire prestige through the successes of those who are assisted. Ottenberg also notes that the traditional leadership within local groupings is shifting away from the elders to educated young men, traders, and businessmen.

Miracle (8.45) emphasizes the negative aspects of the extended family, particularly as it affects capital accumulation. He states that regardless of how or by whom savings are accumulated, they are rapidly dissipated by meeting the demand and needs of kinsmen usually residing in nearby areas. Farmers must be skilled in concealing savings, must make highly liquid local investments, or must invest in livestock or buildings in an area distant to where he resides. As a result, the incentive for local, productive investment is reduced. Secondary effects also exist. Miracle states that housewives buy nondurables in extremely-small quantities so as not to give the appearance of having wealth in the form of visible stocks of these commodities.¹

¹In this connection, Bauer notes, "The fear of the obligations of the family system is partly responsible for the widespread use of textiles and trinkets as outlets for savings, in preference to more productive forms of investment which are more likely to attract the attention of relatives" (8.10, p. 8).

²For example, single cubes of sugar, half cups of cooking oil, single matches are purchased (8.45, p. 221).
Such retailing practices would appear to be of a relatively high-cost nature. In addition, individuals are reluctant to utilize deposit accounts in banks because of the fear that through bribery or word-of-mouth relatives will become aware of such savings. These factors interact to increase the problems of the accumulation and most productive uses of capital. Thus, the African in transition from a communal structure to an essentially free enterprise economy often has to accommodate the socially-sanctioned claims and needs of his family members.

Even when the individual enters occupations other than farming, he often does not escape his family obligations. If he becomes a shop-keeper, his ability to remain in business and his incentives to continue in this more competitive environment have to be affected by the social claim by relatives to take what they need from his shop (8.31). Similar problems are encountered by those providing professional services. Politicians, too, are not immune from discharging their social obligations; the logical consequence is the encouragement of nepotism (8.17, 8.31).

In summary, communal structures and extended family systems can have both positive and negative impacts on developmental processes. Such structures maintain and reinforce the relationships among members. In a hypothetically ideal sense, they provide an existing economic and social infrastructure onto which modernization components can be grafted, assuming such modifications are economically and socially feasible and available to the members. The competitiveness, inclination towards diversification, and the smaller scales of operation associated with
private ownership are avoided. Lower per unit production costs and
greater flexibility to accommodate changing market conditions may
also result. Finally, the extended family system represents a potential
foundation on which cooperative enterprises in marketing, credit, and
retailing consumer goods can be built.

Other Values and Attitudes Influencing Individuals' Objectives

At early stages of economic development, values and attitudes are
largely derivable from and sustained by religious beliefs. In their
religions, individuals find guidance for their behavior toward other
individuals and toward the secular world. Religion and tradition
interact to exert varying degrees of social control over individual
goals as translated into behavior patterns. Deviants are subjected to
social pressure and to the displeasure of religious and magical spirits
which are summoned to punish individuals or to purge them of the forces
causing their nontraditional behavior.

Values and attitudes have other origins. They are often conditioned
by individual experiences associated with nature and attempts to increase
their control over nature. Interspatial contact through trading
practices, intermittent employment away from the village, and military
and local government responsibilities increase individual awareness of
alternative forms of life and of the means potentially available to
affect his own well-being. In addition, contact with other cultures
through colonialism, warfare, and missionaries alters the structure
of values and attitudes, or at least partially suppresses these phenom-
en.
Values evolve through time. In a sense, they represent man's accommodation with his environment. They are also instrumental in shaping his environment. Thus, values are not quickly discarded or replaced; but they do change as man's environment changes. Such is the nature of the pressures and incentives generated by economic development and by increased contact with other economic and social groups within and external to the economy. From the standpoint of national planning, the problem is to determine the nature and strength of such values and attitudes, the substitution ratios among them, and the means whereby such social factors have a basis for facilitating the realization of national goals. But are the values and goals of the national planners consistent with or reflective of those characterizing the people for whom the plans are being devised and implemented?

The previous discussion on religion and familism bore out the contention that their influence on individual behavior need not be imical to economic change. On the other hand, they do contain features which, if strongly stressed, could inhibit individuals' aspirations and their attitudes toward developmental processes. As change occurs, individuals are likely to find a justification in their religion for the roles they assume rather than regard religion as defining their role in the social and economic structure of society.

What values exist among agricultural producers in less-developed areas? At low stages of economic development where producers are essentially subsistence-oriented the emphasis is on security; i.e., acting so as to ensure survival of the family (8.27, 8.49, 8.55).
Security is not only the value but the objective of these individuals. Planning horizons are largely confined to production cycles. Low levels of production relative to consumption requirements leave little "surplus" for saving or investment. The emphasis is on maintenance rather than expansion of capital stock. A small "surplus", if any, is generally not the consequence of inefficient use of available resources but rather the small quantity and low productivity of traditional resources. Over time, the stress on survival has contributed to the evolution of the most efficient production practices, given the resource configuration of the producer. Family labor is often underemployed during much of the year. This does not necessarily reflect a high value placed on leisure but rather an absence of diversification of farm enterprises and the lack of necessary complementary inputs. Furthermore, because of inadequate diets and poor physical health, laborers may have less ability to work over time. Despite the relatively-low levels of living, a high value is placed on the proper observance of marriage and funeral ceremonies,

1As indicated earlier, the extended family and village cooperation are means whereby communal survival is enhanced (8.27, 8.42). Jacoby (8.37) also makes this point but adds that such mutual dependence is a potential basis for establishing cooperatives: "... the time-honoured institution of mutual aid, which still today is a vital factor in the life of the peasant and time and again has helped him to overcome the frequently recurring periods of emergency. The decisive effort, therefore, should be concentrated on making him realize that his everyday life is a permanent state of emergency and thus transforming the mutual aid concept into an understanding of the benefits of cooperative activities. When first this basic change in mentality has been achieved and the cooperative ideology established the generally overestimated difficulties in introducing technical 'know-how' will be overcome relatively fast" (8.37, p. 32).
fiestas, and religious observances. Social pressure is so strong that producers incur debt in order to meet these social obligations.

How does the producer view his situation? If he does not understand the nature of the environment in which he operates but relies primarily on traditional interpretations to guide his motivations and behavior, he has difficulty in perceiving ways to influence his economic well-being. Although he experiences the influence of natural forces on his farming operations and on his family's health, he does not view the causal relationships in terms consistent with scientific explanations but rather in terms of supernatural phenomena (8.9, 8.27, 8.31, 8.55). The continued observance of traditional behavior obviates the need for individual thought and innovative decision-making, the latter both tending to create anxiety and uncertainty. Such traditional guidance is provided by the village elders and tribal chiefs, guidance which usually tends to be conservative in nature (8.18, 8.55).

In a study of eighty farm operators near Calcutta, Bose (8.15) attempted to determine the relationship between producers' personal attributes and their behavior toward the adoption of improved agricultural practices. He found a statistically significant positive correlation between the adoption of improved practices and (1) business attitude toward farming; (2) rationality; and (3) scientific attitude. Conversely, a statistically significant negative correlation with (1) traditional outlook and (2) religious inclinations was found. Familism had a low negative correlation which was not statistically significant. The sample respondents were cultivating owners operating three or more acres of land and had more than average education relative to the population in the region. For example, 36 respondents and between five and ten years of education, five had completed high school, and seven had two years of college education. Extensive communication with the city also existed.

In his study of an Egyptian village, Adams (8.1) notes that the responsibility for individual decision-making increases anxieties and that such individuals may find more security in the workings of Communism rather than liberal democracy. Adams suggests that individuals are attracted by the absolute assurances of Communism and the "religious fervor of its (footnote continued on the following page)
Even if favorable weather enables the producer to generate a "surplus" in excess of customary consumption levels, the net returns from investment in additional traditional inputs may be so low as to discourage investment (8.56, 8.60). Furthermore, increasing consumption levels would likely have highest priority. Where nontraditional inputs are available and their productivity demonstrated elsewhere, the producer may consider such inputs as too risky for his own operations. The costs of not meeting consumption requirements with his own production will range from going into debt to no longer having the means to survive. Traditional production patterns provide a good deal of security, even though at low levels of living. In addition, his receptivity to the suggestions by government representatives and merchants that he alter his cropping or resource allocation pattern is low. This follows from a general distrust for people from outside his immediate village, especially for government officials (8.6, 8.16, 8.23, 8.24). This distrust is largely a questioning of the motives of those who suggest changes. The merchants' purchasing and retailing activities tend to exploit the peasants. Based on past experiences, the peasant is rationally skeptical of the merchant's suggestions to purchase a new input from him or to produce a new cash crop which will eventually be marketed through him. Similarly, the government is seen as an external force whose representatives have a historical impact of harming rather than helping peasants. Furthermore, changes in inputs and in production techniques may be resisted because (1) they tend to alter the (footnote continued from preceding page) missionaries". "Traditional Islam's demand is that the elements of a working system be absolute, not that they be logically consistent" (8.1, p. 234).
social relationships in the village (8.35, 8.43, 8.66, 8.68); and (2) the introduction of new seed varieties and crops may alter traditional consumption patterns of producers (8.4, 8.43). However, innovations which can be grafted on to the existing production and consumption patterns without seriously disrupting traditional behavior generally have a higher degree of receptivity.¹

Villages, initially operating as essentially "closed" communities, eventually have contact with the outside world. Such contact assumes a number of forms with varied consequences. Contact has been both imposed and endogenously generated. Colonialism and military conquest have left their impact. The superimposition of external cultures disrupted or at least suppressed traditional forms of government, economic activity, and social structures. Labor was appropriated for slave trade and for work in mines and on plantations producing export crops. The ruling elite attempted to introduce their own forms of government and educational systems. In some areas, the life styles of the colonialists influenced the occupational structures and aspirations of native peoples. For example, British influence in Africa and Asia influenced some of the indigenous population to aspire to public administration, education and trading positions. Similar influences resulted from the Spanish involvement in Latin America. The Ibo of Nigeria and Kikuyu of Kenya

¹Myrdal writes that although cultivators may resist change in their work patterns and life styles, they sometimes have economic reasons for this attitude. For example, even though water and climatic conditions are favorable for double cropping, payments to the landlord, hired laborers, and water authorities are the same for the first as for the second crop. The second crop, however, usually has a lower yield while requiring more labor inputs (8.49, p. 1285-6).
were strongly influenced by the British and incorporated European values concerning individual enterprise, initiative, and consumption patterns into their own cultures (8.44, 8.54, 8.59). The work of missionaries in education and religion also influenced the understanding of the physical environment and the aspirations of some African peoples. On the other hand, the imposition of external force tended to strengthen traditional values among other societies and increased their resistance to change (8.59).

Latin America was colonized in the 16th and 17th centuries by southern Europeans whose countries were economically backward relative to Britain's position during her colonialization period in the 17th and 18th centuries (8.26). Further, the maintenance of relationships with the mother country tended to reinforce this initial differential impact. The Spanish were considered to be less enterprising and less technologically-oriented than the British. However, Wolf (8.68) in his discussion of the "open" peasant community in Latin America states that their outward-looking orientation arose when these communities were established by European settlers whose consumption and production patterns influenced local people and involved them in the outside market. Furthermore, the peasants produced cash crops which were in increasing demand in Europe.

Contact is also endogenously generated. The impact of population growth on limited land resources forces emigration and partial employment away from the village (8.41, 8.68). Where social pressure against wealth accumulation is strong, enterprising individuals either acquiesce or move to a less-traditional village. Similarly, if individuals find
economic demands made on them to support the civil-religious hierarchy and the village fiestas to be oppressive, the alternative is to move to another area (8.51, 8.66).

Only the most isolated villages today do not have some interaction with a money economy. As the range and variety of contacts increase through "culture brokers", traders, communications media, and spatial mobility, the scope of individuals' awareness and experiences expands with at least a partial impact on behavior patterns of producers and consumers. As subsistence-oriented producers are drawn into the exchange or money economy to obtain those essentials they themselves do not produce, they also become aware of the existence and availability of other consumer goods. In order to obtain these, however, producers need to increase their demand for money income or for "surplus" commodities which can be exchanged. For some, the aspired level of living is above the existing level. But the aspired level is also above the attainable level if previous production and consumption patterns are maintained. The producer now faces a more complex matrix of decisions. Previously, he had a strong preference for present consumption over future consumption. This resulted primarily from his low levels of living. His problem now is to generate additional money income or obtain external credit which can be used to purchase some of these goods directly or can be invested in his production unit to increase future output and income levels. Where available, off-farm employment on a

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1The existence and availability of goods is assumed here. Such goods may be obtained from village specialization and exchange, from a consumer goods industry in the economy, and from imports from abroad. Thus, the agricultural sector is developing as a market for the goods currently or potentially producible by other sectors of the economy.
nearby plantation or in another sector of the economy is a means of augmenting income. In addition, such labor mobility may result in the acquisition of production skills and changes in producers' aspirations, not only in terms of consumer goods but also in housing, medical services, and education for their children. If these aspirations are held strongly, they can assume the role of values thereby exerting a stronger impact on producer behavior.

Increased participation in the money economy also acquaints producers with the existence of nontraditional inputs, if they are available, and with the relative valuations placed on goods sold in the market. A few enterprising producers may perceive that by substituting a cash crop for a crop previously consumed, the income from selling the cash crop will more than cover the expenditures for purchasing the crop consumed but previously produced. Improved inputs for expanding production may be made available through financing by a local merchant or moneylender. In both cases, however, the producer has, in effect, made a partial substitution of values; i.e., wealth accumulation for security\(^1\) and also has demonstrated an optimistic or favorable attitude toward realizing his goal. Another producer may also place a high value on increased income; but if his subjective probability toward realizing the higher income is low, he is motivated to continue his previous cropping pattern. Where investments are contemplated, the decision-making process becomes much more complex: (1) The planning horizon

\(^1\)Since valuing wealth accumulation is incompatible with some professed religious beliefs, the value may alternatively be stated in terms such as better housing and clothing or better transportation with a bicycle.
must be lengthened and the net returns from the investment estimated; (2) With a longer planning period, additional uncertainties are introduced; price variability, production variability, and tenurial security must be taken into account; and (3) The investor must decide between productive investments and those made for security, prestige, and liquidity purposes. The determination of net returns from alternative investments is a complicated problem for producers, regardless of the stage of economic development.

Land is almost universally valued for the security and prestige it provides. This is true of the Indian peasant as it is of the Latin American hacienda owner. But the transfer of title to land through ownership does not in itself represent a productive investment. Only if ownership induces a shift to more productive cultivation practices or more investment in nonland inputs can land investments be termed productive investments. In Africa, cattle are valued for the prestige which accrues to the owner rather than for their profitability (8.7, 8.35).¹ In other societies, jewelry and ornaments are prized for the prestige they provide and for their high liquidity if money or credit financing is required to meet contingency situations (8.34, 8.55, 8.64).

¹Hoselitz cites an interesting example of the consequences resulting from a failure to recognize the value East Africans place on cattle. The immunization of cattle against disease carried by tsetse fly was anticipated to result in larger, healthier herds which would permit large-scale exportation of beef. To the East African, cattle were a form of wealth and immunization would permit him to increase his wealth. But, according to Hoselitz, immunization did not generally lead to an increase in the amount of beef marketed but rather to problems of overgrazing as herd numbers expanded. Hoselitz concludes that "... the value system of the East Africans places emphasis on the number of heads owned by a person rather than on the returns he can gain by marketing them" (8.35, p. 413).
At relatively-low stages of economic development, individual behavior is at least partially circumscribed by the social approval of his peers. Among communal and extended family groups, the social approval associated with internal redistributions of wealth and allocations of collectively-held land according to family needs tend to constrain individual activity. At later stages of development, the same family structure can provide a means for transferring capital to those attempting to improve their position within agriculture and those establishing nonagricultural enterprises.

1See Hirschman (8.33, pp. 11-14) for his discussion of the "group-focused" image of change. Briefly, an economic and social equilibrium has evolved through time with individuals having fairly well-defined roles in the community structure. Individual initiative may result in zero-sum outcomes where one's gain is another's loss, thereby upsetting the previous equilibrium. Such initiative is discouraged by social pressure and by group-imposed penalties. Individual well-being is suppressed in favor of collective considerations.

2For example, the Ibo of Nigeria are a highly individualistic people. While individuals are dependent upon their family and community for forms of support, they nevertheless have to demonstrate their own ability to succeed in the world (8.54). Positions of prestige and authority within society are largely achieved rather than ascribed. In contrast, Wolf's (8.68) discussion of the "corporate" community in Latin America indicates the emphasis of communal control over individual activity. This control includes a restriction on the sale of privately-owned land to outsiders which tends to limit introduction of outside people and their influence and to maintain the property and social structure of the community. Wolf states that, "Adherence to the culture validates membership in an existing society and acts as a passport to participation in the life of the community. The particular traits held help the individual remain within the equilibrium of relationships which maintain the community" (8.68, p. 460).
Among Malayan peasants, Swift (8.64) notes a strong value placed on wealth as a means to comfort and security. He adds, however, that emphasis on wealth beyond a certain point produces hostility among other peasants. The peasant who works hard is esteemed; but if his individual initiative causes him to lessen his participation in ceremonial events or in helping his counterparts observe these events, his behavior elicits hostility. Swift comments that:

"The most striking quality about the economically successful peasant is a lack of concern for public judgment, a feeling that he will exact respect and recognition in spite of the popular view, an awareness that he is an object of criticism and jealousy, which he returns with a private contempt for his less industrious and successful neighbors" (8.64, p. 151).

A similar attitude has been found among Lao peasants (8.29). Work, per se, is not valued nor is an extremely-high value placed on the accumulation of land and capital. Individuals who are too aggressive in their attempts to accumulate wealth are viewed with disfavor, if not open hostility, by their village counterparts. Halpern (8.29) adds that the villagers are not disinterested in the accumulation of capital and material goods. They can perceive benefits resulting from more land and livestock, improved housing and clothing. Rather, the stronger attitude is one tending toward fatalism. For example, wealth accumulation is not important since the individual feels as though he cannot influence or control his own well-being. He considers his success as being determined by "... forces present in the individual at birth as well as those acting upon him from the outside" (8.29, p. 99).

The effectiveness of social pressure in constraining individual activity is present in some Latin American peasant societies. In his
study of a Guatemalan peasant society, Nash (8.51) states that individuals who begin to act in their economic self-interest begin to weaken their ties with the community. If they also refuse to participate in the civil-religious structure of the community, they may be forced to emigrate to another Indian community or to a Ladino\textsuperscript{1} town. In the Mexican Indian community included in his study, those consciously violating accepted modes of behavior were physically punished, at times resulting in death. Nash concludes that:

"... they eject the economic deviant, the social deviant and the culturally marginal person. This keeps a successful economic innovation which might lead to a change in the social system from spreading by conduction to other members of the society. At the same time the economic opportunities that would entice members of these societies need to be extraordinary before they will hazard their small resources and their social positions" (8.51, p. 303).

Wolf's (8.68) description of the "corporate" and "open" communities in Latin America provides additional evidence. In the "corporate" community; i.e., the "socially bounded" community, influences external to the community are resisted, individual accumulation and display of wealth are discouraged, and the community has the right to review and revise individual decisions. Hard work and poverty, as well as behavior indicative of these attributes, are commended while laziness and greed and their accompanying behavior are reproved. Conversely, in the "open" community; i.e., the community which actively participates in the surrounding economies, external interaction is favored and emphasized, wealth accumulation and display are permitted and expected, and individual initiative is unrestrained by community approval. As mentioned earlier, Wolf attributes these behavioral differences to the \textsuperscript{1}Ladinos are Westernized or Western-oriented Indians.
fact that many of the "open" communities were established by settlers who brought to Latin America cultural patterns of consumption and production which involved these communities in relations with an outside market.

Srinivas in Goheen, et al. (8.25), writing about agricultural peasants in India, states that an individual who works hard and saves money is respected in the community. Wealth accumulation is attributed as much to hard work as to the belief that "God has favored a 'virtuous' man." When a wealthy man is also considered a "bad" man in the community, his wealth is attributed to "the good actions which he undoubtedly performed in a previous incarnation." Villagers also point out that some recent misfortune has affected him or his family which they interpret as "divine anger with his present 'badness'" (8.25, p. 4).

Associated with economic change and development is a differential distribution of costs and benefits among individuals in the economy. The relative demand for various goods produced undergoes change. Those individuals best able to perceive new economic opportunities as they arise and who have the resources to take advantage of these opportunities are in a position to increase their wealth. Wealth, in addition to providing the capacity to exploit future economic opportunities, also provides social and political power. In the absence of wealth redistribution programs through tax policies and transfer payments the wealthy accumulate more wealth, and the relatively disadvantaged tend to lose their bargaining position and become increasingly dependent on the wealthy and the government for their well-being. Concomitantly, through increased contact with the rest of the economy and improved
communications systems, the disadvantaged become increasingly aware of their relative position in society. A potential climate for social and political turmoil is created. High population growth rates tend to accentuate the situation. The tenant, the landless laborer, the small owner-operator want more land, better education facilities, and a more equitable sharing of the costs and returns. They continue to be dependent upon the landlord, the patron and the moneylender; but through labor unions and pressure on the government to initiate reforms, they find means to potentially improve their economic and political bargaining position.

In most societies land is highly valued and is a symbol of prestige. Where producers are restricted to cultivating only small plots, a redistribution of land is seen as the means to improve their positions. Thus, the wealthy and the landowners see advantages in maintaining the economic and social status quo (8.35, 8.39, 8.46). The landlord or patron needs the labor services of his "clients". But at the same time, the landlord often provides credit, production inputs, and counseling services. A mutual dependence exists. However, the peasant's stronger dependence places him in an inferior bargaining position. The landless laborers and tenants represent potential threats to landowners' positions. To the extent this is true, the elites are primarily interested in economic change which benefits them but leaves the disadvantaged in a continuing inferior power position. Though they are likely increasingly constrained by the threat of peasant organization and retaliation, the elite, directly or indirectly through the political system, may publicly support reform measures but take measures to see
that they are not effectively implemented.

As the economy expands through sectoral development and increased division of labor, a restructuring of the values attached to various occupations undergoes change. The prestige associated with occupations in agriculture and crafts declines relative to that accorded positions in public administration, education and law. There is some suggestion that both managerial innovation and capital formation are hindered by persistent high evaluation of a "leisure class" and the choice of current luxury consumption over reinvestment and productive expansion (8.20, 8.46). Values and attitudes oriented toward economic growth and development are only necessary but not sufficient. In addition, individuals must be aware of the opportunities, a proper configuration of economic incentives must exist, producers must have the resources or access to external assistance in order to exploit such opportunities, and the uncertainties facing the producer must be acceptable.

Objectives

To some extent, the objectives or goals which individuals pursue were discussed in the preceding sections of this chapter. The varying degrees of responsiveness to changing prices and to information provided by extension personnel were discussed in the previous chapter. In some cases, social factors tend to constrain the economic activity of individuals. However, the observance of these social proprieties are also objectives in themselves, at least by the conformists. In other areas, economic pursuits are limited only by individual's awareness and entrepreneurship and by the resources available to him. Even
in the relatively "open" communities, income or profit maximization over time is only a means to the higher objective of utility maximization. But since utility is derived from consumption of both goods and leisure and from participation in community affairs, the usual assumption of profit maximization is rarely, if ever, synonymous with the more generalized objective of utility maximization. Instead, the more meaningful objective of market-oriented producers is that of constrained profit maximization with constraints not only on resource availabilities but also (1) Labor availability where a portion of the economically-productive labor inputs are devoted to social and local governmental affairs and (2) "Surpluses" available for productive investments must compete with less-productive or nonproductive investments. Again, the objective is utility maximization and not pure profit maximization. This objective is consistent with the general contention that nearly all producers are "economic men" in that they prefer more to fewer economic goods. Added here is the proposition that a number of implicit constraints are involved.

At low stages of economic development, producers' objectives tend toward production for survival and any investment is geared toward maintenance of the production plant rather than expansion of the size

\[^1\]According to Kamarck (8.38), the African producer thinks in terms of increasing returns to his labor rather than profits. Nair (8.50) notes that among rice cultivators in most parts of India, both among landowners and tenants having varying sizes of operations, "The increase in gross output and therefore income does not interest them if the margin of profit per para or bag of rice decreases thereby, which it normally does of course, with heavier investments in fertilizer and labour such as the Japanese method or any more scientific method of cultivation must involve" (8.50, p. 44).
of operations. The principal constraint on investment is the inability to generate a production "surplus" in excess of consumption requirements. Consumption requirements, however, usually include expenditures for gifts, social events and religious activities. These latter expenditures represent funds which could potentially be invested. However, two additional considerations are necessary. First, one of the producer's objectives is to maintain or improve his social standing in the community. Prestige accrues to those who satisfy these socially-approved activities, and prestige provides utility. Second, producer's planning horizons are extremely short; a high value is placed on present consumption over future consumption. In addition, the low returns from investment in traditional inputs may be discouraging, especially if producers are able to discount returns over time (8.56, 8.60). Few institutions exist in many rural areas for accepting and paying a return on savings. An attitude of distrust coupled with the costs associated with traveling to these institutions located outside of the community lessen the incentive to make savings deposits.

Consumption patterns for these subsistence-oriented producers are relatively inflexible through time. They are established by custom and tend to vary primarily with the family cycle. With only limited contact with the economy external to the village, these traditional consumption patterns continue. A number of goods not produced by the farmer must usually be obtained from a local merchant or trader. Such goods often include sugar, salt, tobacco, cooking utensils and some clothing. The quantity purchased of each is relatively invariant as long as the traditional consumption pattern is maintained.
As long as prices are invariant, traditional consumption patterns imply a corresponding income demand which is also essentially invariant. Production decisions in terms of essentially-fixed incomes are not incompatible with producer behavior at low stages of economic development (8.53). As noted earlier, however, the demand for income varies with the prices paid for consumption goods not directly produced. Such behavior is primarily indigenous to essentially-closed communities where limited resources, restricted aspirations, and strong social pressure interact to maintain an economic and social status quo. As these communities are opened, the strength of these forces declines and producer-consumers are introduced to nontraditional influences.

For the subsistence-oriented producer, output is primarily a function of the quantity of labor applied to the resource base consisting of land, draft animals, and relatively-simple tools and implements. Figure 8.1 loosely summarizes the situation faced by the producer. The production possibility curve is drawn so that the MVP_{labor} rises rapidly with initial labor inputs but then rapidly declines as a relatively-large quantity of labor is employed. Movements to the left of L^* on the horizontal axis denote additional units of labor employed. The vertical axis represents income which reflects the total value of production aggregated by the exchange value of the individual commodities according to a numeraire or by some monetary unit. Superimposed in Figure 8.1 are the producer's subjective indifference curves representing the marginal rates of substitution between income and leisure. Leisure denotes nonwork but includes time spent in social and governmental activities. Income, translated into physical quantities,
Figure 8.1. Optimum labor-use level for maximizing individual utility

Figure 8.2. Optimum production for maximizing individual utility
represents consumption requirements, including payments in kind for taxes and debt obligations, stocks for draft animals, allowance for maintenance of capital stock, income necessary to purchase or obtain goods consumed but not produced, and income for undertaking customary social expenditures. The indifference curves are drawn to indicate a high marginal rate of substitution of leisure or nonwork for income. This is postulated as the consequence of the ability to sustain traditional consumption patterns and of the limited aspirations and opportunities to alter consumption patterns. In Figure 8.1 utility is maximized by expending \( L^*_1 \) of labor to produce \( OI_1 \) of income. Of the total quantity of labor inputs available for work, \( L^* \), \( LL_1 \) is devoted to leisure. Assuming only two products are produced, \( Y_1 \) and \( Y_2 \), the production possibility curve representing the combinations of \( Y_1 \) and \( Y_2 \) which can be produced using \( L^*_1 \) of labor is diagrammed in Figure 8.2. The positions and shapes of the production possibility curves are a function of the labor-allocation decision made in Figure 8.1. Superimposing the producer's indifference curve representing his preference in the consumption of \( Y_1 \) and \( Y_2 \), the planned optimal output configuration is denoted by \( Y_1^* \) and \( Y_2^* \).

1Referring to Equations 2.9 or 9.1, the utilization of \( L^*_1 \) of labor implies that a sufficient quantity of \( K^0 \) is available to sustain this amount of labor. If not, only a lesser amount of labor can be employed which generates less income and a lower level of utility.

2The more realistic proposition is that the decisions made in Figures 8.1 and 8.2 are essentially simultaneously determined. That is, if \( Y_1^* \) and \( Y_2^* \) represent consumption requirements, then \( L^*_1 \) of labor, given fixed resources and production techniques employed, is required to produce these output levels. Thus, the producer's decision in Figure 8.2 determines the necessary, corresponding decision to be made in Figure 8.1. A more comprehensive discussion of these decision-making processes is presented in Chapter IX.
In Figure 8.3, each unit of labor employed results in a higher income level either as a result of an increase in the exchange values, for example, the exchange value of wheat relative to sugar, salt and tobacco increases, or because of a favorable production period. The indifference curves are assumed to be essentially unchanged as income increases. This, again, is the assumed result of the producer's limited contact with an exchange economy which, as yet, supplies only the goods traditionally purchased and consumed. As income increases, the tangencies of the higher indifference curves with the respective income-possibility curves indicate that the producer maximizes utility by working less and enjoying more leisure. This phenomenon represents a backward-sloping labor supply function of the producer to his firm. ¹

In Figure 8.4, the smaller physical quantities produced do not indicate that the producer has reduced the quantities of goods he consumes. Rather, the amount of Y₁ and(or) Y₂ necessary for exchange in order to obtain those goods consumed but not produced and some of those goods used in social events is reduced.²

As mentioned earlier, increased contact with an exchange or money economy, an economy which provides a larger variety of consumer goods

¹If income increased through higher exchange values only, the MPPₗ of labor at various labor-use levels is unchanged but the MVPₗ increases for the specific input level being considered. In this exercise, the MVPₗ may be considered the implicit wage or salary of the producer. If his salary increases, he is inclined to work less.

²Such marketing behavior implies that changes in the quantity marketed are inversely related to price movements. The objective is to market that quantity whose value will permit the producer to obtain those goods consumed but not produced by him. This behavior is noted by a number of contributors to a discussion of marketed surpluses in India.
Figure 8.3. Changes in optimum labor-use levels as monetary income increases

Figure 8.4. Changes in the optimum output configuration as labor-use levels vary
as development proceeds, induces more enterprising producers to raise their aspirations and alter their desired consumption pattern. The principal objective is still that of utility maximization; however, the components and their respective utility coefficients undergo change. The question now arises as to whether or not these producers are able to generate the additional income through increased production which is needed to purchase these newly-demanded goods. If production remains largely invariant, one alternative is to secure external financing from a merchant, moneylender or landlord in order to purchase these goods. However, granting that producers have relatively short planning horizons, the newly-acquired indebtedness and the capacity for repayment must be taken into account. The potential dangers of continued indebtedness were discussed in Chapter V. Implicitly, the utility from consumption is greater than the disutility of indebtedness and the potentially attendant consequences of debt.

Another approach which is perhaps more likely and more desirable from the standpoint of economic development is represented in Figures 8.5 and 8.6. Through increased market contact, the relative demands

1 For example, "The speed with which the peasants of South-East Asia and West Africa (with their different cultural backgrounds) acquired the taste for the new imported commodities and expanded their export production in order to be able to buy them offers us concrete evidence of their capacity to respond positively to economic incentives (8.48, pp. 41-42).

2 Such a statement, of course, is based on the questionable presumption that the values of economic planners, for example, are those shared by the producers. To economic planners, less leisure and productive investment of any surpluses generated are preferred to the converse. Producers, on the other hand, weigh these alternatives heavily only if such behavior results in higher levels of utility to them. The increased economic-orientation which economic development generally creates, at least within a range of incomes, and the emphasis on the insatiability of demand for consumer goods as markets expand would tend to alter producers' values towards those (footnote continued on the following page)
Figure 8.5. Changes in labor-use levels resulting from a change in MRS and from higher incomes

Figure 8.6. Changes in utility-maximizing output patterns corresponding to higher labor-use levels

(footnote continued from preceding page) held by national planners subject, of course, to certain constraints. For example, resettlement programs in Africa have met resistance because of the attachment of people to particular units of land.
for farm-produced goods, consumer goods and leisure are hypothesized to change in the direction that causes the marginal rate of substitution of leisure for income to fall. That is, income and the purchasing power it represents now have a higher value relative to leisure than was previously the case. In Figure 8.5, indifference curve $I_1'$ reflects the change in preference between income and leisure and the resulting marginal rate of substitution between the two. If the new family of indifference curves not only has a different shape but assumes a different position on the income possibility curves, for example, $I_1^*$, the producer's optimal behavior is to now employ $L_1^*L_1^*$ of labor in order to produce $I_1^*$. The additional $L_1^*L_1^*$ of labor causes the production possibility curve in Figure 8.6 to shift to the right. A higher level of utility, $U_3$, is possible due to the shift in preferences and consequent additional amount of labor used. Consumption of both $Y_1$ and $Y_2$ can be increased as can the quantity of consumer goods purchased in the market. In the aggregate, higher consumption levels of consumer goods purchased in the market are possible only if the corresponding quantities of these goods demanded are available. If income and demand are present but not the goods, inflationary tendencies and consumer frustration result. Ceteris paribus, the terms of trade are turned against producers and an increased amount of income or capital potentially leaves the agricultural sector. A larger quantity of goods must be marketed in response to the rise in prices. The frustrated expectations of producer-consumers may condition subsequent attitudes and objectives relative to income accumulation and developmental processes in general.
As the opportunity to increase the consumption of all goods above the initial levels of $Y_1^*$ and $Y_2^*$ arises, so does the possibility of saving increments of income through nonconsumption. Capital formation has now been introduced. As long as the producer's planning horizon remains constricted to the next production period or harvest cycle, such savings will likely be hoarded or lent on a short-term basis to relatives and fellow villagers. Utility is also derived from hoarding and from lending, regardless of whether or not any interest is paid. On the other hand, if through education, government programs, or observation of others the producer is able to expand his planning horizon, longer-term productive investment is a feasible alternative.

Savings

Savings provide only the means to invest; favorable investment opportunities must exist to mobilize and channel savings into productive uses. Where the saver and the investor are two different persons, institutions such as savings associations and rural banks are necessary to make the transfer. Private lending by the saver is an alternative. But the most important determinant of savings is the level of income. The relatively low per capita incomes in most less-developed areas suggest a low capacity for saving. However, per capita incomes do not reflect income distributions. The relatively few who

1 The short planning horizons need not preclude producers from buying improved seeds, fertilizer and additional irrigation water inputs. The returns from these inputs are largely confined to the period in which they are used.

2 The problem of allocating income between immediate consumption and investment providing a flow of returns over time is deferred to Chapter IX.
receive a major proportion of the income have a high capacity to save. Even those at the lower end of the income scale save.¹ But the All-India Rural Credit Survey (8.58) provides data indicating that the primary reason for not saving is the lack of a means for saving.² See Table 8.1. The indication that "no margin for saving" existed does not imply that expenditures in excess of basic consumption and production needs were not made.

Increasing present consumption through reducing savings always remains an alternative. The nature of the increased consumption is important. If savings are in the form of commodities produced and in excess of traditional consumption patterns, higher consumption means fewer goods marketed. The savings remain in the firm-household unit and within the agricultural sector without stimulating developmental processes. Higher per capita consumption may have a secondary impact on improving physical health and increasing labor productivity. Alternatively, such savings may be used to support larger families which are not exactly a boon to areas wrestling with problems of overpopulation.

¹Hagen writes, "... as we get more income data about low-income countries we find that even at incomes of $50 or $100 per capita, they can save, and adequately to achieve economic progress, if they are sufficiently motivated to do so" (8.28, p. 624). In a similar vein, Hirschman comments, "With respect to savings and capital, anthropologists have long known that primitive people who, by Western standards, live 'on the margin of subsistence' insist nevertheless on devoting a considerable portion of their time, energies, and resources to ceremonial purposes, giftmaking, and other activities not directly related to consumption" (8.33, p. 2).

²This conclusion is reinforced by the survey response that lack of facilities, low interest rates, and transactions difficulties were not significantly limiting factors.
Table 8.1. Distribution of districts, by number of cultivators for upper and lower strata, according to reasons for not placing savings in accounts or not purchasing bonds, stock shares or insurance policies, All-India Rural Credit Survey, 1950-51*

<table>
<thead>
<tr>
<th>Total number of districts</th>
<th>Number of cultivators replying in the affirmative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>1 to 5 to 10 to 20 to 30 to 40 to 60 and above</td>
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<th></th>
<th>75</th>
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<th>-</th>
<th>2</th>
<th>-</th>
<th>14</th>
<th>59</th>
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</thead>
<tbody>
<tr>
<td><strong>Is it because you have no margin for saving?</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Lower strata</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>Upper strata</td>
<td>75</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>26</td>
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<th></th>
<th>75</th>
<th>39</th>
<th>20</th>
<th>6</th>
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<tbody>
<tr>
<td><strong>Is it because you prefer to hold savings in cash?</strong></td>
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<tr>
<td>Lower strata</td>
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<td>20</td>
<td>6</td>
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<td>-</td>
</tr>
<tr>
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<td>15</td>
<td>10</td>
<td>4</td>
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<td><strong>Do you prefer to lend money?</strong></td>
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<tr>
<td>Lower strata</td>
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*The definitions for "Upper" and "Lower" strata cultivators are given in Chapter V, footnote 1, p. 215.

*Source: Abstracts from Tables 11.3 and 11.4, All-India Rural Credit Survey (8.58).
Where savings are used to increase consumption of consumer goods produced in other sectors of the economy, such expenditures represent transfers out of the agricultural sector which may have a beneficial impact on stimulating the growth of these other sectors. When the supplies of these consumer goods do not keep pace with increases in demand, prices are bid up. Initially, the terms of trade are turned against the agricultural sector and larger quantities of income flow outward from this sector. If as prices rise producer-consumers expect prices to rise further in the future, additional incentive for increasing present consumption is created.\(^1\) Savings are reduced and price increases accentuated. The consumer goods sectors are growing, but the question of whether or not the quantity of agricultural commodities necessary to meet the food requirements of laborers and the raw materials of manufacturers will be forthcoming is raised. If not, prices for agricultural products will be bid up adding to the existing inflationary tendencies. Additional marketings of agricultural commodities are needed. Additional investment in the agricultural sector must take place if production and marketings are to be increased.

**Investment**

Criteria for investment decisions were outlined in Chapter II. Investment may be either productive or nonproductive. From a developmental standpoint, the former is preferred. For a number of situations, the latter is entirely rational. Given a sufficiently-liberal inter-

\(^1\) See the discussion of the elasticity of expectations with regard to prices in Chapter VII, p. 391.
pretation, the present value rule in Equation 8.1 embodies the factors influencing investment decisions. The criterion of the rule is to select that investment opportunity from existing alternatives which results in the highest nonnegative present value. If the PV is negative, the investment should not be made; if zero, the investor can be indifferent to that particular investment opportunity. It is not

$$PV = -(I) + \sum_{t=1}^{n} [R(t) - E(t)](1 + \rho)^{-t} + I \ n \ (1 + \rho)^{-n} \quad (8.1)$$

$$PV = [S \ (1 + i)^n \ (1 + \rho)^{-n}] - (S) \quad (8.2)$$

suggested that investors are actually able to quantify Equations 8.1 and 8.2, but these equations summarize the factors which rational, prospective investors would tend to take into account. As already noted in Chapter II, the components in Equation 8.1 have the following interpretations:

1. \(-I\) is the initial monetary cost of the investment;

2. \(n\) is the final time period of the planning horizon in terms of the length of time over which net returns accrue to the investment or a self-imposed, constricted time period during which the investment must show a favorable return;

3. \(R(t)\) and \(E(t)\) are the estimated returns and costs, respectively, in the \(t = 1, \ldots, n\) time periods for the particular investment opportunity being contemplated;

4. \((1 + \rho)^{-t}\) is the discounting mechanism for determining the PV of the estimated net returns through time. The discount factor, \(\rho\), incorporates considerations of the economic opportunity cost of investment, uncertainty, and social factors; and
(5) \( I_n (1 + \rho)^{-n} \) is the discounted terminal value of the investment if the investment is not entirely used up in the production process.

**Nonproductive investment** Consider nonproductive investment first. Such investment may be in the form of jewelry and ornaments, consumer durables, improved housing, hoarding, and in some cases, land purchases. Land is equally physically productive, ceteris paribus, whether it is owned or rented. It is in this context that investment through purchasing land is unproductive. Land ownership, however, likely motivates some producers to make investments which affect the land's productivity and to engage in cultivation practices which tend to maintain productivity through time. Where effective land rents are high, producers in favorable financial positions may have the incentive to purchase land thereby affecting the distribution of income and their own capacity to generate a capital surplus. In addition, land ownership provides psychic returns through the prestige and security it accords. The other forms of nonproductive investment provide similar returns. Jewelry and hoarding in the form of gold and other metals also provide a hedge against inflation and political instability affecting the value of paper currency. Since they have high liquidity, they can also be used readily to finance or secure financing for un­foreseen contingencies.

\[^1^\]To those not believing in the influence of patron saints and magical spirits on individual well-being, expenditures for religious ceremonies are, in a sense, nonproductive investment. To the believer whose religion embodies reincarnation, such expenditures can be viewed as highly productive investment, although in the nonphysical sense. Similarly, gifts to landlords and patrons may provide an intertemporal pay-off to the giver in terms of counsel, allocation of more productive tracts of land and a more secure tenurial arrangement.
Referring to Equation 8.1, the following intuitive interpretation is given to the components when nonproductive investments are considered:

(1) The $R(t)$ are the social and psychic returns referred to earlier which have a qualitative dimension. In the case of housing investment, maintenance costs would be reflected in the $E(t)$;

(2) $\rho$ includes the opportunity cost associated with these investments. For example, the opportunity cost is the rate of return foregone by not making productive investments or by not placing the funds in a credit institutions where interest could be earned. Estimates of the rate of return to productive investment are scarce. If Schultz (8.61) is correct in his contention that the rate of return on investment in traditional inputs is low, the opportunity cost component in $\rho$ is fairly small. Where improved inputs are available and adaptable, the opportunity cost would be substantially higher. In addition, uncertainty associated with the estimated rate of return could be incorporated by reducing this estimated rate. Consequently, $\rho$ would vary with the nature of productive inputs and with the price and production uncertainty estimated to accompany these inputs. With land, the possibility of land reform and expropriation introduces an element of institutional uncertainty. The lower $\rho$, the less net returns are discounted and the more attractive are nonproductive investments;

(3) As noted previously, $n$ is the length of the planning horizon which may be one year or an intergenerational time span. Consumer durables have a limited life of usefulness, as does housing. Conversely, land, jewelry and gold are essentially indestructible and provide returns over an extended period of time. Planning horizons also vary with the
personal attributes and attitudes of the investor; and

(4) The more durable investments have a discounted terminal
value since they are not used up or consumed during the planning period.
Given the inflationary tendencies in many developing areas, the term
\( I_n (1 + \rho)^{-n} \) should be stated in real terms; i.e., the monetary value
is adjusted to reflect the impact of inflation on prices paid by pro-
ducer-consumers. Since land and gold serve as a hedge against inflation,
the monetary value of these investments at the end of the planning
period would tend to rise with rising prices in the economy.

**Productive investment** This category of investment includes
undertakings such as constructing terraces, drainage ditches and irriga-
tion systems for land; adding new enterprises to the farm; purchasing
draft animals and machinery; and placing funds in a credit institution
or lending privately so that a return in addition to repayment of
principal is realized.

For productive investment in the firm, Equation 8.1 has its usual
connotations. The \( R(t) \) and \( E(t) \) are the returns and costs, respectively,
associated with the investment considered. These monetary values should
be expressed in real terms to take account of changes in price levels.
The length of the planning period, \( n \), is the life of the investment or
a shorter period during which the investor requires the project to be
profitable. Constricting the planning period is one means of allowing
for the different forms of uncertainty that are present. Alternatively,
tenurial insecurity and production variability can be taken into account
by increasing \( \rho \). In situations where social pressure is a factor in in-
fluencing wealth accumulation through private investment, such social
factors can be incorporated by subjectively raising $\rho$. That is, as $\rho$ is increased, the net returns must be sufficiently large to compensate for uncertainty and for adverse social phenomena. The rate of interest obtainable on savings accounts or through private lending serve as approximations of the opportunity cost component of $\rho$. The data in Chapter V on interest charges levied by private lenders suggest that the opportunity cost of productive investment is high. In addition, the localization of lending and borrowing reduces the uncertainty of default by the borrower.

The discounted terminal value of the investment in Equation 8.1 is extremely important to potential investors. This is especially true for tenant operators. If the possibility of termination of tenure is high and the investor has no assurance of recovering the remaining capitalized real value of the investment, not only is the discounted terminal value equal to zero, but $\rho$ is increased and(or) $n$ is reduced. If allowance is made for compensating the investor for the remaining value of his investment, this component in Equation 8.1 will have a positive value and will influence the individual's investment decisions. If costs and returns are shared by the landlord and the tenant, the appropriate coefficients should be prefixed in Equation 8.1.

Placing funds in public savings institutions provides not only high liquidity but a good deal of security. As indicated previously, the lack of such institutions in some rural areas and a general attitude of skepticism toward government-affiliated agencies reduce the number of individuals who can or do patronize these organizations. In Equation 8.2, $S$ is the quantity of funds placed in savings at the beginning of
and i is the interest rate paid which is compounded annually. As before, n is the terminal point of the planning period. The discount factor, \( \rho \), represents opportunity cost plus allowance for uncertainty. Since compounded interest and principal are in monetary terms, they should be adjusted to real terms to reflect expected future changes in general price level of the economy. The opportunity cost of saving is the rate of return foregone by not making the most productive, alternative investment. In the case of traditional inputs, this opportunity cost may be relatively low. The uncertainty component in \( \rho \) would be essentially zero because of the high liquidity and assured returns associated with savings accounts. If \( \rho = i \), the PV is zero only if prices are stable so that the real value of S is unchanged. With inflation, the real value of S in \( S(1 + i)^n \) will be less than the initial real value of the S deposited; i.e., the last term in Equation 8.2. Where savings institutions are not located in the saver's community, any expense incurred in making the initial deposit and final withdrawal must be considered.

Private moneylending is often a profitable alternative especially where traditional inputs result in a low opportunity cost associated with lending.\(^1\) Short-term returns are relatively high and expenses low. Since lenders have a personal acquaintance with borrowers, the uncertainty associated with possible default is also low. Equation 8.2 is appropriate for moneylending also. In place of S, the quantity of

\(^1\)In this connection, Rahim notes that the strong demand for credit among East Pakistan farmers permits the relatively affluent producers to earn a 50 to 100 percent return on private lendings (8.57, p. 417).
funds lent is substituted. If the loan is repaid at the end of \( t_1 \) and the principal plus interest is relented at the beginning of \( t_2 \), the monetary value of the initial loan plus interest is \( L(1 + i_1)(1 + i_2) \). If the interest rates charged are invariant, at the end of the \( n \)-th period, the funds plus interest have a monetary value of \( L(1 + i)^n \). More realistically, the value of the loan at the end of \( t_1 \) is \( L(1 + i_1) \) less expenses involved in the lending transaction.
Literature Cited


CHAPTER IX. INTEGRATIVE APPROACH TO AGRICULTURAL DEVELOPMENT

In the preceding chapters, a number of economic and social factors influencing individuals' production, consumption, and investment decisions; resource productivity and agricultural output levels; and the well-being of agriculturalists as producers and consumers have been discussed. As was evident, individual factors could not be discussed independently of other factors. Rural credit institutions are related to marketing and land tenure systems. Producers' attitudes and objectives are influenced by tenurial arrangements; social systems; and the infrastructure of the economy, especially marketing, education and communications facilities. The marketing structure, in turn, is conditioned by the nature of credit institutions, the level of producers' marketings and incomes, and the state of transportation and communications facilities. In attempting to describe and predict the behavior of agriculturalists, the interaction among these factors together with the impact of climatic forces must be assessed. Without an inventory of the quantity and productivity of the producer's resources, including his personal attributes, and the choice indicators he faces, only a qualitative assessment of these factors can be made. This is the objective of the subsequent discussion.

The focal point of departure is the small-scale producer whose decisions and activities are essentially subsistence-oriented. This orientation is primarily the result of the producer's inability to generate an output level in excess of annual consumption requirements. Although the implication is that the producer is "survival-oriented", 
his consumption pattern nearly always contains items which are not physically consumed.\(^1\) The importance given to exchanging gifts, post-harvest festivals and religious observances suggests possession of or access to financial means permitting levels of living above physical survival. The ubiquity of these expenditures also suggests the means for saving and additional capital accumulation in the economy. In addition, the majority of subsistence-oriented producers have some contact with an exchange or money economy where they obtain those items they consume but do not produce. Also, practices of hiring labor and supplying labor for hire are common in many areas.

For heuristic purposes, the producer is subjected to a number of hypothetical, but meaningful, situations which affect his capacity and motivation to potentially improve his economic well-being. Through the use of these situations, as postulated, the transition or evolution of a subsistence-oriented producer toward a market-oriented producer is described. This initial focal point should not obscure the fact that in any less-developed area producers operating on a variety of scales of production coexist. Both small-scale producers and plantation growers produce for the export market. Subsistence-oriented and large-scale, commercial producers both contribute to meeting domestic food and fiber demands. The longer-term importance of the large number of small-scale producers is that they must eventually be more fully integrated into the economy. They also represent a huge potential market for indigenously-produced consumer goods. These factors suggest the

\(^{1}\text{These expenditures are in addition to rents, taxes and debt repayment.}\)
importance of understanding their motivation and capabilities to adjust and take advantage of economic changes as they occur.

Production

The frame of reference for resource allocation and production decisions is given in Equation 9.1. The expression, incorporating the use of Lagrangean multipliers, can be viewed either as a utility maximization or profit maximization problem depending upon whether the producer is subsistence- or market-oriented. In either case, producers' activities are subject to the constraints imposed in Equation 9.1, the estimated price relationships, and the physical productivity of the production inputs used. It is not presumed that producers are actually able to quantify Equation 9.1 and complete the calculations described later. Rather, Equation 9.1 reflects those factors producers take into account when making their production decisions. The marginal conditions for economic efficiency, which are derived below, represent the conditions producers tend to approximate in order to maximize their objectives subject to the constraints imposed. Equation 9.1 is interpreted below.

\[ J = \sum_{i=1}^{n} p_i q_i + \mu \left[ k^0 - \sum_{j=1}^{m} x_j k^j \right] + \varphi \left[ l^0 - \sum_{k=1}^{s} \theta_k k_k \right] + \lambda \left\{ J\{q_1, \ldots, q_v\} \right\} \]  \tag{9.1}

\(^1\)Tenant-producers are not considered in this chapter. The discussion at several other points in the study should have emphasized some of the problems peculiar to tenants. However, they confront many of the same problems faced by small-scale owner-operators.
Outputs and valuations

In the expression \( \sum_{i=1}^{n} p_i q_i \), the \( q_i \) are the \( n \) outputs produced for consumption and/or exchange. For simplification, assume all \( q_i \) are crops. The corresponding \( p_i \) are the implicit prices or valuations reflecting consumption requirements and preferences for those goods directly consumed and the exchange values for those traded or sold.\(^1\)

The exchange values are determined according to supply-demand conditions in the marketplace. For example, \( p_1 \) results from that price or exchange value which equates the aggregate demand and supply for \( q_1 \) such that \( D_1(p_1) = S_1(p_1) \). At a later stage when producers are market-oriented, all the \( p_i \) \((i = 1, \ldots, n)\) represent the prices received by producers in the market. At this point, it is not necessary to designate which \( q_i \) are consumed directly and which are exchanged.

Working capital constraint

In the working capital constraint, \( \mu [K^o - \sum_{j=1}^{m} \pi_j q_j] \), the terms have differing connotations depending upon whether the producer is subsistence-oriented or market-oriented. Consider the subsistence-oriented producer first. \( K^o \) represents a "wages fund" concept where \( K^o \) is a stock of commodities, theoretically aggregated according to calories or some other common denominator, which is used to sustain laborers and draft animals whose services are used in the production process. The \( q_j \) are the variable inputs used by the firm. For this class of producer, the variable inputs are largely services from labor,

\(^1\)A question may exist as to the legitimacy of summing implicit consumer valuations based on consumption patterns and prices in terms of exchange values. Figure 2.1 denotes the derivation of the implicit "price" ratio; i.e., ratio of consumer valuations, between two commodities.
both family and hired, and from draft animals. Seed requirements are also included. The \( \pi_j \) denote the "demands" on \( K^0 \) which, in turn, permit the \( q_j \) to provide their services. For example, the \( \pi_j \) represent the additional consumption laborers and draft animals require if they are to be physically able to provide an increment of input services to the production process. The \( q_j \) represent different classes of labor classified, for example, on the basis of age, sex, and hired versus nonhired labor. The \( \pi_j \), therefore, vary with the respective \( q_j \). Implicitly, a linear relationship exists between the \( \pi_j \) and the respective quantities of \( q_j \) used.

Referring to Figure 8.1, the point of tangency between the income possibility curve and the marginal rate of substitution of income for leisure represents the producer's preferred labor-leisure-income pattern. The question arises as to whether or not sufficient means; i.e., \( K^0 \), exists for sustaining that amount of labor. If \( K^0 \) is sufficient to support only \( L^*_1 \) of labor and if financing in terms of \( K \) is not secured, the producer is forced to choose more leisure over labor. The alternative is to offer a portion of his labor services for hire, which would otherwise be devoted to leisure, so that his income from the firm and from wages approaches the desired level \( I_1 \). If external employment is not available, then since the producer in Figure 8.1 would prefer to expend \( L^*_1 \) of labor to generate \( I_1 \) of income, he is, in effect, involuntarily unemployed to the extent of \( L^*_1 L^*_2 \) of labor inputs. In this situation, government transfers, for example, in the form of food assistance to augment \( K^0 \), would physically permit the producer to use more labor inputs so as to earn a higher income. A
portion of this incremental income may flow to the government and to other sectors of the economy.\(^1\) If \(K^o\) permits the producer to reach point A, he is, according to his objective, fully employed at that point. Society, however, may view him as being less than fully employed. If \(K^o\) exceeds that necessary to sustain \(L_1L^*_1\) of labor, a portion need not be consumed or the \(\pi_j\) can be increased until \(K^o\) is exhausted. The increase in \(\pi_j\) and the consequent greater capacity to work conceivably shift the income possibility curve upward for each level of labor input. Both income and utility levels could be increased.\(^2\)

For the market-oriented producer, \(K^o\) is defined as the producer's working capital expressed in monetary terms. The \(q_j\) are again the variable inputs. In addition to labor and draft animal inputs, fertilizer, inputs of irrigation water, and machine services are included. The \(\pi_j\) are rewritten as \(p_j\) where the latter are the actual prices or opportunity costs of obtaining and using these inputs.

For the two classes of producers, the Lagrangean multiplier \(\mu\) has a different interpretation. For subsistence-oriented producers, \(\mu\) represents the marginal utility derived from consuming the goods producible with an additional unit of \(K\). For market-oriented producers, \(\mu\) represents the marginal value product obtainable with an additional unit of \(K\).

\(^1\)As the \(K^o\) of other producers is increased, the aggregate effect on individual real and money incomes will be affected by the capacity of the marketing system to absorb increased marketings, by market prices received, and by the effect on prices for consumer goods as per capita incomes of producers vary.

\(^2\)See preceding footnote.
Land constraint

Land, as one of the inputs of the production process, acts as an additional constraint on the scope of producer's activities. Tenants are constrained by the amount of land they can rent and owner-operators by the amount they own and can rent as tenants. In areas of shifting cultivation, the land constraint represents the amount of land cleared for production. Where land is communally held, individual land constraints are determined by centrally- or collectively-determined land allocations.

In Equation 9.1, the land constraint is expressed as $\phi [L^0 - \sum_{k=1}^{s} \theta_k q_k]$. $L^0$ is defined as the aggregate of land services, as distinguished from the number of acres or hectares under cultivation. The $q_k$ represent the different classes of land in terms of productivity. Where land is inherited by more than one member of the family and where each class of land is equally divided so that the aggregate amount of land in each inheritance is of nearly equal value, successive fragmentation of land holdings occurs. Thus, each producer usually holds land of varying productivity. The $\theta_i$ are the indicators of productivity. If $q_1$ is twice as productive as $q_2$, $\theta_1 = 2\theta_2$ and $q_1$ provides twice as many land services in the aggregated $L^0$. The Lagrangean multiplier $\phi$ has the same interpretation as $\mu$ but in terms of an increment in $L^0$ rather than $k^0$.

Implicit production function

The production function in Equation 2.37, for example, is in explicit form. However, stating the production function in an implicit form has advantages when the marginal conditions for economic ef-
ficiency are derived. The implicit production function \([F](q_1, \ldots, q_v)\)
is actually a composite of \(n\) production functions; i.e., one for each of
the \(n\) outputs. The term \([F]\) may be viewed as a vector of the \(n\) functions.
For example, if \(q_1\) is an output, \(q_1 = F_1[q_j, q_k]\) where \(q_j\) are the vari-
able inputs including labor, fertilizer and irrigation water while \(q_k\)
are the variable land inputs. The expression \([F](q_1, \ldots, q_v)\) is an
abbreviated form of \([F](q_1, \ldots, q_n, q_{n+1}, \ldots, q_m; q_{m+1}, \ldots, q_s)\)
where \(n+m+s = v\) and \(q_{n+1} = q_{j=1}\) and \(q_{m+1} = q_{k=1}\). The notation becomes
somewhat cumbersome, but the concept is that \(m\) different inputs of
working capital and \(s\) different land inputs are available for producing
\(n\) different outputs. Not every input is necessarily used to produce
every output.

**Marginal conditions for economic efficiency**

The first-order marginal conditions for economic efficiency for a
constrained revenue maximization problem were derived in Equations 2.9
to 2.18. Since the marginal conditions will be frequently referred to
in this chapter, they are restated. In addition, the formulation in
Equation 9.1 which serves as the basis for deriving the marginal condi-
tions is a modified version of Equation 2.9. Upon taking the partial
derivatives of Equation 9.1 with respect to the \(q_i (i = 1, \ldots, v)\), \(\mu\), \(\varphi\),
and \(\lambda\) and setting these equal to zero, the following sets of equations
are derived:

\[
\frac{\partial J}{\partial q_i} = p_i + \lambda_F^i = 0 \quad (i = 1, \ldots, n) \quad (9.2)
\]

\[
\frac{\partial J}{\partial q_j} = -\mu \lambda_j + \lambda_F^j = 0 \quad (j = 1, \ldots, m)
\]

\[
\frac{\partial J}{\partial q_k} = \lambda_k = 0 \quad (k = 1, \ldots, s) \quad (9.3)
\]
\begin{align*}
\frac{\partial J}{\partial q_{k}} &= -\varphi q_{k} + \lambda F_{k} = 0 \quad (k = 1, \ldots, s) \\
&\quad (i = 1, \ldots, n) \quad (9.4) \\
\frac{\partial J}{\partial \lambda} &= k^{o} - \sum_{j=1}^{m} \pi_{j} q_{j} = 0 \quad (9.5) \\
\frac{\partial J}{\partial \varphi} &= L^{o} - \sum_{k=1}^{s} \theta_{k} q_{k} = 0 \quad (9.6) \\
\frac{\partial J}{\partial \lambda} &= [F](q_{1}, \ldots, q_{v}) = 0 \quad (9.7) \\

\text{Selecting any two equations from Equation 9.3 and/or Equation 9.4} \\
\text{and dividing the two, the least-cost combinations of using inputs are} \\
\text{obtained, as in Equations 9.8a to 9.8f. These results must be satisfied} \\
\text{for any combination of inputs.} \\
\frac{\pi_{j}}{\pi_{r}} &= \frac{F^{i}_{j}}{F^{i}_{r}} = \frac{MPP^{i}_{j}}{MPP^{i}_{r}} = \frac{\partial q^{i}_{r}}{\partial q^{i}_{j}} = MRS^{i}_{j-r} \quad (j, r = 1, \ldots, m) \\
&\quad (i = 1, \ldots, n) \quad (9.8a) \\
\frac{MPP^{i}_{j}}{MPP^{i}_{r}} &= \frac{\pi_{j}}{\pi_{r}} \quad (9.8b) \\
\frac{\theta_{k}}{\theta_{1}} &= \frac{F^{i}_{k}}{F^{i}_{1}} = \frac{MPP^{i}_{k}}{MPP^{i}_{1}} = \frac{\partial q^{i}_{1}}{\partial q^{i}_{k}} = MRS^{i}_{k-1} \quad (k, l=1,\ldots,s) \\
&\quad (i = 1, \ldots, n) \quad (9.8c) \\
\frac{MPP^{i}_{k}}{MPP^{i}_{1}} &= \frac{\theta_{k}}{\theta_{1}} \quad (9.8d) \\
\frac{\pi_{j}}{\theta_{k}} &= \frac{F^{i}_{j}}{F^{i}_{k}} = \frac{MPP^{i}_{j}}{MPP^{i}_{k}} = \frac{\partial q^{i}_{k}}{\partial q^{i}_{j}} = MRS^{i}_{j-k} \quad (j = 1, \ldots, m) \\
&\quad (k = 1, \ldots, s) \quad (9.8e) \\
\frac{MPP^{i}_{j}}{\pi_{j}} &= \frac{MPP^{i}_{k}}{\theta_{k}} \quad (9.8f)
\end{align*}
Equation 9.8f summarizes the necessary result that the marginal physical product corresponding to the last increment of each variable input must be equal for all inputs in the production of each of the n outputs.

Similarly, selecting any two equations from Equation 9.2 and dividing the two, the optimal output configuration is obtained, as in Equation 9.9. This result must be satisfied for any combination of outputs.

\[
\frac{p_i}{p_h} = \frac{f^i}{f^h} = \frac{\partial q_h}{\partial q_i} = RPT \quad (i, h = 1, \ldots, n) \quad (9.9)
\]

Finally, selecting any one equation from Equation 9.2 and dividing this by any equation from Equation 9.3 and(or) Equation 9.4, the necessary input-output relationships are derived in Equations 9.10a to 9.10d.

\[
\frac{-\mu n}{p_i} = \frac{F^i}{F^j} = -\frac{\partial q_i}{\partial q_j} \quad i = (1, \ldots, n) \quad j = (1, \ldots, m) \quad (9.10a)
\]

\[
\frac{MPP^i_{P_j}}{\eta_j} = MVP^i_j = \mu \quad (9.10b)
\]

\[
\frac{-\varphi \theta_k}{p_i} = \frac{F^i_k}{F^i} = \frac{\partial q_i}{\partial q_k} \quad i = (1, \ldots, n) \quad k = (1, \ldots, s) \quad (9.10c)
\]

\[
\frac{MPP^i_{P_k}}{\theta_k} = MVP^i_k = \varphi \quad (9.10d)
\]

If Equations 9.8f, 9.9, and 9.10d are satisfied simultaneously, subject to Equations 9.5, 9.6 and 9.7; if the second-order conditions for a constrained maximization problem are met; and if the implicit assumptions of non-negativity for all goods and coefficients hold, an
optimum resource allocation pattern resulting in an optimum output configuration is determined. Of course, the output configuration is only the planned or expected one. The actual output realized, given the planned resource allocation, is subject to the producer's ability to estimate the technical coefficients of production and the exogenous forces of nature. The producer's next decision is that of disposing of the realized outputs so as to maximize his level of utility. The commodities can be consumed directly, exchanged for other commodities which are consumed, or stored for future contingencies. A number of additional claims on income such as land rent, debt repayment, taxes, replenishment of $K^0$, and maintenance of fixed resources usually exist. Most of these additional claims must be met if output levels are to be maintained in subsequent production periods. Only that output or income which is in excess of these fixed and variable costs is relevant for the producer's consumption decisions. In order to systematize the discussion of the producer as a consumer, the producer is assumed to have some contact with an exchange or money economy. As the producer moves away from subsistence- towards market-oriented production, the frequency of contact with the money economy steadily increases.

Exchange Economy

The basic operation of an exchange economy was discussed in Chapter VI. Since the equations specified there will be used again in the discussion of a series of postulated situations affecting producer and consumer behavior, the equations are restated so as to facilitate reference to them. Equation 9.11 represents the excess demand for the
i-th good by the r-th producer. The terms \( q_{ir} \) and \( q^o_{ir} \) denote the quantity demanded and brought to the market, respectively, of the i-th good by the r-th producer. The \( q^o_{ir} \) result from the maximizing formulation in Equation 9.1. The \( q_{ir} \) result from the implicit demand function given in Equation 9.12. If \( E_{ir} \) is positive, the r-th producer has a net demand for \( q^o_i \); if negative, he supplies \( q^o_i \) in exchange for some other commodity.

\[
E_{ir} = q_{ir} - q^o_{ir} \quad (i = 1, \ldots, n) \quad (r = 1, \ldots, t) \tag{9.11}
\]

\[
q_{ir} = f(p_i / p_i h, y_r : T) \quad (i, h = 1, \ldots, n) \tag{9.12}
\]

\[
y_r = \sum_{i=1}^{n} p_i q_{ir} = \sum_{i=1}^{n} p_i q^o_{ir} \quad (r = 1, \ldots, t) \tag{9.13}
\]

\[
\sum_{i=1}^{n} p_i (q_{ir} - q^o_{ir}) = \sum_{i=1}^{n} p_i E_{ir} = 0 \quad (r = 1, \ldots, t) \tag{9.14}
\]

The value of his endowment, in effect his income, is \( \sum_{i=1}^{n} p_i q^o_{ir} \), as in Equation 9.13; \( \sum_{i=1}^{n} p_i q_{ir} \) represents the value of expenditures on the \( q_i \) demanded. The \( p_i \) represent the exchange values in terms of a numeraire. Excluding the possibility of credit financing, the maximum value of goods obtained through exchange is restricted to the value of the producer's endowment. This constraint is satisfied in Equation 9.13. This represents the r-th producer's budget constraint which is restated in Equation 9.14 in terms of excess demands. That is, the total value of the r-th producer's excess demands must sum to zero.

---

1The functional relationship specifies that demand for \( q_i \), for example, is a function of \( p_i \) relative to prices of other consumer goods, monetary income, and \( T = \) tastes and preferences.
The producer as a consumer derives utility from goods he consumes. These goods include the \( q_i \) obtained in the market plus the goods produced and consumed directly. The \( r \)-th producer's utility function is stated in Equation 9.15. The vector \([c]\) represents the respective quantities of those goods produced and consumed directly.\(^1\) By Equation 9.11, the utility function can be rewritten as in Equation 9.16. The producer's objective, now operating as a consumer, is to maximize Equation 9.16 subject to his budget constraint, Equation 9.14. The constrained utility maximization problem is represented in Equation 9.17 with the use of a Lagrangean multiplier, \( \lambda \).

\[
U_r = U_r(q_{1r}, \ldots, q_{nr}; [c]) \tag{9.15}
\]

\[
U_r = U_r(E_{1r} + q^o_{1r}, \ldots, E_{nr} + q^o_{nr}; [c]) \tag{9.16}
\]

\[
S_r = U_r(E_{1r} + q^o_{1r}, \ldots, E_{nr} + q^o_{nr}; [c]) - \lambda (\sum_{i=1}^{n} p_i E_{ir}) \tag{9.17}
\]

The first-order conditions for utility maximization by the \( r \)-th producer-consumer are obtained by taking the first partial derivatives of Equation 9.17 with respect to the \( E_{ir} \) \((i = 1, \ldots, n)\) and \( \lambda \) and setting these equal to zero.

\[
\frac{\partial S_r}{\partial E_{ir}} = \frac{\partial U_r}{\partial E_{ir}} - \lambda p_i = 0 \tag{9.18}
\]

\[
\vdots
\]

\[
\frac{\partial S_r}{\partial E_{nr}} = \frac{\partial U_r}{\partial E_{nr}} - \lambda p_n = 0
\]

---

\(^1\)The vector \([c]\) corresponds to the commodities retained for direct consumption in the price elasticity of quantities marketed formulations discussed in Chapter VII.
\[
\frac{\partial S_r}{\partial \lambda} = - (\sum_{i=1}^n p_i E_{ir}) = 0 \tag{9.19}
\]

Since \( \frac{\partial E_{ir}}{\partial q_{ir}} \equiv 1 \), Equation 9.18 can be rewritten as:

\[
\frac{\partial U_r}{\partial E_{ir}} \frac{\partial E_{ir}}{\partial q_{1r}} + \lambda p_1 = \frac{\partial U_r}{\partial q_{1r}} - \lambda p_1 = 0 \tag{9.18}'
\]

\[
\frac{\partial U_r}{\partial E_{nr}} \frac{\partial E_{nr}}{\partial q_{nr}} + \lambda p_n = \frac{\partial U_r}{\partial q_{nr}} - \lambda p_n = 0
\]

\[
\frac{\partial U_r}{\partial q_{1r}} / \frac{\partial q_{nr}}{\partial q_{1r}} = \frac{\lambda p_1}{\lambda p_n} \text{ and } \frac{\partial q_{nr}}{\partial q_{1r}} = \frac{p_1}{p_n} = MRS_{1-n} \tag{9.20}
\]

Taking any two equations, for example, the first and last from Equation set 9.18' and dividing, the r-th producer maximizes his utility when the marginal rate of substitution between the two goods is equal to their inverse price ratio. This condition must hold for all combinations of \( q_i \). When both Equation 9.20 and the second-order conditions for a constrained maximization problem have been satisfied, the r-th individual has maximized his utility by the appropriate production, exchange, and consumption decisions.

Subsistence- and market-oriented producers co-exist. In the following discussion, a number of situations affecting the producer's capability and incentive to make the transformation from subsistence- to market-oriented production are postulated. This transition, or rather the tendency towards market-orientation, is not an irreversible process.
Subsistence production represents the home base to which producers can return when adverse economic conditions reduce the profitability of producing for the market. The return to essentially-subsistence production is rational as long as adverse economic conditions persist.

The relative lack of farm management studies for most less-developed areas forces economists and national planners to rely on aggregate production data. Not only are such data usually considered suspect but the aggregates mask the nature of individual economic activity. Increased aggregate output does not imply increases on the part of all producers.

Case 1: Planned Production Equals Planned Consumption

Given the essentially-unpredictable impact of environmental conditions on production levels, the situation in Case 1 would only be coincidental. Nevertheless, Case 1 does help to orient the discussion of subsequent case situations.

After the components of Equation 9.1 have been specified and the marginal conditions for efficiency have been met, the resulting planned output configuration is such that (1) The outputs of \( q_i \) (i = 1, ..., n) are equal to the respective quantities consumed in \( [C] \); and (2) The quantity of \( q_n \) produced is equal to the amount consumed directly and that marketed in order to expend \( E^* = \mathbf{p}_E [\mathbf{E}] + FC = \mathbf{p}_n q_n \).

---

1. The studies in economics of farm management conducted by the Directorate of Economics and Statistics, Ministry of Food and Agriculture in India are exceptions.

2. Recall that \( [\mathbf{E}] \) represents a vector of those consumer goods purchased from a merchant-trader, and FC denotes any fixed cash payments for rent and taxes. At low stages of economic development, \( E^* \) is assumed to be fixed for subsistence-
the r-th producer, the excess demands in Equation 9.11 for \( q_i \) \((i = 1, \ldots, n-1)\) are equal to zero; \( q_i = q_i^o \) for these \( n-1 \) commodities. The 
excess demand for \( q_n \) is negative since \( q_n = 0, q_n^o > 0 \) and \( q_n - q_n^o < 0 \). The 
negative excess demand indicates that \( q_n \) is marketed. Let \([E]\) be 
represented by \( q_{n+1} \) and \( q_{n+2} \). Since \( q_{n+1}^o = q_{n+2}^o = 0 \), the excess 
demands for these two goods are positive. In determining the conditions 
for utility maximization in Case 1, only \( q_n, q_{n+1}, \) and \( q_{n+2} \) need be 
considered. According to Equation 9.13 the r-th producer's income is:

\[
Y_r = \sum_{i=n}^{n+2} p_i q_i^o \text{ where } q_{n+1}^o = q_{n+2}^o = 0. \text{ Expenditures are equal to } Y_r = \sum_{i=n}^{n+2} p_i q_i^o \text{ where } q_n = 0. \text{ Subtracting the r-th producer's income from his } 
expenditures, assuming the value of goods sold must equal the value of 
purchases, his budget constraint is expressed in Equation 9.21. The r-th 
producer-consumer's utility function is given in Equation 9.22 and the 

\[
\sum_{i=n}^{n+2} p_i (q_i^r - q_i^o) = \sum_{i=n}^{n+2} p_i E_{ir} = 0 \quad (9.21)
\]

\[
U_r = U_r (q_n, q_{n+1}, q_{n+2} ; [C]) \quad (9.22)
\]

\[
S_r = U_r (E_n + q_n^o, E_{n+1} + q_{n+1}^o, E_{n+2} + q_{n+2}^o ; [C]) 
- \lambda \left( \sum_{i=n}^{n+2} p_i E_{ir} \right) \quad (9.23)
\]

constrained utility maximization problem in Equation 9.23. Taking the 
first partial derivatives of Equation 9.23 with respect to \( E_n, E_{n+1}, \) 
(footnote continued from preceding page) oriented producers. Recall 
further that only one good, \( q_n \), is marketed to provide the income 
necessary to undertake \( E_n \). All goods produced in excess of \([C]\) 
and the \( q_n \) marketed are exchanged according to the mechanics of the 
exchange economy.

\(^1\) Since the excess demands for \( q_i \) \((i = 1, \ldots, n-1)\) are zero, these 
\( q_i \) are excluded from Equations 9.13 and 9.14.
and \( \lambda \) and setting these derivatives equal to zero, the following equations are derived:

\[
\frac{\partial S}{\partial E_{ir}} = \frac{\partial U}{\partial E_{ir}} - \lambda p_i = 0 \quad (i = n, n+1, n+2) \tag{9.24}
\]

\[
\frac{\partial S}{\partial \lambda} = - \left( \sum_{i=n}^{n+2} p_i E_{ir} \right) = 0 \tag{9.25}
\]

Since \( \frac{\partial E_{ir}}{\partial q_{ir}} = 1 \), Equation 9.26 holds. Dividing any two equations of 9.26, Equation 9.27 is obtained.

\[
\frac{\partial U}{\partial E_{ir}} \frac{\partial E_{ir}}{\partial q_{ir}} - \lambda p_i = 0 \quad (i = n, n+1, n+2) \tag{9.26}
\]

\[
\frac{MU_n}{p_n} = \frac{MU_{n+1}}{p_{n+1}} = \frac{MU_{n+2}}{p_{n+2}} \tag{9.27}
\]

In Equation 9.27, \( p_n \) is the price received for the \( q_n \) marketed; it is also the opportunity cost associated with directly consuming \( q_n \). Therefore, the marginal utility of consuming \( q_n \) per monetary unit of \( p_n \) must equal the marginal utilities derived in consuming \( q_{n+1} \) and \( q_{n+2} \), each divided by its respective cost. The second-order conditions are assumed to be satisfied. Equation 9.27 indicates that utility has been maximized subject to the budget constraint, prices for consumer goods, and implicitly, \([C]\). The more general condition that holds is:

\[
\frac{MU_1}{p_1} = \frac{MU_2}{p_2} = \ldots = \frac{MU_{n+2}}{p_{n+2}} \tag{9.28}
\]

In the absence of change, the production and consumption patterns which are evolved would be repeated from one time period to the next. Of course,
the influences of weather, the effect of changes in the family cycle on consumption patterns, and the appearance of unforeseen contingencies make invariant production and consumption patterns unrealistic.

Case 2: Actual Production Exceeds Planned Production of \( q_n \)

In this situation, the production of \( q_i (i = 1, \ldots, n) \) is still assumed to equal the planned consumption as reflected in \([C]\). However, the actual production of \( q_n \) is greater than that amount necessary to satisfy direct consumption and to expend \( E^* = p_n q_n \). The "surplus" \( q_n \) may be the consequence of favorable weather during the production period. Alternatively, the estimated \( p_n \) used for planning the amount of \( q_n \) that must be produced and marketed is less than the actual \( p_n \) received by the producer so that less \( q_n \) needs to be marketed to undertake \( E^* \). Furthermore, the prices in \([p_E]\) may have fallen. In any of the above circumstances, a smaller amount of \( q_n \) needs to be marketed. Initially, income is greater than expenditures, as in Equation 9.29.

\[
Y_r = \sum_{i=n}^{n+2} p_i q_{ir} \quad \sum_{i=n}^{n+2} p_i q_{ir}
\]

(9.29)

The question now arises as to the disposition of the "surplus" \( q_n \). A number of alternatives exist. The number considered by the producer depends partly upon the length of his planning horizon and the size of the "surplus". If the "surplus" is relatively small, buying land is not a feasible alternative. If his planning horizon only extends to the next production period, productive investment yielding a flow of returns over several periods is not an important alternative. This short planning horizon is assumed to constrain producer's alternatives in Case 2. Some of the more-feasible alternatives open to the producer include the
following:

(1) Increase consumption of $q_n$;

(2) Increase consumption of $[E]$;

(3) Increase consumption of some of the other $q_i (i = 1, \ldots, n-1)$ through exchange of the "surplus" $q_n$;

(4) Place in inventories for any contingencies which may arise in the coming production period; and

(5) Invest in nonproductive items such as jewelry and ornaments, expend socially, or place in hoards.

Investments in durables, such as jewelry, provide a flow of psychic returns as long as the items are held. In this sense they are unproductive. Indirectly, they provide at least a partial means for making productive investment when they are used as collateral for securing external financing. Since such durables are held beyond the production period planning horizon, they will not be considered in Case 2. Items (1) and (3) may provide a return in the subsequent production period if through increased consumption producers' physical well-being is improved so that they have a greater physical capacity to work. Depending on the pattern of current consumption and the amounts by which consumption is increased, the income-possibility curves in Figure 8.5 may shift upward at all points. Even where savings institutions exist, as in post offices and credit associations, they will not be considered in Case 2. This is because of assumed unfamiliarity or mistrust of these institutions by producers at low stages of economic development. Finally, increasing $K^0$ is a feasible alternative. Since this involves interproduction periods, it will not be considered at this point.
Since all these alternatives are eventually consumption-oriented, the best utilization of the "surplus" \( q_n \) is that which maximizes utility during the planning period. For convenience, let hoarding be included in (4) and assume that contingency stocks are not carried forward into the next production period. Alternatives (1), (2), and (3) can be considered within the context of the exchange system specified in Case 1. For alternatives (4) and (5), two additional consumer goods are added. Let \( q_{n+3} \) = contingency stocks and \( q_{n+4} \) = social and religious expenditures. Although they are introduced as new goods, it is likely that producers in Case 1 also made social and religious expenditures.

The demand for contingency stocks, \( q_{n+3} \), is a function of a number of factors. Although such demand would vary with individuals, Equation 9.30 represents an implicit demand function which includes the most important parameters. In Equation 9.30, \( [C] \) and \( [E] \) are as previously defined; the other components are identified as:

\[
q_{n+3} = g([C], [E], \sigma^2_P, S, 0, A)
\]

\( \sigma^2_P \) = Variability of production from one production period to the next, primarily as the result of weather conditions

\( S \) = Existence of storage facilities and the costs of storage, including spoilage

\( O \) = Opportunity cost in terms of deferred gratification in consumption foregone and in terms of the potential costs associated with necessity for external financing to meet contingencies.

\( \text{Social expenditures can also have intertemporal returns in that they may help to ensure, for example, favorable renting and credit arrangements.} \)
A = Attitudes of the producer whether, for example, emphasis is on fatalism as compared with planned actions, even though on a short-term basis.

For subsistence-oriented producers at relatively-low stages of economic development, the combination of a limited capacity to generate a "surplus" of \( q_n \) and short planning periods tends to motivate producers to increase consumption rather than place in stocks for contingencies. Where an attitude of fatalism prevails, production variability and necessity to resort to credit financing are considered as phenomena over which the producer has no control. Where climatic factors are not favorable, the costs of storage are high. In areas where ties of the extended family are still strong, any stocks planned for contingencies may be "demanded" for consumption by other family members.

Social and religious expenditures often have a strong claim on available income. Even at relatively-low levels of per capita income, the observance of social proprieties maintains or increases the social status of the producer. The observance of social events in the family, postharvest festivals, and offerings to village saints and religious spirits are often costly in terms of available income. But to the producer, there is a certain practicality to these expenditures. Maintenance of social status helps to ensure his well-being as fellow villagers offer assistance when adversities occur. Postharvest festivals are a means of solidifying labor-exchange and collective work arrangements.

Some of these phenomena were described in Chapter VIII. See, for example, the discussion of the civil-religious hierarchy in Latin America and traditional religion in Africa.
Gifts to the landlord or patron may be reciprocated by giving the donor favorable treatment in renting and credit-financing arrangements. Again, where fatalism is strong, contributions to saints and spirits are viewed as means toward ensuring favorable production in the next period, good health, and general well-being of the producer's family. To the external observer, fatalism may appear as highly irrational. If the producer does not have a creditable alternative, fatalistic attitudes are also rational attitudes to him. An implicit demand function for social and religious expenditures is given in Equation 9.31 where \([C], [E]\) and \(A\) are as in Equation 9.30 where:

\[ q_{n+4} = h([C], [E], p_{n+4}, SS, A) \]  \hspace{1cm} (9.31)

\[ p_{n+4} = \text{Monetary or opportunity costs associated with these expenditures} \]

\[ SS = \text{Social status and obligations of the producer as they affect his relationship to the community and to those wielding the most power over him.} \]

Before introducing \(q_{n+3}\) and \(q_{n+4}\) into the exchange economy, their respective prices must be interpreted. Let \(p_{n+3}\) be viewed as the larger of the opportunity cost of marketings foregone or the opportunity cost of foregone increased consumption of \(q_n\). Let \(p_{n+4}\) be the larger of actual costs of social and religious expenditures or the opportunity costs of these outlays.

The process of deriving the conditions for utility maximization is the same as for Case 1. Since the individual is assumed to be unable to affect the \(p_i (i = n, \ldots, n+4)\), placing the "surplus" \(q_n\) on the market
for exchange by the r-th producer would not affect the $p_n$ he receives nor the $p_i (i = n+1, \ldots, n+4)$. The producer is able to affect the $p_i (i = 1, \ldots, n-1)$, however, since these have been defined as implicit consumer valuations. As the absolute and relative consumption levels of these $q_i (i = 1, \ldots, n)$ are varied, the corresponding $p_i$ are also expected to change. Thus, for those goods which are both consumed directly and obtained through exchange with $q_n$, two valuations for the same good result: (1) The implicit consumer valuation, and (2) the exchange value or market price of the good. The use of implicit consumer valuations must be abandoned at this point. That is, they may be still used in specifying Equation 9.1; but since a "surplus" is now available for exchange, the exchange values of the $q_i$ are the relevant prices for determining the actual consumption pattern which maximizes utility. The $p_i$, in terms of consumer valuations, were important in deriving the planned production and consumption patterns.

The exchange values can be viewed as the opportunity costs of consumption.

Equations 9.11 through 9.20 also apply here. The only difference is that $i = 1, \ldots, n+4$. Again, if the second-order conditions are satisfied, the consumption pattern which maximizes utility is that for which Equation 9.32 holds. If the prices are fixed and the units of consumer goods perfectly divisible, increasing the consumption of one good, for example, $q_n$, will lower the marginal utility of the last incre-
The equality stated in Equation 9.28 no longer holds. The consumption levels of all other goods must be increased before equality is restored as in Equation 9.32.

At this point, only the individual producer-consumer has been considered. Only in this situation can prices received and paid be assumed invariant as the individual in question determines his marketing and consumption decisions. As additional producers generate "surpluses", this assumption must be relaxed. The only exception is an unlikely situation where all prices are fixed through government policies. The introduction of price variations is deferred to Case 4.

Case 3: Actual Production is Less Than Planned Production of $q_n$

This situation is similar to that encountered in Case 2 with the exception that actual production of $q_n$ is less than that planned amount necessary to purchase $E^* = p_n q_n$ and to meet planned, direct consumption of $q_n$. If $E^* = [p_E][E] + FC$ is to be maintained, a portion of $[E]$ must be advanced on credit by the merchant or external financing must be obtained. Alternatively, the producer can provide labor services for hire to generate additional income if such opportunities exist. Assume that excess demands for the other $q_i (i = 1, ..., n-1)$ are still zero and that consumption requirements or demands cannot be reduced below the

1. The usual assumption of diminishing marginal utility with higher consumption levels has implicitly been made.

2. Alternatively, credit in kind is secured for a portion of $q_n$ so that the planned consumption and necessary marketing of $q_n$ can take place.
essentially subsistence levels. The r-th producer’s income is given in Equation 9.33. His income, however, is less than his planned expenditures.

\[ Y_r = \sum_{i=n}^{n+2} p_i q_{ir} < \sum_{i=n}^{n+2} p_i q_{ir} \] (9.33)

\[ Y_r = \sum_{i=n}^{n+2} p_i q_{ir} + C_r = \sum_{i=1}^{n+2} p_i q_{ir} \] (9.34)

To remove the inequality, the necessary amount of credit, \( C_r \), is added to the income from the \( q_{n}^o \) actually marketed, as in Equation 9.34.

The utility function for the r-th producer-consumer and his budget constraint are given in Equations 9.35 and 9.36, respectively. The constrained utility maximization problem is of the same format as in Equation 9.23. If the first- and second-order conditions for a constrained maximization problem are satisfied, utility is maximized when the actual consumption pattern results in Equation 9.37 being satisfied.

\[ U_r = u_r(q_n, q_{n+1}, q_{n+2}; [C]) \] (9.35)

\[ \sum_{i=n}^{n+2} p_i E_i + C_r = 0 \] (9.36)

Equation 9.23. If the first- and second-order conditions for a constrained maximization problem are satisfied, utility is maximized when the actual consumption pattern results in Equation 9.37 being satisfied.

\[ \frac{\text{MU}_1}{P_1} = \frac{\text{MU}_2}{P_2} = \ldots = \frac{\text{MU}_{n+2}}{P_{n+2}} \] (9.37)

---

1 This is not consistent with an earlier statement that some of the \( q_i \) may represent demand for social expenditures. If they are, they could be reduced even for subsistence-oriented producers.
The $p_{n+1}$ and $p_{n+2}$ must be given a modified interpretation. In addition to the prices charged by the merchant-trader for these items, the real cost is the retail price plus the effective cost of the credit obtained.

The consumption pattern has been maintained only through the use of external financing. The credit plus interest must subsequently be repaid. The question of generating the means for repayment arises. According to Figure 8.5, if the marginal rate of substitution of leisure for income changes and if $K^0$ is sufficient to sustain a larger level of labor employment, a higher income can be planned. That is, the new income is sufficiently high to permit the producer to maintain his usual consumption pattern and to repay the credit advanced. If additional income is not available through revenue from increased production or from income earned off the farm, the original debt must be refinanced. Indebtedness becomes even more burdensome if a series of unfavorable production periods occurs. As was noted in Chapter V, continued indebtedness greatly reduces the bargaining position of the debtor and is often a very costly situation to him. The source of credit is important. Relatives may be willing to defer repayment until the producer's income position improves. Landlords may use indebtedness as a lever for raising the producer's rent. Merchant-traders may put a double squeeze on debtors who are effectively forced to patronize these individuals. The merchant may both pay the producer a lower price for the output he markets and charge him a higher price for the items retailed by the merchant. Professional moneylenders exert a continuing hold over their debtors. If the debt level becomes too high, the money-
lender may eventually appropriate the land of the debtor in lieu of debt repayment. To some extent, existing social pressure in the village tends to constrain the degree to which merchants and resident money-lenders can exploit their debtors. Even though they provide useful and necessary services, the credit terms associated with these private sources of credit tend to reduce the ability of subsistence-oriented producers to generate a surplus for debt repayment, for increasing consumption, and perhaps eventually for productive investment in the firm.

Case 4: Production in Terms of Exchange Values With "Surpluses" Generated by Several Producers

This situation is a modification of Case 2 where a single individual generated a "surplus" of \( q_n \) which was subsequently consumed and(or) exchanged in the market according to prevailing exchange values. This increased contact with the exchange economy is postulated to affect the producer's behavior regarding production and consumption decisions. The increased awareness of benefits through exchange and of the relative exchange values of goods in the market cause at least some producers to alter their production and consumption patterns. A portion of the goods previously produced and consumed directly, where the last increments consumed provided relatively-small increments of utility, can be exchanged either for goods not produced or goods produced in only relatively-small quantities. Such is the basis and the reason for the existence of an exchange economy.

The relevant prices for production and consumption decisions are no longer the implicit consumer valuations, but the exchange values of
goods in the market. These values represent the following: (1) Marginal revenues earned by goods marketed, (2) Opportunity costs of goods produced and directly consumed, and (3) Prices or acquisition costs of goods consumed but not produced. The constrained maximization problem represented in Equation 9.1 is now in terms of maximizing total value of goods produced subject to the $K^O$ and $L^O$ constraints and the estimated $p_i$, the respective exchange values. If the first- and second-order conditions for economic efficiency are satisfied, a resource allocation and planned production configuration result. The actual production realized affects consumption and marketing decisions. The actual production is a function of planned production and the effect of weather and other exogenous factors.

Producers can effect some control over exogenous factors though the use of pesticides, herbicides, improved seed varieties, and better cultivation practices. These inputs, however, have not yet been introduced into the environment of the $r$-th producer. The concept of a "surplus" being a quantity produced in excess of traditional consumption requirements is no longer valid. Direct consumption represented by $[C]$ is relaxed. Consumption patterns now vary with the range of goods available through exchange, the exchange ratios, and the budget constraint of each of the $t$ producer-consumers. "Surpluses" are now in terms of negative excess demands. Again, demand for the individual $q_i$ is represented by Equation 9.12. As in Case 2, some of the $q_{ir}^O$ for the $r$-th producer can be increased by favorable weather during the production period. The $q_{ir}^O$ also increase for other producers in the area. Assume that only $q_{in}^O$ increases over the planned production level.
For a point of departure, assume that each of the $t$ producers is in equilibrium. That is, a set of prices exists so that the excess demands for each commodity by each producer-consumer are equal to zero, as in Equation 9.38 and Equation 9.20 holds for all $t$ producer-consumers.

$$E_{ir}(p_1, \ldots, p_{n+2}) = 0 \quad (i = 1, \ldots, n+2)$$
$$\quad (r = 1, \ldots, t) \quad (9.38)$$

The increased production of $q_n$ upsets the previously-postulated equilibrium. Not only does $\mu_{q_n}$ vary with a change in consumption, but aggregate variations in the quantity of $q_n$ marketed affect $p_n$ and, in turn, the real and monetary incomes of the $t$ producer-consumers. As a consequence of price and income changes, changes in the relative demand for the $q_i$ cause a secondary or, theoretically, a simultaneous round of forces to be set into motion. As demands for the $q_i$ vary so does the $(p_1, \ldots, p_{n+2})$ price configuration which, in turn, affects producer's incomes as in Equation 9.13. Only a general equilibrium solution can provide a price configuration such that Equations 9.20 and 9.38 are satisfied and individual utility is maximized subject to the constraints involved.

The problems of determinancy, in the absence of a general equilibrium solution, can be elucidated by considering the decision-making processes of an individual producer-consumer. In Figure 9.1, the producer-consumer is assumed to consume only two commodities, $q_1$ and $q_n$. Assume that only $q_n$ is produced. Point $A$ represents the initial equilibrium. The individual has produced $Oq_n^o$ which provides revenue amounting to $R^1 = p_n^1 q_n^o$. Each point on $R^1$ is an economically-feasible combination of $q_1$ and $q_n$ which can be consumed. That is, with $R^1$ and the pre-
vailing $p_1$, the maximum amount of $q_1$ that can be consumed is $Oq_1^m$; however, the entire quantity $Oq_n^o$ must be marketed. Alternatively, if $Oq_n^o$ is consumed, no revenue is available to purchase $q_1$. At point $A$, $\frac{MU_{q_1}}{p_1} = \frac{MU_{q_n}}{p_n}$ and utility is maximized subject to the budget constraint $R^1$. The producer-consumer's optimizing behavior is to market $q_n^1q_n^o$ of $q_n$ and consume $Oq_n^1$ and $Oq_n^1$ of the two goods.

With the increased amount of $q_n$ produced, for example, $q_n^*$ in Figure 9.1, and with $p_1$ and $p_n$ temporarily invariant, the individual earns a higher revenue, $R^3 = p_n^1q_n^*$. $R^3$ permits him to consume larger...
quantities of both $q_1$ and $q_n$, thereby moving to a higher utility level. With prices invariant, the increase in money income is also an equivalent increase in real income. Utility is now maximized at point B with $q_n^3$ marketed, $Oq_n^3$ consumed directly and $Oq_1^3$ purchased for consumption with revenue from marketings. The analysis is completed at this point only if the prices remain invariant. However, some of the other producers have also increased their production of $q_n$. With more $q_n$ marketed, $p_n$ will vary unless it is supported by government price policy or, coincidentally, demand and market supply increase at the same rate.

The hypothetical supply-demand conditions are represented in Figure 9.2. The hypothesized conditions are assumed to reflect the activities of the local merchant-trader who has some degree of both monopolistic and monopsonistic influence. The demand curve he faces, for example, DD is the demand curve by wholesalers at the next stage in the marketing process. The curve is downward-sloping because of product differentiation, restricted mobility of buyers, and(or) credit arrangements. The corresponding marginal revenue curve lies below DD at all points. The merchant-trader, as a buyer of the $q_n$ locally produced, has a degree of monopsonistic power because of an assumed limited number of competing buyers and(or) because credit advances to producers require or induce the latter to market their $q_n$ with the trader-creditor. Because of this monopsonistic power, a marginal acquisition cost curve, $ME_g$, exists for each aggregate supply curve denoted as $S$. That is, as the merchant-trader buys additional increments of $q_n$, each increment has a
higher cost to him. He maximizes his net returns at the price-quantity configuration where $\text{MR} = \text{ME}_S$. With $S_1$ in Figure 9.2, he purchases $Oq_n^1$ and pays $p_n^1$ to producers marketing $q_n$. With the increased production of $q_n$ as a result of favorable weather, the market supply curve in Figure 9.2 is expected to shift to the right. Curve $S_2$ with the corresponding $\text{ME}_S^2$ is drawn. If demand is invariant, $Oq_n^2$ is now purchased but at a lower price, $p_n^2$.

The market supply curves become vertical; i.e., perfectly inelastic, at the point where the merchant-trader's financial resources, including external credit financing, are exhausted and(or) quantities offered by producers are exhausted.
Returning to Figure 9.1, the lower market price now received by the producer-consumer, $p_n^2$, results in $R^2 = p_n^2 q_n^* < R^3$. The new budget constraint in Figure 9.1 lies between $R^1$ and $R^3$. In addition, since $p_n^2 < p_{n1}^1$, $q_n$ becomes less expensive relative to $q_1$ in consumption. With $p_n^2$, $R^2$ not only lies to the left of $R^3$ but has less slope than $R^1$ and $R^3$. That is, with $p_1^1$ and $p_n^2 < p_{n1}^1$, relatively more $q_n$ can be consumed with the new monetary income $R^2$. Assume the new equilibrium point is at C. A different consumption and marketing pattern now results. In addition to variations in $p_n^2$, the resulting variations in money income to all t producer-consumers affect the demand for $q_1$. As $q_1 r$ varies so does $p_1$. For the individual in Figure 9.1, an increase in $p_1$ results in the intersection of $R_2$ on the ordinate to move downward. While monetary income is unchanged, real income is lower. Another optimal consumption and marketing configuration results. Also, those individuals producing and marketing $q_1$ realize changes in $Y_r$ as $p_1$ varies. This, in turn, affects their demand for both $q_1$ and $q_n$ and another round of price and quantity adjustments follows.

With variations in real and monetary income, as described above, how does the producer-consumer theoretically determine his consumption and marketing decisions? Assume he produces and consumes both $q_1$ and $q_n$. In addition, he consumes but does not produce $q_{n1}$. In Figure 9.3, the three commodities are represented by the three axes. Movements away

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1 Mathematical formulations of the effect of changes in relative prices on production, consumption, and, in turn, quantities marketed were given in Chapter VII. An alternative, geometric approach is introduced here.
Figure 9.3. Determination of optimum production and consumption patterns when $q_1$ and $q_n$ are produced and $q_1$, $q_n$, and $q_{n+1}$ are consumed from 0 and along the $q_n$ and $q_{n+1}$ axes denote larger quantities as do movements up the $q_1$ axis. The production possibility curve, PP, denotes various combinations of $q_n$ and $q_1$ that can be produced. Superimposed on PP is the estimated $p_1/p_n$ price ratio used for production planning. Assume $p_1/p_n = RPT$ at Point A; $q_n^*$ and $q_1^*$ = AA are produced. As with the producer-consumer in Figure 9.1, the individual in Figure 9.3 must decide how much of $q_1^*$ and $q_n^*$ to market and how much of the three commodities to consume. As already noted in Figure 9.1, these decisions vary

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1 These are the possibilities from Equation 9.1 when $q_1$ represents only $q_1$ and $q_n$.
with different prices. These prices, in turn, vary with the aggregate impact on supply and demand resulting from the combined effect of individual decisions.

Where producers are forced to market immediately after harvest at prevailing or predetermined prices either because credit advances are tied to marketing obligations or due to lack of storage facilities, the marketing decision is simplified or is determined for them. Part of the income received goes for credit repayment. That is, the credit repayment, whether in kind or in money, is subtracted from \( Y_r \) in Equation 9.13. The utility maximization process with the modified budget constraint proceeds as described earlier.

Where storage facilities exist and producers have control over their marketing decisions, a hypothetical approach is described below. Since producers can control their marketings\(^1\) and since market prices fluctuate, the estimated future market prices which are also the opportunity costs of direct consumption are important for decisions to market or consume. The ability to make reasonable estimates is directly influenced by the amount and reliability of information about future supply and demand conditions in the market. The prices the \( r \)-th producer receives and pays are conditioned by the marketing and consumption decisions of others. Table 9.1 is a two-way classification table of expected, subjective utilities for the \( r \)-th producer-consumer with different combinations of market prices for \( p_1 \) and \( p_n \) that may be expected.

\(^1\)Of course, control over marketings is constrained by immediate consumption requirements. As time passes, portions of \( q_n \) and \( q_1 \) are consumed, thereby reducing the quantities available for speculative marketing.
Table 9.1. Estimated, subjective utilities of the r-th producer-consumer as his real income varies with different assumptions regarding hypothetical probabilities associated with decisions of the other t-1 individuals in marketing q_1 and q_n

<table>
<thead>
<tr>
<th></th>
<th>(0.2)</th>
<th>(0.5)</th>
<th>(0.3)</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>M_n</td>
<td>P_n</td>
<td>P_n</td>
<td>P_n</td>
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<tr>
<td>(.3)</td>
<td></td>
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</tr>
<tr>
<td>M_1</td>
<td>1</td>
<td>U^{11}</td>
<td>U^{12}</td>
</tr>
<tr>
<td>(.6)</td>
<td>2</td>
<td>U^{21}</td>
<td>U^{22}</td>
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<tr>
<td>(.1)</td>
<td>3</td>
<td>U^{31}</td>
<td>U^{32}</td>
</tr>
</tbody>
</table>

Expected to exist during the marketing and consumption period. Similarly, in conjunction with Figure 9.3, Table 9.1 represents a game theory approach to marketing and consumption decisions of the r-th individual.

The M_i^n (i = 1, 2, 3) represent the decisions of the other t-1 producer-consumers in marketing q_n. For example, M_2^n corresponds to S_2 in Figure 9.2 with the corresponding p_2^n. That is, each M_i^n reflects different supply-demand conditions in the market resulting in different market prices, p_i^n. Similarly, the M_1^n represent market conditions for q_1 with corresponding prices, p_1^n. According to Figure 9.3, the r-th individual has produced q_1^* and q_n^* = AA. As p_n^n and p_1^n vary, so does his money income. Variations in p_{n+1}^*, ceteris paribus, affect the real
income of the individual in question. Thus, $p_n^1$ and $p_{n+1}^1$, together with an estimate of $p_{n+1}^n$, generate a level of real income; i.e., a budget constraint, which can be superimposed in Figure 9.3. Previously, a money income line; i.e., an iso-revenue line denoted as $p_1/p_n^1$, was superimposed to determine the optimal production configuration. Alternative real incomes exist for the various estimated combinations of $p_1$, $p_n^1$, and $p_{n+1}^n$.

In Figure 9.3, a family of three-dimensional indifference curves reflecting consumer preferences among $q_1$, $q_n^1$, and $q_{n+1}^1$ can be drawn. These are similar to the two-dimensional utility curves drawn in Figure 9.1. In Figure 9.3, as was true in Figure 9.1, points of tangency exist between the budget constraints and the utility curves. Different budget constraints; i.e., levels of real income, result in different tangencies with the utility curves, and in turn, varying levels of utility. These levels of subjective utility are denoted as $U^{11}$, ..., $U^{33}$ in Table 9.1. Corresponding to each $U$ is a different marketing and consumption pattern. If the individual is able to place subjective probability estimates on the likelihood of the alternative $M_n^1$ and $M_1^1$ occurring, the decision-making process is simplified. In Table 9.1, hypothetical estimates of the subjective probabilities of the alternative marketing conditions have been assigned. For example, the $r$-th individual estimates that there is a 50 percent likelihood that $p_n^2$ will be the market price he receives for the $q_n^1$ he markets. With these hypothetical estimates, the $r$-th individual expects $p_1^2$ and $p_n^2$ to be the market prices most likely to prevail. With these estimated prices, he can estimate his real income, as in Equation 9.39. Let this real income level be denoted as $R^*$.
in Figure 9.3. If \( R^* \) is tangent to a three-dimensional utility curve at point \( B \), the following decisions are made: (1) Consume \( \Omega_{q_n}^c \) and market \( q_n^c q_n^* \) of \( q_n \), respectively; (2) Consume \( BB \) of \( q_1 \) and market \( (AA - BB) \); and (3) Consume \( \Omega_{q_{n+1}}^c \) with the revenue from marketing \( q_1 \) and \( q_n \).

With varying prices, the actual impact on the individual producer-consumer is no longer discernible. What can be said is that as long as all \( p_i \) are variable, a new configuration of market or exchange values will be evolved which will generate individual equilibriums for all participants.\(^1\) Relative to their initial position, some individuals will be better off; others may be worse off. Some qualitative implications are discussed below.

**Larger quantity of goods available for consumption**

Since the \( q_i^o \) (\( i = 1, \ldots, n-1 \)) have been assumed invariant, the increase in \( q_n^o \) produced and exchanged results in a larger aggregate of goods available for consumption in the exchange economy. This suggests that even though some individuals may be made worse off in the exchange process, a redistribution pattern of commodities theoretically exists whereby each individual is at least as well off as he was in the initial equilibrium. According to Figure 9.2, a larger quantity of \( q_n \) is marketed at a lower price. Ex post, if producers had acted collectively, the same amount of income; i.e., \( \frac{1}{n} q_n^1 \), could have been obtained by not

\[
Y_r = \frac{p_1 q_1^* + p_n q_n^*}{n+1}
\]  

(9.39)

---

\(^1\) Perhaps it should be pointed out that the equilibrium is on the consumption side, given the production configuration that has been realized. This, of course, does not imply that the resource market is also in equilibrium. Furthermore, intertemporal considerations of equilibrium have not been introduced.
increasing the quantity of $q_n$ to be marketed, thereby causing the supply schedule to remain stationary. The quantity $\frac{1}{2} q_n^1$ would then have been available for internal exchange and consumption. Instead, the quantity $\frac{1}{2} q_n^2$ leaves the exchange economy for consumption elsewhere.¹ Such consumption may take place in a deficit-producing area of the agricultural sector, in the nonagricultural sector, or in the export market. Thus, an increased outflow of $q_n$ for use elsewhere has resulted.

Change in the terms of trade

In addition to the internal exchange values undergoing change, the prices received and paid through external contact with the merchant-trader have been altered. As $p_n$ changes in Figure 9.2, the $[p_E]$ are likely to change as the real incomes of producers-consumers change. The income elasticities of demand for goods in $[E]$ are relatively high. Assuming that only $q_n^{n+1}$ is included in $[E]$, the expected increase in demand for $q_n^{n+1}$ is indicated in Figure 9.4. In the aggregate, a larger quantity is purchased at a higher price. In the process, the merchant is able to generate a larger revenue. The shaded area represents the initial total revenue to the merchant. With the rightward shift in demand, total revenue to the merchant has increased. This revenue is represented by the area delineated by horizontal lines. That is, there has been a net outflow of income from producers to the merchant-trader. The question now arises as to the disposition of this higher income by the merchant.

¹A portion of $\frac{1}{2} q_n^2$ may be retained by the merchant-trader for subsequent resale to producers whose stocks have been exhausted prior to the next harvest period.
So far in the analysis, the merchant-trader represents the only link with the external world. He is the channel through which transfers of income from the agricultural sector can potentially be used in the development of other sectors of the economy. Total revenues to the merchant can be further increased, ceteris paribus, by a shift in the supply schedule to the right. Such a shift could result from a decrease in the supply price of items to the merchant, and/or an improvement in his financial position which permits him to obtain his inventory at lower per unit costs or a larger inventory at the same unit cost.
Degree of exploitation by the merchant-trader

Because of his monopolistic and monopsonistic powers, the merchant-trader is able to exact prices and revenues in excess of those which would prevail under more competitive conditions. Referring to Figure 9.2, if the monopsonistic powers were abolished a larger quantity would be purchased at the price corresponding to the intersection of MR and $S_1$. Similarly, with $S_2$ a larger quantity at a price above $p_n^2$ would be purchased. If both monopolistic and monopsonistic powers were eliminated, producers would receive $p_e^1$ and $p_e^2$ with $S_1$ and $S_2$, respectively. That is, these are the prices at which aggregate supply equals aggregate demand. Under present conditions, by paying producers prices below $p_e^1$ while charging consumers through wholesale middlemen, $p_e^1$, the merchant-trader realizes a monopolistic-monopsonistic gain of $p_n^1 p_e^1 AB$. With $S_2$ an even larger exploitative gain is realized.\(^1\) Under more competitive conditions, producers would receive higher prices while consumers could obtain $q_n$ at a lower cost.

Case 5: Introduction of Government Programs

Up to this point, producers are making their production and consumption decisions in terms of past or estimated exchange and market values and then participating in an exchange economy to maximize utility through optimum consumption and marketing patterns. Because of assumed limited planning horizons, private investment, other than maintenance of capital stock, has not been considered yet. "Surpluses" have been generated

\(^1\)The merchant-trader is also in a position to realize monopolistic gain through his retailing activities. See Figures 6.4 and 9.4.
through favorable weather conditions. However, unusually favorable weather is only a temporary phenomenon. During periods of unfavorable weather, "deficits" will occur to many producers. Because of producers' limited planning horizons and their general inability to generate sizeable "surpluses", producers continue to operate at essentially-low levels of economic equilibrium. The relatively-low per capita incomes minimize the need and capacity for contact with the external world. The most prevalent exception, however, is that of hiring out labor services to employers outside of the community either on a part-time or longer-term basis.

Increasingly, governments have assumed the role of attempting to create an environment favorable to expanding agricultural productivity and output. The means have been varied: public investment in the infrastructure of the agricultural sector, planned price and credit policies, and agrarian reforms of varying ambitions. Legislation controlling land ownership and use, tenancy arrangements, terms of credit, and judicial recourse when conflicts arise is effective only if such legislation is vigorously implemented. In addition, individuals must be aware of its existence and must have the means, intellectual and financial, to initiate proceedings to ensure protection of their rights.

A limited number of hypothetical situations are discussed below with attempts to assess their qualitative impact on individuals as producers and consumers.
Public investment in the form of food assistance

Public distribution of food can have both humanitarian and output-increasing consequences. Food may be distributed as grants or as a form of essentially low-cost credit. In Chapter V the necessity and the relatively-high cost of securing credit for planting expenses and sustaining consumption until harvest were discussed. Public assistance can, at least partially, fill this need on the part of subsistence-oriented producers. To demonstrate this possibility, Figure 8.1 is redrawn here as Figure 9.5. The income-possibility curve, as before, represents the maximum amount of income obtainable with various levels of labor inputs. For the individual producer, increases in labor use and higher output levels do not affect price relationships. The labor-leisure scale denotes the maximum amount of labor services available

Figure 9.5. Optimum labor-use level for maximizing individual utility
within the producing unit. Since demands on labor for other than produc­tion purposes exist and since utility is also derived from nonwork, the maximum amount of labor will rarely be employed. Utility is maximized at point B where \( L_0 \) of labor is used to generate \( I_0 \) of income. The question now arises as to whether or not B is a feasible point. That is, in Equation 9.1 is \( K^0 \) sufficiently large to sustain \( L_0 \) of labor. If the magnitude of \( K^0 \) permits only using \( L_1 \) of labor to realize \( I_1, L_0L_1 \) of labor is involuntarily unemployed. The corresponding amount of utility is \( U_1 \) where \( U_1 < U_3 \). Assume that the producer receives an amount of \( K \) through public distribution which would permit him to sustain \( L_0 \) of labor. If the food is given in the form of a grant without any stipulation as to use, the producer may either (1) Continue to employ \( L_1 \) of labor but increase direct consumption so that utility is increased to, for example, point C; or (2) Increase the amount of labor used without substantially increasing the consumption level per labor input until \( L_0 \) is used to reach point B.

Consider alternative (1) first. Within the production-consumption period, the grant amounting in value to \( I_1I_2 \) permits the producer to reach \( U_3 \). The utility derived at point C is equivalent to that at B. A larger quantity of goods is now available for marketing and exchange. If the grant is in the form of \( q^* \), the situation in Case 2 is replicated here. For the aggregate effect, however, Case 4 is appropriate. A new set of equilibrium exchange values is evolved, total revenues to the merchant increase, and a larger quantity of goods is available for aggregate consumption. Unless the grant is sustained in subsequent periods, however, the new equilibrium is only temporary. In the next
period, only \( L_1 \) of labor can be used to generate \( I_1 \) providing \( U_1 \). Thus, grants in this form and under these conditions have not contributed to increasing agricultural productivity.\(^1\)

Alternative (2) may have longer-term consequences. Using the food equivalent of \( I_1 I_2 \) to employ more labor, income is increased to \( I_0 \). The addition to income, net of the amount of food assistance, is \( I_2 I_0 \). An even greater quantity of goods is now available for marketing and exchange. If the increased output is marketed to the local merchant with the residual traded within the exchange economy, Case 4 is essentially replicated here. That is, a larger quantity of agricultural goods leave the sector, the terms of trade to agriculturalists are lowered, and the exchange values adjust until the market is cleared. Referring to Figure 6.5, the demand curve would likely shift leftward as the supply schedule moves to the right. Depending on the position of the new schedules, the degree of exploitation by the merchant may have lessened. In the aggregate, producer-consumers now have a greater quantity of goods for consumption resulting in higher aggregate utility. Such an orientation reflects a strong preference for present consumption and an aversion to deferred gratification. If the food aid is not provided in the subsequent production period, producers will revert back to producing at point A in Figure 9.5.\(^2\) In this situation, food aid has had a one-shot impact permitting higher consumption levels during the distribution period but with little effect on future agricultural productivity.

\(^1\)An indirect, secondary effect through improved physical condition may result. Labor may become more efficient, thereby causing the production possibility curves to shift upward.

\(^2\)See preceding footnote.
On the other hand, if the experience in using food aid to generate $I_o$ has a favorable impact on producers' attitudes and objectives toward increasing their output levels, a portion of the increased output may be used to expand $K^o$ for use in the following production period. Conceivably, point B could be reached again or some point on the AB arc in Figure 9.5. This change in producer behavior implies a lengthening of his planning horizon. That is, by deferring present consumption, a planned, higher future production and consumption level can be contemplated. At this point, the potential for private, productive investment has been introduced into the firm and the exchange economy.

From the standpoint of increasing agricultural productivity and, in turn, the capacity of this sector to provide a "surplus" for use in creating and expanding other sectors of the economy, alternative (2) is clearly preferable. Therefore, national planners should be motivated to structure food distribution programs so that the possibility of realizing alternative (2) is enhanced. One such proposed program follows. Since subsistence-oriented producers are inclined or, perforce, forced to secure credit in kind from the local merchant in order to sustain their consumption patterns until the next harvest period, public distribution of food could at least partially meet this need. Since the producer is often accustomed to repayment in kind of principal plus interest to the merchant, the producer could also make such payments to a public agency. In this situation, the food aid could be viewed as a revolving "working capital" fund where interest payment represents a net transfer from the agricultural sector. The requirement that food aid must be repaid should induce producers to produce at a point on arc
AB rather than at point C in Figure 9.5. Of course, the costs of establishing the public distribution and collection mechanisms would have to be taken into account. Such a mechanism, however, could serve as the channel or lever for implementing other government policies such as collecting tax revenues and providing extension service assistance. In addition, the collection mechanism could conceivably be expanded into a marketing outlet as an alternative to the local merchant or trader. These latter individuals, however, provide a number of services to producers. If a public agency is to provide an effective alternative to the local merchant, the latter's services must be duplicated in order to gain producers' acceptance. As mentioned earlier, however, the costs in terms of capital and administrative resources are likely to be high for an effective program. Such an investment requires that a continuing source of food for public distribution exists. Indigenous buffer stocks and long-term external assistance would enhance the possibility of using food distribution programs to expand agricultural productivity.

Public investment in the infrastructure of the agricultural sector

Chapter VI was devoted to a brief discussion of the impact of the infrastructure on producers' activities. Educational systems reduce man's reliance on magic and spirits to maintain and improve his well-being and increase his understanding of the forces which interact to determine his production and income outcomes. This increased understanding should lengthen producers' planning horizons. The implications for producers' attitudes toward adoption of nontraditional inputs and for private investment in the firm are apparent. Literacy reduces the
strength of the moneylender's and merchant's grasp on the producer.

Public investment in marketing, communications, and transportation facilities increases the number of marketing outlets open to producers and retailers, improves resource mobility, and provides a more effective mechanism through which consumers signal preferences and resource owners indicate the availability of input services. Marketing costs and middlemen's margins may be reduced as transportation costs are reduced and as better transportation and communication systems increase competition among buyers of agricultural commodities and retailers of consumer goods. Higher net prices to producers and lower retail costs to consumers, ceteris paribus, increase both monetary and real incomes. The introduction of new consumer and producer goods is also facilitated.

The increased availability and variety of consumer goods affect consumers' tastes, as in Equation 9.12, and, in turn, consumers' consumption patterns and demand for income. The increased demand for income is expected to motivate producers to work harder, as in Figure 8.5, and to associate higher opportunity costs with certain social expenditures and nonproductive investments. In addition, a wider range of consumer goods should affect both the price and income elasticity of demand for those goods produced and consumed directly. This is especially true if per capita, real incomes also increase. As noted in Chapter VII, the interaction of these phenomena tends to increase the price elasticity of quantities marketed. In the process, producer-consumers become more sensitive to changing economic conditions.

Public investment in irrigation and land reclamation programs, in plant and animal disease control measures, and in research projects to
breed improved crop varieties and determine optimum mixes of complementary inputs all tend to affect the technical coefficients of production and, in turn, resource productivity.

Consider land reclamation or disease control programs which essentially do not require additional investment in complimentary inputs by producers. The increase in the technical coefficients of production and the availability of additional land for production create a capacity for expanding output, given resource availabilities and existing production techniques. The increased production can be marketed, consumed, and exchanged. As in previous case situations involving expanded outputs, only a limited amount of the increase leaves the exchange economy. Exchange values fluctuate to clear the markets, and the major proportion of output is locally consumed. The incentives for increasing production are primarily to generate the means for purchasing the limited variety of items retailed by the local merchant and for obtaining traditional consumer goods through exchange with other producers and craftsmen in the locality. Two important consequences are apparent. First, producers and the economy are essentially "inward-oriented". Incentives are largely internal to the community or exchange system. Second, the linkages with the external economy are few and weak. Such conditions favor evolution of a dualistic economy. Any "surpluses" generated in the agricultural sector have little impact on stimulating the development of other sectors. Producers are wary of individuals and influences external to their community. If this sector is to perform its historical and theoretical role as the *primum mobile* of general economic expansion, the exchange economy must be opened up
through additional linkages with the rest of the economy. Extension service personnel can act as transmitters of change as can the merchant-trader.

Reforms and public investment in social overhead capital facilities create and strengthen linkages among communities and various sectors of the economy. Consequently, producers become increasingly market-oriented in terms of production incentives, resource availabilities, and consumption patterns. Furthermore, investment and economic expansion in other sectors of the economy affect the value of $M$, as in Equation 9.10b. Increases in $\mu$ should motivate some producers to invest a portion of their capital funds outside the firm thereby increasing capital mobility in the economy. Only through the evolution of an integrated economic system can economic agents effectively signal their preferences and governments attempt to implement policies to effectively guide economic activity. It is in establishing these linkages that the public sector can play an important role in developmental processes.

**Public pricing policies**

Public pricing policies whether through marketing boards or legislated price programs affect the $p_i$ and $p_j$ as they appear in production, consumption, and investment functions. Since such policies are selective, relative prices change. The least-cost combination of inputs, as represented by Equation 9.8a, changes with variations in the relative prices of inputs. Similarly, optimum output configurations, as in Equation 9.9, are altered. Finally, price relationships affect the values of $R(t)$ and $E(t)$ in the investment decision rule. See Equation 2.67.
Public pricing policies reduce price uncertainty for some commodities; prices of other commodities are subject to fluctuations in market conditions. Consequently, positive price policies orient decision-making processes, especially for private investors.

Public pricing policies without reforming the infrastructure are less effective. Where producers are required because of credit advances to market their output with landlords and merchant-traders at prices largely determined by the latter, publicly-supported market prices have little effect on production decisions and incomes received through marketing. The advantages of price supports accrue to the marketing middlemen.

If the government subsidizes the costs of credit and improved inputs without improving marketing channels, the marketing system may not be able to absorb the increased output. The problem of "deficit" and "surplus" areas may be accentuated with adverse prices resulting in both of these areas. Prices are adverse to consumers in "deficit" areas and to producers in "surplus" areas.

The contribution of the public sector was discussed in Chapters VI and VII. Public programs and policies simply cannot have an a priori justification. The allocation of funds and administrative resources necessary for these measures must be weighed as to their alternative uses toward reaching public goals and(or) planning objectives.

Prior to discussing Case 6, assume that either government investment or public financing of individual marketing middlemen has resulted in a modification of the marketing structure. In addition, the increased contact with a market offering a larger variety of consumer
goods has altered the producer's income-leisure preferences, as in Figure 8.5. Finally, market expansion has not been only in terms of marketing outlets and the availability of consumer goods. Nontraditional production inputs now appear in the market as they become available, and the mobility of capital and labor inputs is increased. Producers now gear production and consumption decisions to prevailing and anticipated market prices and become more responsive to changes in market conditions. Private, productive investment is introduced on a broader scale as planning horizons are expanded and as producers become aware of existing investment opportunities.

Case 6: Economic Decisions in Terms of Market Conditions With Intertemporal Private Investment

From Case 1 to the present, the producer has been transformed from an essentially self-sufficient producer to one producing in terms of and for an exchange economy to one who is market-oriented in his economic activities. Referring to Equation 9.1, the terms now have a somewhat different interpretation. The $p_i$ represent prices received by producers in the market. The $\pi_j$ are now $p_j$ where the latter denote prices paid for or the opportunity costs of inputs used by producers. $K^O$ is the quantity of working capital in monetary terms. The $q_j$ are no longer restricted to labor and draft animal services and to seed requirements. They may also include such inputs as fertilizers, irrigation water, and herbicides.

The maximization process is similar to that in the previous cases. The producer, as a price-taker, estimates future $p_i$ and $p_j$. Satisfaction of the first- and second-order conditions for economic
efficiency is associated with a planned output configuration and a derived input demand pattern. At this point, assume that input markets are in equilibrium. The producer's allocation between work generating income and leisure is again determined as in Figure 8.5. The planned output levels are, of course, conditioned by exogenous forces which influence actual output levels.

For single-period utility maximization by producer-consumers, the process is similar to that used previously. In Case 6, most outputs are sold in the market, and most consumer goods are purchased there. For example, wheat is sold and flour or bread is purchased; cotton and wool are sold while textiles and clothing are purchased. The additional consumer goods, not previously available prior to market expansion, are denoted as \( q_i (i = n+5, \ldots, n+k); \) \( (k-4) \) is the additional number of consumer goods now available. Commodities such as rice and wheat can still be produced and consumed directly. However, the costs or prices attached to these goods in consumption are the market prices; i.e., their opportunity costs. With planning horizons spanning several production periods, savings and private investment are introduced as additional, potential claims on incomes and profits realized. Contingency stocks and social and religious expenditures were introduced in Case 2 as \( q_{n+3} \) and \( q_{n+4} \), respectively.

If all outputs are marketed, actual output levels multiplied by their respective market prices equals total revenue to the producer.\(^1\)

Total revenue, however, exceeds the income available for purchasing commodities such as transportation costs and sales commissions.

---

\(^1\)The prices received in the market should be net of the producers' selling costs such as transportation costs and sales commissions.
sumer and investment goods. Deductions of payments to some variable inputs and to fixed costs must be made before the level of disposable income is determined. Disposable income is denoted as $DI$ in Equation 9.40. Variable costs would include those for seed, fertilizer, hired labor and irrigation water inputs. Some of the $q_j$ represent inputs of family labor. The corresponding $p_j$ should be their opportunity costs in terms of wages which could be earned if these labor inputs were not employed on the farm. More realistically, these opportunity costs should be discounted by a factor representing any social costs associated with working for an employer in perhaps another area together with the economic costs of transportation and housing necessary to secure external employment. For family labor, the product imputed to these inputs is a positive contribution to disposable income. Conversely, payments to hired labor are negative contributions since such payments leave the firm and household unit. Thus, in the summation $\sum_{j=1}^{m} p_j q_j$ in Equation 9.40, those $q_j$ representing inputs of family labor assume zero values. Fixed costs denoted as $FC$ include specific taxes, cash rents, and allowance for depreciation. Disposable income also includes profits accruing to the firm. Equation 9.40 is the new budget constraint for the utility

$$DI_r = \sum_{i=1}^{n} p_i q_i - \sum_{j=1}^{m} p_j q_j - FC \quad (9.40)$$

$$S_r = U_r \{q_{n-1}^-, \ldots, q_{n+k+4}^+\} - \lambda \{DI - \sum_{i=n-1}^{n+k+4} p_i q_i\} \quad (9.41)$$

maximization problem for the $r$-th market-oriented producer-consumer. See Equation 9.41. Implicitly, only quantities of $q_{n-1}$ and $q_n$ are produced and consumed directly. The additional goods consumed are $q_{n+1}^+$ to $q_{n+k+4}$.
where \( k \) is unspecified. For example, \( q_{n+5} \) may be wheat flour while 
\( q_{n+4+k} \) represents a transistor radio. For single-period utility maximization, \( DI \) is allocated among alternative consumption goods so that 
the marginal utility per last dollar expended on each good is equal 
for all alternative goods. As the producer's planning horizon is ex­tended, savings and private investment are introduced as additional 
potential uses for \( DI \). The producer's objective remains that of 
maximizing utility during the planning period. Utility is derived from 
commodities directly consumed, consumer goods purchasable from income, 
wealth accumulation, and leisure.

What incentives exist for saving and investment? That is, what are 
the relative increments to aggregate utility through saving as compared
with increasing present consumption or using funds for private invest­ment? This question was partially discussed in the Chapter VIII sub­section dealing with producer's objectives. That discussion indicated 
that the criterion for choosing among alternative types of investment is 
to select that alternative which yields the highest level of net returns 
discounted over the planning period. Not only is the derived PV of 
alternative investments important, but the time-distribution of net re­tuns is an additional factor. Potential investors having precarious 
financial positions may not be able to withstand negative net returns 
during early periods of the investment payoff even though the PV 
associated with the investment is positive. The problem of comparing 
psychic or social returns with monetary returns is resolved by trans­forming these phenomena into the common denominator of utility. Psychic 
returns provide utility directly; monetary returns provide utility
through consuming consumer goods, hoarding, and saving. For convenience, the length of the planning period is assumed equal for all alternative uses of available funds.

**Saving and lending decisions**

Intuitively, low per capita incomes provide individuals with a relatively-low capacity to save. However, as noted before, expenditures on social and religious observances and on investment in jewelry suggest that individuals are not so close to the margin of physical subsistence that they cannot save. Savings in the form of "surpluses" generated can be hoarded, placed in savings accounts, or invested directly. Given that producers are now market-oriented with multi-period planning horizons, hoarding or simply holding money in excess of that amount necessary for routine transactions is not economically rational. Therefore, hoarding will be ignored. "Surpluses" placed in savings accounts and lent privately are examined in this section. "Surpluses" for direct private investment are discussed in the following section.

Funds placed in branch banks and post offices provide an essentially-guaranteed return determined by the rate of interest paid and the frequency with which interest is compounded.\(^1\) Annual or compounded interest provides income streams to the saver during this planning period. Assuming interest is only paid annually, S amount of savings deposited in time period \(t_0\) has earned interest in the amount of \(iS\) at the beginning of \(t_1\). At this point, the savings have a monetary value of \((1+i)S\). The

---

\(^1\) Funds may also be placed in informal savings associations where no interest is paid on savings regularly deposited but one individual receives the total amount deposited. This individual is selected by lottery or on a revolving basis. Cooperative credit associations usually pay interest but not necessarily (footnote continued on following page)
interest income, is, may be withdrawn or left in the account to earn interest in t. As the price level in the economy varies while i is invariant, the real value of the interest income and savings plus interest varies.

Where funds are lent privately rather than placed in a savings account, interest income is also earned. Such loans are usually made on a short-term basis which provides lenders with a relatively-high turnover of funds. The uncertainty of debtor default is low since the lender is usually personally familiar with the prospective borrower's financial position and personal attributes. If additional lending opportunities are not available as previous loans are repaid, the lender has the option of placing these funds in a savings account or making private investment. These options provide him with a reasonably high degree of flexibility in using funds for private lending.

Prior to specifying the income streams, one additional assumption is made. This assumption is that in the absence of net investment, the real value of the producer's output; i.e., \( \sum_{i=1}^{n} p_i q_i^o \) is unchanged during the planning period. Thus, \( Y_o = Y_1 = Y_2 \) even though the \( p_i \) and \( q_i \) may vary from one time period to the next. Recapitulating, the producer expects to realize \( Y_o \) during each production year of his planning period. Due to exogenous forces, however, \( Y_{\text{actual}} > Y_o \) in \( t_o \) so that a "surplus" for potential savings results. The producer-consumer now must decide how to utilize this "surplus". A three-year planning period is arbitrarily specified. The income streams for the alternatives considered (footnote continued from preceding page) on as regular a basis as the public agencies. These two types of savings institutions will not be included in the following discussion, although they could be readily included.
above are listed in Table 9.2.

Table 9.2. Alternative income streams according to disposition of "surplus"

<p>| | | | |</p>
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<tr>
<td>$t_0$</td>
<td>$t_1$</td>
<td>$t_2$</td>
<td>$t_3$</td>
</tr>
<tr>
<td>$Y_o$</td>
<td>$Y_o + \Delta Y_o$</td>
<td>$Y_o$</td>
<td>$Y_o$</td>
</tr>
<tr>
<td>$Y_o$</td>
<td>$Y_o + \frac{(1+i)S}{P_1}$</td>
<td>$Y_o + \frac{(1+i)S}{P_2}$</td>
<td>$Y_o + \frac{(1+i)S}{P_3}$</td>
</tr>
<tr>
<td>$Y_o$</td>
<td>$Y_o + \frac{(1+i)L}{P_1}$</td>
<td>$Y_o + \frac{(1+i)^2L}{P_2}$</td>
<td>$Y_o + \frac{(1+i)^3L}{P_3}$</td>
</tr>
<tr>
<td>$Y_o$</td>
<td>$Y_o + \frac{(1+i)L}{P_1}$</td>
<td>$Y_o + \frac{(1+i)^2L}{P_2}$</td>
<td>$Y_o + \frac{(1+i)^3L}{P_3}$</td>
</tr>
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</table>

Equation 9.42 reflects the alternative of increasing immediate consumption either through consuming the "surplus" directly or the equivalent value of consumer goods. Postharvest festivals and special religious offerings may absorb this "surplus". Higher present consumption, however, leaves expected future income unchanged. That is, $Y_o$ is expected to be forthcoming throughout the rest of the planning period. Associated with this income stream is an intertemporal, subjective utility configuration. The time-distribution and aggregate of expected utility is implicit in Equation 9.46 where $Y_1 = Y_o + \Delta Y_o$ and $Y_{t\neq 1} = Y_o$. The term $L_t$ denotes the amount of leisure, as in Figure 8.1.
The income streams obtainable through saving are given in Equations 9.43 and 9.44. In Equation 9.43 the individual annually earns interest income amounting to $iS$ which is withdrawn for expenditure on consumer goods. Since $S$ remains intact, the same amount of interest is earned and consumed in $t_2$ and $t_3$. Alternatively, in Equation 9.44 the interest accrued is left on account to earn additional interest income. At the end of $t_3$, $S$ amount of initial savings now has a monetary value of $(1+i)^3S$. These funds can be used for consumption, continued savings, or investment in the next planning period. Given that the value of $i$ is expected to be invariant during $t_0$ to $t_3$, the interest earned, in monetary terms, is a fixed income. The real value of this income, however, varies with changes in the general price level. Therefore, potential savers must view simple or compounded interest in terms of its real value or its purchasing power. The certainty of earning interest is high; the uncertainty of its real value is dependent upon recent and anticipated price movements. Taking into account the time-distribution of income, price uncertainty, and the potential saver's intertemporal demand for income, subjective utility configurations similar to Equation 9.46 result. For Equation 9.43, $Y_t = Y_o + \frac{iS}{p_t}$ for $t = 1, 2, 3$ where $p_t$ is the consumer price index. Utility is also derived from the security provided by $S$. The corresponding utility function is given in Equation 9.47. For the income stream represented by Equation 9.44, $Y_t = Y_o$ in Equation 9.47, but $S/p_t$ should now be written as $S_t/p_t$. 

$$U = \sum_{t=0}^{\infty} U_t = \sum_{t=0}^{\infty} U(Y_t, L_t)$$

(9.46)
\[ U^* = \frac{3}{t=0} \sum_{t=0}^{3} U_t = \frac{3}{t=0} \sum_{t=0}^{3} U(Y_t, L_t, \frac{S}{P_t}) \]  

since \( S \) plus compounded interest provide increasing amounts of security through time. That is \( U \left[ \frac{(1+i)S}{P_1} \right] < U \left[ \frac{(1+i)^2 S}{P_2} \right] \) if \( p_1 = p_2 \).

Where private moneylending is a feasible alternative, Equation 9.45 represents one of several possible income streams. With annual interest, the lender's funds have a monetary worth of \((1+i)L\) at the end of \( t_1 \) where \( L \) is the quantity of funds lent. If the entire amount is relent in \( t_2 \) at the same interest rate, at the end of \( t_2 \) the monetary value of such funds has increased to \((1+i)^2 L\). As before, the estimated monetary value should be adjusted for expected price movements. The certainty of income associated with savings deposits no longer holds. Since merchants and landlords, as competing moneylenders, provide services in addition to extending credit and since the demand for credit varies with production and income levels, the market for private lenders is somewhat uncertain. The absence of publically-enforced regulation of moneylending activities permits moneylenders to exert some influence over the rates they charge; \( i \) may be variable from year to year. Certain nonmonetary returns may accrue through lending to friends and relatives. In addition, any goodwill through lending may be reciprocated at a later date. Finally, landlords as moneylenders are able to exact returns in addition to interest income. Tenant indebtedness may enable landlords to raise the tenant's effective rent and(or) force the tenant to market his output through the landlord who is in a position to influence prices paid to and received by tenants. After weighing these economic and non-
economic factors, another subjective utility configuration is derived.

At this point, producers with "surpluses" to consume, save, or lend select that alternative from Table 9.2 which maximizes their utility over the planning period. Several combinations of consuming, saving, and lending within the planning period are feasible. Each has a corresponding utility pattern. The producer has another alternative. "Surpluses" represent the means for making both productive and nonproductive investments which contribute to wealth accumulation and income flows. These investments generate additional utility configurations for the producer-consumer.

**Investment decisions**

The factors affecting investment decisions were discussed in Chapter VIII where the present value rule was used as the investment decision-making criterion. The investor rationally selects those having a PV greater than zero. Since his objective is to maximize utility over the planning period, investment and consumption alternatives must be evaluated simultaneously. Table 9.3 is comprised of a set of equations denoting the intertemporal wealth and income positions of the producer-investor. Each equation has a corresponding intertemporal utility pattern. As with Table 9.2, only a few of several possible situations are included.

Equation 9.48 is appropriate for the producer's decision to invest the "surplus" in a nonproductive manner. That is, investment is made in an asset which enhances the wealth position of the investor but does not provide any direct monetary return. This asset, denoted as W, may be in the form of jewelry and other durables. In addition to the economic factors, another subjective utility configuration is derived. Since the surplus is likely not large, purchasing land is not a feasible alternative. Investment (footnote continued on following page)
security provided by $W$, psychic returns are derived through its ownership, display, and possible inclusion in inheritances. Where inflation and government instability cause individuals to be skeptical of the value of paper currency, an asset whose monetary value rises with inflation is an attractive investment alternative. Consequently, $W$ should reflect the estimated real value of the asset during the planning period. These estimated real values are denoted as $W_1$ to $W_3$. The consumption patterns sustainable by $Y_o$ and the investment in $W$ represent a particular utility pattern during the planning period.

The time stream of income corresponding to investment in traditional inputs is given in Equation 9.49. The net returns in each time period, i.e., $R(t) - E(t)$, are denoted as $NR_t$. The net returns in the first (footnote continued from preceding page) in improved housing would necessitate expenditures for maintenance. Alternatively, the monetary value of $W$ is reduced by the allowance for depreciation through time.
periods may be zero or negative. As the productivity of the investment materializes, the net returns assume positive values. If at the end of \( t \) the flow of returns has not been exhausted, the remainder has a capitalized monetary value which is denoted as \( Y_T \). The superscript \( T \) denotes investment in traditional inputs. In Equation 9.50, the components have the same connotation. The superscript \( NT \) denotes investment in nontraditional inputs. The components of Equations 9.49 and 9.50 are divided by respective time-period price levels to adjust expected monetary values to expected real values. \( Y_0 \) is already in real terms.

The net returns for respective investment alternatives must be estimated for each time period. Incorporated in the net returns are estimates of the time-distribution of the physical productivity of the investment; the expected prices at which the output can be sold; and the anticipated costs, in addition to the initial investment, which are incurred. In addition to the uncertainties surrounding these estimates are the uncertainties growing out of the producer's tenurial arrangement, the rate at which other producers will adopt similar investments, the rate at which improved technology appears, and the possibility of unplanned contingencies which arise before positive net returns from the investment are forthcoming. The uncertainty is greatest with investment in nontraditional inputs. Not only is there the uncertainty of physical response. But if the investment affects the quality, texture, or color of the output, additional market and price uncertainties are real phenomena. With traditional inputs, however, familiarity and experience give producers a better basis for evaluating the profitability of these investments.
The producer-consumer has now been confronted with the alternative opportunities to increase consumption, save, lend, or invest. He selects that income stream from Tables 9.2 and 9.3 which maximizes the utility accruing to him over his planning period. Corresponding to that optimal income stream is a particular behavioral pattern which translates into the best disposition of the available "surplus".

Partial Equilibrium in the Input Market

In the preceding discussion, producers have been assumed to have fixed endowments of resources and after resource allocation decisions have been made, the resource or input markets have been assumed to be in equilibrium. Agricultural inputs have various degrees of mobility and of alternative uses in the economy. Land is essentially fixed, geographically. The major proportion of cultivable land has little alternative use other than for agricultural purposes. On the other hand, labor is the most mobile of the agricultural inputs. As noted in Chapter VI, many agriculturalists also engage in trading. Even small-scale producers engage some hired labor during peak labor demand periods, especially during harvest. They themselves may also offer labor services for hire during slack periods of labor demand within the firm. Some individuals leave the farm to secure nonfarm unemployment only to return at a later date. Of course, labor supply and mobility are a function of the extent and reliability of market information, the spatial distribution of points of supply and demand, and the stage of development of the economy as it affects the demand for essentially unskilled labor from rural areas.
The discussion in Chapter V suggests a large amount of localized capital mobility among traders, moneylenders, and debtors. Where savings are generated and savings institutions are accessible, the mobility of such funds is enhanced. Furthermore, large-scale producers and absentee landlords are inclined to transfer funds from their agricultural operations to nonrural banks, investment in rural and urban real estate, and purchase of domestic and foreign government debentures. Rural capital is also mobilized and transferred through public tax policies and through turning the terms of trade against the agricultural sector. As with labor, capital mobility is affected by the existence of savings and banking institutions and by the awareness of capital demand and investment opportunities throughout the economy and in the international market.

The producers are endowed with quantities of land, labor, and capital which they can utilize directly or offer to others demanding the services of these inputs. Let these input endowments be denoted as $q^0_a$, $q^0_l$, and $q^0_c$, respectively. Since these inputs can be employed directly, the producer has an implied derived demand for the inputs he owns. His objective remains to be that of utility maximization as in Equation 9.46. For example, he derives utility from leisure and from the uses of that income which is imputed to labor when it is directly employed on the farm plus any income earned through external employment.

The problem is to determine the derived demand for land, labor, and capital denoted as $q_a$, $q_l$, and $q_c$, respectively. Once these quantities have been estimated, then excess demand functions for the three classes
of inputs can be specified.¹ For simplification, assume that the land market is, in effect, in equilibrium.² The derived demand for labor and capital in the production of a single output was theoretically represented in Figures 2.2 and 2.3.³ The derived demand for capital and labor was based on a change in the wage rate with the price of capital and the budget constraint invariant. Alternatively, if Equations 2.10 to 2.13 are solved simultaneously for the \( q_i \) and \( q_j \), a derived demand configuration for the variable \( q_j \) inputs corresponding to the optimal output configuration of the \( q_i \) is obtained.⁴ For the individual producer, the \( p_i \) and \( p_j \) used for planning are invariant with respect to his individual de-

¹The assumption of equilibrium in the input markets used earlier in this chapter implies that the excess demand functions for the \( t \) producers-consumers were equal to zero, individually and collectively. That is, an input price configuration existed which cleared the market.

²This simplification is not too restrictive. In some less-developed areas, especially Africa, a land market per area does not exist. Landlords and tribal chiefs allocate land tracts to "tenants" according to various criteria, some unrelated to market conditions. For each "tenant" his allotment is his land constraint.

³Equation 2.46 is also a static input demand function based on estimated technical coefficients and price relationships. However, there is no allowance for a capital constraint. That is, the producer is assumed to have the financial resources which permit him to employ the input up to the point where its MVP equals its respective price. In addition, Equation 2.8 must be satisfied.

⁴In Appendix D, a formalized version of the derived demand for variable inputs is developed. Instead of the prices being invariant, as in Equations 2.10 to 2.13, the output and input prices are permitted to vary simultaneously. It is these expected or anticipated variations in price relationships that are important for planning production and, in turn, input demand decisions.
cisions. His budget constraint, $K^0$, represents the total amount of financial resources at his disposal for potential use in production. $K^0$ would include any savings from past profits, working capital funds, and external financing. However, $K^0$ has alternative uses, the number of alternatives depending on the stage of economic development and the infrastructure of the economy. The funds represented by $K^0$ can be placed in savings institutions, lent locally, or invested in nonagricultural sectors. This has already been noted at two points. First, in Equation 2.18 the marginal value product of each input in the production of each output must equal $\mu$ where $\mu$ can be interpreted as the opportunity cost of using a unit of $K^0$ in the production of the $n$ outputs. If the $\text{MVP}_{i}^{j} < \mu$ where $(i = 1, \ldots, n)$ and $(j = 1, \ldots, m)$, then the producer will find it economically advantageous to shift a portion of $K^0$ from use in his production unit to elsewhere in the economy. This transfer would continue until $\text{MVP}_{i}^{j} = \mu$ holds. Similarly, if $\text{MVP}_{i}^{j} > \mu$, this signals that a flow of capital resources in the production unit should take place until equality holds. Second, the saving, lending, and investment alternatives were introduced in Equations 9.43 - 9.45 and 9.48 - 9.50. The producer selects that alternative which maximizes his utility over his particular planning period.

Since a short-run equilibrium in the input market is under consideration here, uses of $K^0$ will be confined to such inputs as labor, seeds, fertilizer, and irrigation water. The fact that a residual from fertilizer applications usually remains to affect output in the following production period is ignored. In addition to the $K$ on hand, denoted as $q_c^0$, additional $K$ may be demanded if Equation 9.51 has a positive value.
That is, the discounted value of net returns from the use of the additional units of \( K \) less the repayment of \( K \) plus interest must be positive. As before, \( \rho \) denotes the opportunity cost of using \( K \) in production plus a subjective allowance for uncertainty. If the \( r \)-th producer determines that units of \( K \) in addition to \( q^o_c \) can be profitably used, he becomes a net demander of \( K \) and \( q_{cr} - q^o_{cr} > 0 \).

Previously, the land market has been assumed to be in equilibrium so that \( q_{ar} = q^o_{ar} \) for each of the \( r = (1, \ldots, t) \) individuals. Most producers have some endowment of capital, \( q^o_c \), and several will also be net demanders. The same applies to labor, denoted as \( q^o_l \) and \( q_l \). However, capital is not demanded as capital per se but for the purchasing power it provides in obtaining the variable inputs of production. The markets for these various inputs must also be in equilibrium. Consider only fertilizer and irrigation water which are designated as \( q_f^o \) and \( q_w^o \), respectively. Endowments of \( q_f^o \) and \( q_w^o \) may be assumed zero; that is, \( q_{fr}^o = q_{wr}^o = 0 \) for the \( t \) producers. The problem now is to indicate the conditions necessary for a short-run equilibrium of the input markets.

In addition to the \( t \) producers, some of whom are net demanders and net suppliers of inputs, the suppliers of fertilizers and irrigation water inputs plus moneylenders providing external financing must be added. Consequently, there are potentially \( t+v \) participants in the input markets where \( v \) denotes the number of suppliers of \( q_f^o \), \( q_w^o \), and \( q_c^o \). Referring to Equation 9.1 since \( (j = 1, \ldots, m) \), \( m \) variable inputs are introduced with the aggregate use-level constrained by \( K^o \). To simplify
the discussion, let \( m = 3 \) where

\[
\begin{align*}
q_1 &= \text{Labor} \\
q_2 &= \text{Fertilizer} \\
q_3 &= \text{Irrigation water.}
\end{align*}
\]

Credit is introduced as \( q_4 \) and enters Equation 9.1 as \( K^0 \). The \( t \) individuals have endowments of labor, \( q_{1r}^0 \), and some have working capital, \( q_{4r}^0 \). The other \((v-t)\) individuals have endowments of fertilizer, irrigation water, and in the case of landless laborers, labor inputs which are denoted as \( q_{2r}^0, q_{3r}^0, \) and \( q_{1r}^0 \), respectively, where \((r = 1, \ldots, t, t+1, \ldots, v)\). Moneylenders have \( q_{4r}^0 \). Those who are net suppliers of inputs; i.e., \( E_{jr} = q_{jr}^0 - q_{jr}^o < 0 \), demand payments in cash or in kind. Let this demand for cash be represented as \( q_5 \). Money is lent, inputs retailed, and labor services offered for hire in exchange for \( q_5 \).

As noted earlier, input demands including credit are derived on the basis of estimated price and productivity relationships. The excess de-

\[
E_{jr} = q_{jr}^0 - q_{jr}^o \quad j = (1, \ldots, 5) \quad r = (1, \ldots, t, t+1, \ldots, v) \quad (9.52)
\]

---

1. The subsequent discussion is generalizable to a larger number of inputs. To refer to the labor market with attendant supply and demand curves implies homogenous labor inputs. To alleviate this oversimplification and consequent distortion of actual conditions, different classes of labor can be identified as separate inputs, each having its own supply-demand conditions.

2. When working capital is in kind, \( q_{4r}^0 \) represents the units of funds corresponding to the monetized value of these stocks. The monetized values are essentially the real costs of using these stocks to sustain laborers and draft animals. Of course, if they are consumed directly, transport and marketing costs are not encountered. Since such working capital can be lent to others, it can also be viewed as an endowment of credit. Consequently, if \( E_{4r} = q_{4r}^0 - q_{4r}^o > 0 \), the \( r \)-th individual is a net positive demander of credit for use as working capital which represents the means for effectively demanding \( q_1, q_2, \) and \( q_3 \).
mand functions are given in Equation 9.52. Net demands are constrained by the values of individual endowments. These constraints can be best understood by segregating the discussion according to the type of participant.

Net suppliers of \( q_2, q_3, \) and \( q_4 \)

The common characteristic of these individuals is that each supplies inputs in exchange for cash, \( q_5 \). If \( q_{2r} = q_{3r} = q_{4r} = 0 \) for \( r = t+1, \ldots, v \); i.e., if these resource owners do not demand any quantities for inventory stocks, the values of their endowments and their income constraints are represented below:

\[
\begin{align*}
y_r &= p_2 q_2^o \quad (r = t+1, \ldots, v) \\
y_r &= p_3 q_3^o \quad (r = t+1, \ldots, v) \\
y_r &= p_4 q_4^o = (1+i)q_4^o \quad (r = t+1, \ldots, v)
\end{align*}
\]

In Equations 9.53 and 9.54, \( p_2 \) and \( p_3 \) are the prices at which \( q_2^o \) and \( q_3^o \) are retailed to producers. The monetary values of \( y_r \) represent these individuals' respective demands for \( q_5 \). That is, they demand cash equal to the value of their sales. For the net suppliers of credit, for example, moneylenders, \( p_4 = (1+i) \). That is, if 100 units of money are lent at simple, annual interest of 20 percent, the amount of \( q_5 \) demanded is \((1 + .20)(100) = 120\) units of money.

Landless laborers and net suppliers of \( q_1 \)

The \( r \)-th producer may be a net supplier or demander of \( q_1 \). His endowment, \( q_{1r}^o \), is the amount of labor services potentially available within the firm. His derived demand includes the demand for productive
purposes and for leisure, as demonstrated in Figure 8.1. If the derived demand is less than his endowment, he provides labor services for hire. Landless laborers also have an endowment of labor services. They may have a demand for leisure; they do not have a derived demand for productive purposes in the sense that the r-th producer has. Rather, they supply labor inputs in exchange for \( q_5 \) which is synonymous with wage receipts. The budget constraint for producers and landless laborers, in terms of labor income, is given in Equation 9.56. The corresponding price represents the per unit wage rate for landless laborers and labor for hire provided by producers. It also represents the opportunity cost of direct use of labor services within the firm. That is, the price is the amount of firm product which must be imputed to each labor input directly employed. For the \( t \) producers, if Equation 9.56 is negative, they realize an income from labor services offered for hire. In turn, they demand \( q_2, q_3, \) or \( q_5 \) with this income. Equation 9.56 is negative for landless laborers seeking employment; they will demand only \( q_5 \) with their labor income.

\[
p_1E_{kr} = p_1(q_{kr} - q_{kr}^o) \quad (r = 1, \ldots, t, t+1, \ldots, v) \quad (9.56)
\]

Producers with positive excess demand for credit, \( q_4 \), for use in procuring \( q_1, q_2, \) and \( q_3 \)

This situation is best understood if \( q_{4r}^o = 0 \), although this stipulation is not necessary. If the r-th producer has a derived demand for 100 units of \( q_4 \), his initial monetized excess demand function for \( q_4 \) is given in Equation 9.57. But, his actual budget constraint is more complicated. He has the use of 100 units of \( q_4 \) to obtain other inputs.

\[
p_4E_{4r} = (1+i)E_{4r} = (1+i)[q_{4r} - q_{4r}^o] = (1+i)100 \quad (9.57)
\]
In addition, however, he must repay \((1+i) 100\) at the end of the production year. Rewrite Equation 9.57 as 9.58 where \(T_j\) represents, in effect, the transfer of 100 \(q_4\) from a creditor to the \(r\)-th producer. \(R_j\) represents the repayment of \((1+i)100\) which must be made to the creditor. According to Equation 9.58, the \(r\)-th producer-debtor has 100 units of \(q_4\) for use in purchasing other inputs. Assume the entire amount is expended on \(q_2\), as in Equation 9.59, where \(q_2^o = 0\) and \(q_2^r = 100/p_2\). Then if \(E_{1r} = 0\), the necessary condition represented by Equation 9.14 is satisfied as in Equation 9.60. That is, the sum of expenditures must equal the pur-

\[
p_4E_{4r} = (1+i)100 + T_j - R_j
\]

\[
p_2E_{2r} = p_2(q_{2r} - q_2^o) = 100
\]

\[
p_2E_{2r} - p_4E_{4r} = 100 - 100 = 0
\]

chasing power of the \(r\)-th producer. Of course, if \(E_{1r} < 0\), then \(p_1E_{1r}\) represents a means, in addition to \(T_j\), for purchasing additional units of \(q_2\) as well as other inputs.

Conceptually, a price configuration exists such that \(\sum_{j=1}^{5} E_{jr}\) \((p_1, \ldots, p_5) = E_r = 0\) where \((r = 1, \ldots, t, t+1, \ldots, v)\). At this point the \(r\)-th individual is in equilibrium. If \(E_r = 0\) for all \(v\) individuals, then a configuration of equilibrium prices for the various input markets results. That is, equilibrium levels for the interest and wage rates and for fertilizer and irrigation water prices are evolved. Resource allocation patterns result and, in turn, production configurations. With the production levels realized, the producer-consumer determines his optimum consumption pattern which may include savings and private investment.
The interrelationships among various factors affecting producers' production, consumption, and investment decisions have been stressed in the preceding chapters, especially Chapter IX. While a number of "vicious circles" in the Nurkse (2.6) and Singer (2.7) sense can be postulated, this conceptual approach to developmental problems is misleading. As observed in Chapter II, the concept of a "vicious circle" likely implies the existence of "propitious" or "beneficient circles". That is, if the "vicious circle" can be turned around, the "propitious circle" should result. For example, if the "vicious circle" is identified as one of low per capita real incomes → low per capita savings → low per capita private investment → low per capita real incomes, a reduction in taxes with per capita real incomes invariant would be expected to generate a higher per capita level of savings, a portion of which can be invested so as to increase resource productivity and producers' incomes. A "propitious circle" which should be cumulative upward is now operative. Of course, this reasoning ignores several, potential obstacles to the upward, cumulative growth. Beginning with higher per capita savings, private investment may not be undertaken because the potential investment has an unfavorable estimated present value.¹ The assumption that private investment is also profitable investment cannot be made on an a priori basis. In addition, producers' ob-

¹See a later section of this chapter for a discussion of some of the "friction points" influencing investment decisions.
jectives condition decisions to consume, hoard, expend socially, and invest in either productive or nonproductive ventures. For subsistence-oriented producers, the need and, in turn, the utility derived from increasing present consumption represent a strong first claim on any savings or "surpluses" that are generated.

One additional comment on the use of "circles" as a conceptual approach is necessary. A circular and causatively-reinforcing inter-relationship implies that the "circle" can be broken into at any point so as to make it cumulative upward. However, the validity of this assumption and(or) behavioral proposition has already been questioned in the preceding paragraph. The various links or components of the "circle" are not of equal strength and importance. Higher savings whether through increased incomes, lower taxes, or public subsidization of certain private costs are not sufficient for expanding private, productive investment. Similarly, public investment and price policies which raise incomes or potential incomes need not generate additional savings. The increments of income may rather be spent on consumer goods and in bidding up the prices of these commodities. True, at least a partial transfer of income out of the agricultural sector for use elsewhere in the economy takes place. However, the subsequent capacity of the agricultural sector for increasing food and fiber supplies is not improved. In a "second round" of economic activities, the income transfers implicit in increased expenditures for consumer goods may stimulate production of these goods. In turn, the increased availability and variety of such goods may act as a positive incentive motivating producers to try to raise their incomes. Production and con-
sumption decisions are not only interrelated for those goods which are produced and directly consumed, but these decisions also affect producers' motivations for increasing production and income levels.

The importance of the agricultural sector in developmental processes was outlined in Chapter I. In most less-developed countries, a majority of people derive, directly or indirectly, their incomes from this sector. In addition to considerations of personal economic and social well-being, per capita real income levels condition the level of government revenues through taxation and market demand for producer and consumer goods produced elsewhere in the economy. Government revenues are necessary for sustaining public functions. A strong market demand in the agricultural sector is likely prerequisite to diversification and general expansion of the economy. All of these considerations interact to influence social and political stability which, in turn, condition the economic climate for developmental processes.

Planning on national and regional scales is seen as the means for influencing the direction and rate of economic activity. Planners have the generalized objective of increasing market supplies of agricultural commodities for domestic consumption and for export; augmenting individual real incomes so as to raise levels of living and to expand markets for consumer and producer goods in a diversified economy; and improving resource mobility, both labor and capital, among all sectors of the economy. A number of "friction points" tending to impede developmental processes are implicit in the constructs used in Chapter IX where production, consumption, and investment decisions were integrated. Since the price elasticity of quantities marketed con-
structs in Chapter VII incorporate both production and consumption, they serve as useful points of reference for observing these "friction points". In addition, the focal point of interest for developmental processes is primarily on quantities marketed. Since Behrman's (7.5) modification of the original Krishna (7.28) formulation is the more general construct, it is used here. The Behrman construct is given in Equation 10.2

where the terms are identified as follows:

\[ M_1 = q_1 - C_1 \]  

\[ e_1 = \frac{\partial M_1}{\partial p_1} = \frac{p_1}{M_1} \approx rb_1 - (r-1) g + hk(1+b_1) - (r-1)bh_2(1-k) \]

\[ e_1 = \text{Price elasticity of } q_1 \text{ marketed, } M_1, \text{ with respect to } p_1, \text{ the price received for } q_1 \]

\[ r = 1/m \text{ where } m = M_1/q_1, \text{ the proportion of } q_1 \text{ which is marketed} \]

\[ q_1 = \text{Planned quantity of the subsistence crop to be produced as a function of } (p_1/p_2) \]

\[ q_2 = \text{Planned quantity of goods and services, other than } q_1 \text{ to be produced as a function of } (p_1/p_2) \]

\[ p_1 = \text{Absolute price of } q_1 \]

\[ p_2 = \text{Aggregate price of } q_2 \]

\[ p_3 = \text{Aggregate price of all commodities other than } q_1 \text{ which are consumed by the producer of } q_1 \]

\[ I = \text{Total net income of the producer} \]

1A detailed presentation of the Behrman and Krishna formulations is made in Appendix C. Equation 10.2 is a restatement of Equation C.20. Behrman uses upper-case letters for price and quantity notation. The use of lower-case letters here (footnote continued on the following page)
\[C_1 = \text{Direct consumption of } q_1 \text{ by the producer as a function of } \frac{(p_1/p_3)}{I}\]

\[b_1 = \text{Price elasticity of } q_1 \text{ with respect to } \frac{(p_1/p_2)}{}\]

\[b_2 = \text{Price elasticity of } q_2 \text{ with respect to } \frac{(p_1/p_2)}{}\]

\[g = \text{Price elasticity of } C_1 \text{ with respect to } \frac{(p_1/p_3)}{}\]

\[h = \text{Income elasticity of } C_1 \text{ with respect to } I\]

\[k = \frac{p_1 q_1}{I}, \text{ the proportion of total net income accounted for by the value of } q_1 \text{ produced}\]

While Equation 10.2 relates to only the price elasticity of \( q_1 \) marketed, similar formulations can be made for other \( q_1 \) produced. The production component in Equation 10.2 is discussed first; the consumption component is subsequently considered. Finally, private investment which is not reflected in Equation 10.2 is discussed.

**Production**

Recognizing that production decisions are not independent of consumption and investment decisions for the majority of agriculturalists in less-developed areas, the constrained-maximization formulation yielding the \( q_1 \) is restated here as Equation 10.3. These \( q_1 \) correspond to the \( q_1 \) and \( q_2 \) implicit in Equation 10.2. The modification for tenant producers is given in Equation 10.4 where \( r_i \) and \( c_j \) are the tenant's share of the returns and costs, respectively. The \( r_i \) are not to be confused with \( r \) in Equation 10.2.

\[
J = \sum_{i=1}^{n} p_i q_i + \mu \left[ K^\theta \sum_{j=1}^{m} p_j q_j \right] + \varphi \left[ L^\theta - \sum_{k=1}^{s} \theta_k q_k \right] + \lambda \left\{ \left[ F(q_1, \ldots, q_v) \right] \right\} \tag{10.3}
\]

(footnote continued from preceding page) does not denote any changes in the Behrman formulation.
Referring to Equation 10.2, the production components are represented by \( b_1 \) and \( b_2 \), the price elasticities of production for \( q_1 \) and \( q_2 \), respectively. The first "friction point" is the \( p_1/p_2 \) price ratio. Since \( b_1 = \frac{d q_1}{q_1} / \frac{d (p_1/p_2)}{p_1/p_2} \), as \( p_1 \) increases relative to \( p_2 \), ceteris paribus, producers find it profitable to increase production of \( q_1 \) relative to \( q_2 \). The increase in the relative price of \( q_1 \) may be the result of supply-demand conditions in the market or public-pricing policies. Increased production of \( q_1 \) is consistent with the marginal conditions for economic efficiency corresponding to Equation 10.2. See, for example, Equations 2.16 and 2.18. If the production function is of a simplified Cobb-Douglas type such as \( q_1 = a k X_1 \) where \( a k \) represents the fixed inputs and \( X_1 \) the variable input, the short-run price elasticity of production with respect to \( p_1/p_2 \) is given in Equation 10.5.\(^1\) As \( b_1 \) increases, as does \( \varepsilon_1 \).

\[
\varepsilon_1 = \frac{b_1}{1-b_1}
\]  

(10.5)

Referring to Equation 10.2, as the values of \( b_1 \) and \( b_2 \) change, so does \( \varepsilon_1 \). The impact of these changes can be qualitatively determined by taking the first derivates of \( \varepsilon_1 \) with respect to \( b_1 \) and \( b_2 \), as in

\(^1\)This expression was derived earlier as Equation 2.62. That is, if \( Y = q_1 \) and \( p_Y = p_1/p_2 \), Equation 10.5 results.
Equations 10.6 and 10.7, respectively. The expression $\frac{de_1}{db_1}$ is positive respectively, because $r > 1.0$ and $h$ and $k$ are $< 1.0$. How might $db_1 > 0$ arise? Implicit in $[F]$ in Equation 10.3 is a functional relationship between $q_1$ and at least some of the $q_j$ variable inputs. If the relationship is the same as postulated above; i.e., $q_1 = akX_1$, $b_1$ represents the technical coefficient associated with variable input $X_1$, one of the $q_j$. Variable $X_1$ may represent, for example, seed, fertilizer or managerial input. As improved seeds and fertilizer mixtures become available or as extension agents are able to raise the quality of managerial inputs, the value of $b_1$ increases. Consequently, $c_1$ and $e_1$ are both expected to increase. These technological innovations relax some of the existing "friction points". Consider Equation 10.7 where $\frac{de_1}{db_2} > 0$. In Equation 10.2, $b_2$ has a negative value. Therefore, if $db_2 < 0$ in Equation 10.7, $b_2$ in the production of $q_2$ has increased relative to $b_1$ in the production of $q_1$. The term $b_2$ can increase in value similar to that postulated for $b_1$. Thus, producers find it profitable, ceteris paribus, to produce more $q_2$ relative to $q_1$. Furthermore, the value of $k$ is reduced. Consequently, $de_1$ and $db_2$ move in the same direction, and the ratio has a positive value.

---

1 The term $b_2$ is negative in this particular formulation because $b_2$ is in terms of $p_1/p_2$ rather than $p_2/p_1$. 
The term $k$ in Equation 10.2 indicates a degree of diversification of sources of income to the firm. Such sources may include income from external employment. The qualitative impact of changes in $k$ on $e_1$ is given in Equation 10.8 where $b_2$ has a negative value. The sign

$$\frac{de_1}{dk} = -(r-1)[h(1+b_1) + (r-1)hb_2] = -h \left[ \frac{1+b_1}{(r-1)} + b_2 \right]$$  

(10.8)

of $\frac{de_1}{dk}$ depends upon the relative values of the bracketed terms.

Assume $b_1 = .2$ and $b_2 = -.2$. When $m = .1$ and $r = 10$, indicating that only a relatively-small proportion of $q_1$ is marketed, $\frac{de_1}{dk}$ has a positive value. If $dk > 0$, $de_1 > 0$. This relationship is appropriate to situations where: (1) Previous external income is no longer available; (2) Production of cash crops for the export market is no longer profitable; and (or) (3) Net income is reduced through an increase in taxes or rents. In either case, ceteris paribus, $k$ increases. The term $de_1$ also increases because more $q_1$ must now be marketed in order to obtain that income necessary for purchasing consumer goods.

As $k$ decreases through diversification of firm enterprises and any increase in net income and as $m$ increases indicating that a greater proportion of $q_1$ is marketed, $\frac{de_1}{dk} < 0$. That is, with more diversification as to sources of income so that $dk < 0$, ceteris paribus, producers are more sensitive in their decisions to market $q_1$.

Several other "friction points" affecting relative and absolute production levels of $q_1$ and $q_2$ are implicit in Equation 10.3. The levels of $K^0$ and the $p_j$ affect the number of variable inputs, $q_j$, that can be used. Variations in use-levels of the $q_j$ affect both absolute and
relative output levels. As some \( p_j \) are reduced through improved transportation and marketing systems and/or public price subsidization policies, ceteris paribus, the cost structure of the firm is lowered. For example, the cost curves in Figure 4.12 shift downward and producers are able to earn higher net returns. Such higher income may be saved, spent on consumer or producer goods, or privately invested. Factors conditioning this decision were discussed in Chapter IX, Case 6. The implications for income distribution and strength of markets for consumer goods are quite apparent.

**Working-capital constraint**

Given the \( p_j \) in Equation 10.3, the level of \( K^0 \) determines the number of \( q_j \) that can be obtained and, in turn, the feasible points on the firm's SAC actually available to the producer. See Figure 3.4. The level of \( K^0 \) is not independent of consumption decisions. That is, as direct consumption is increased and/or larger quantities of \( q_i \) marketed or exchanged for nonedible consumer goods, ceteris paribus, the amount of working-capital is reduced. This reduction can be offset by securing external financing often in the form of production inputs and consumer goods necessary to plant crops and to sustain laborers until the harvest period. The cost of credit becomes an additional fixed cost which when built into the cost structure of the firm raises average costs of production. As the SAC shifts upward, ceteris paribus, profits or net returns to inputs are reduced. As interest rates and other credit costs increase, producer-debtors find it increasingly difficult to improve their economic well-being.
This is the dilemma of vast number of producers in most less-developed countries. External financing is often necessary. For a variety of reasons ranging from convenience to necessity, most producers obtain their credit from private sources such as professional money-lenders, merchant-traders, and landlords. In addition to the relatively-high nominal rates of interest, abstracting from whether or not these are exorbitant, debtors often pay additional costs when creditors require producers to market their commodities with them at prices determinable by the latter; merchant-traders inflate the retail prices of producer and consumer goods provided as credit in kind; and landlords require tenants to provide labor services and gifts in addition to repayment of the loan plus interest.

Low-cost credit through cooperatives and public agencies lessens producers' reliance on private sources of credit. Lower-cost credit and the absence of marketing ties detrimental to the debtor tend to effect a redistribution of income away from merchants, traders, and moneylenders toward producer-debtors. The effect of this redistribution on developmental processes depends on the relative uses made of this income. That is, is economic growth promoted by income transfers from producers to creditors or by producers retaining a larger share of their revenues? Producer-debtors, however, are definitely in an improved economic position.

Credit offered through cooperatives and public agencies provides opportunities to supervise the use of credit to help ensure that it is employed in its highest use. This highest use may be in production or consumption. The ranking of uses depends upon the objectives of the
lending agency. Collateral with a secure title is usually necessary to obtain credit from cooperatives and public sources. Collateral is a scarce commodity for small-scale producers, especially tenant-operators.

Tenure Arrangement

For tenant-operators, Equation 10.4 is the appropriate maximizing formulation. The $r_i$ and $c_j$ are the tenant's share of the returns and costs of production, respectively. As the $c_j$ are increased relative to the $r_i$, ceteris paribus, the tenant realizes a smaller proportion of the net returns while the landlord is in an improved position. Income has been redistributed in favor of the landlord. The question arises as to the disposition of this income by the landlord. Several references in Chapter III indicate that landlords are often not inclined to undertake investments which would increase land productivity. Rather, buying land and other real estate is a preferred alternative. Such transactions are usually not of a productive nature. That is, they are nonproductive since the productive capacity of the economy is not increased.

For the small-scale producer whose principal asset or resource is family labor, the landlord may provide inputs in addition to land. Monetary and credit in kind are advanced prior to harvest, services of draft animals are provided, and the landlord may provide personal counsel and managerial inputs. Absentee landlords, on the other hand, are primarily interested in income from rents with little regard for land-use practices. When coupled with insecurity of tenancy, tenants are rationally motivated to extract maximum present returns from the land even though subsequent productivity is impaired. The tenant's re-
liance on the landlord for credit and managerial assistance decreases the tenant's bargaining position. The abuses of required marketings and the tenant's obligation to provide labor inputs to the landlord have already been noted.

The logical means for making tenancy arrangements more equitable is through tenancy legislation to protect the rights of both landlords and tenants. The fact that several countries already have existing legislation was brought out in Chapter III. Such legislation, however, is usually not effectively enforced. Landlords have several means to circumvent laws protecting tenants' rights. At the same time, tenants have little political power and little recourse to judicial means for ensuring their legislated rights.

**Opportunity cost component, \( \mu \)**

The marginal conditions for economic efficiency require that the MVP of each input per unit of input cost in the production of various outputs must equal \( \mu \). See Equation 2.18. One interpretation of \( \mu \) is that it represents the opportunity cost of using \( K^0 \) in production of the \( n \) outputs. As \( \mu \) is increased, some producers find investment outside the firm to be more remunerative than using \( K^0 \) as working capital. The spread of savings institutions in rural areas increases the number of investment outlets. Corporate and government stocks and bonds are feasible alternatives for larger-scale producers. The increased mobility of capital helps ensure that capital is redistributed according to its highest known and expected uses.
Consumption

The importance of the consumption component in Equation 10.2 on quantity marketed varies with the stage of economic development and with the type of commodity being considered. Referring to Equation 10.2, \( e_1 \) is affected by \( g \) and \( h \), the two components reflecting price and income elasticity of demand for direct consumption, respectively.

In the case of nonedible cash crops, \( g \) and \( h \) can be assumed to be zero and \( r = 1.0 \) so that \( e_1 = b_1 \). That is, the price elasticity of quantity marketed is equal the price elasticity of \( q_1 \) in production with respect to \( p_1/p_2 \). For edible commodities, \( g \) and \( h \) are nonzero and, therefore, affect the value of \( e_1 \). Let Equation 10.9 represent the implicit demand function for \( q_1 \) where \( DI = \) disposable income and \( T = \) consumer's tastes or preferences.

\[
C_1 = f \left( \frac{p_1}{p_3}, DI : T \right) \tag{10.9}
\]

**Price elasticity of demand for direct consumption, \( g \)**

Recognizing that changes in \( p_1/p_3 \) also affect \( DI \) since \( DI \) is a function of several factors including \( p_1 \), the price elasticity of demand is isolated for examination. The term \( g \) is actually

\[
\frac{\partial C_1}{C_1} / \frac{p_1/p_3}{\partial (p_1/p_3)}
\]

which represents the percent change in demand for \( q_1 \) in direct consumption with respect to percent change in \( p_1/p_3 \). The sign of \( g \) is negative since an increase in \( p_1 \) relative to \( p_3 \) makes \( q_1 \) more expensive in consumption relative to \( q_3 \) and \( q_3 \) is substituted for \( q_1 \).

The absolute value of \( g \) varies with commodities and with consumption patterns. Assume \( q_1 \) represents rice. For subsistence-oriented
producers whose principal food item is rice, the absolute value of g is expected to be very low. That is, the generally low level of consumption and the importance of \( q_1 \) in the total consumption pattern interact so that changes in the \( p_1/p_3 \) ratio have little effect on consumption decisions. Consumption patterns are geared more to physical requirements than to the relative costs of goods consumed.

As real, disposable incomes of producer-consumers increase and as a larger variety of consumer goods becomes available, individuals have both the means and incentive to alter consumption patterns. That is, the relative quantities of consumer goods demanded become more responsive to changes in relative prices of these goods. In this situation, consumer goods act as "incentive goods". In turn, the producer's demand for income increases. To meet the higher demand for income, labor may be substituted for leisure, as in Figure 8.5. If prices received and paid are invariant, larger quantities of goods must be marketed. Alternatively, external financing is used to finance the newly-demanded consumer goods. Use of credit in this manner does not improve the debtor's capacity to repay. In the absence of higher real, disposable incomes, debt must be refinanced, assets sold, or conspicuous consumption reduced. Refinancing and selling assets cause the debtor's economic position to deteriorate. Reducing conspicuous consumption is likely to have adverse social rather than economic repercussions. In all of these situations, a net transfer of income from the producer-consumer takes place.

Referring to Equation 10.2, the qualitative impact of an increase in the absolute value of g is given in Equation 10.10. Increases in g
make the producer-consumer more sensitive to relative prices and, in turn, the price elasticity of \( q_1 \) marketed is also increased.

\[
\frac{de_1}{dg} = -(r-1)[-1] > 0 
\]  \hspace{1cm} (10.10)

Income elasticity of demand for direct consumption, \( h \)

The income elasticity of demand for direct consumption of \( q_1 \) is defined as \( \frac{\partial C}{C_1} / \frac{I}{\partial I} = h \). As relative prices of the \( q_i \) produced vary, ceteris paribus, the producer's monetary income, \( I \), also varies. Corresponding changes occur in the relative demand for those \( q_i \) produced and consumed directly and for those consumer goods purchased in the market. Because of physical requirements and consumption tastes and preferences, the producer attaches differing importance to these commodities. Consequently, the value of \( h \) varies for individual commodities. For example, at low levels of living, certain cereals representing the major component of consumption patterns have a high \( h \). That is, even as incomes rise, a major proportion of income increments is spent on consuming additional food grains.

Rising per capita, real incomes and an increased variety of consumer goods motivate individuals to restructure their consumption preferences and, in turn, the value of \( h \) attached to respective consumer goods. But this substitution among goods occurs largely after levels of living have risen above some minimum, physical level. Previously, consumption patterns were traditional and essentially fixed. Consequently, processed foods, clothing, improved housing, and education increase in relative importance. The income elasticity of demand for
cereals declines, relatively and absolutely.

The quantitative impact of a change in income elasticity of demand for \( q_1 \) and price responsiveness of marketing \( q_1 \), as in Equation 10.2, is evaluated in Equation 10.11. Since \( k < 1.0 \) and \( b_2 \) has a negative

\[
\frac{de_1}{dh} = -(r-1) \left[ k(1+b_1) - (r-1)(1-k)b_2 \right]
\]

value in Equation 10.2, \( de_1/dh \) is always negative. Thus, as \( h \) declines with higher per capita incomes and changes in consumers tastes, the price elasticity of quantities of \( q_1 \) marketed increases.

The important income level is the level of real, disposable income. Disposable income is a function of gross returns, production costs, rents, debt repayment, and taxes. The effects of various terms of credit were discussed previously as was the general ineffectiveness of tenure legislation in regulating rents. The incidence and level of taxation is another "friction point". Imposing new taxes and(or) raising levels of existing taxes, ceteris paribus, reduces disposable incomes. However, a portion of taxes may be subsequently returned in the form of public investment in the economy's infrastructure and underwriting costs of positive pricing policies.

Turnover and import-export taxes represent income transfers through turning the terms of trade against producer-consumers. In addition, the relative incidence of taxes affects the relative profitability of producing various commodities and the relative costs of consumer goods. Consequently, resource allocation, production, and consumption patterns are altered for many individuals.
Private Investment

Investment in outlets other than working capital imply a lengthening of the planning period beyond the production cycle. That is, whether funds are invested in an irrigation pump, improved housing, savings account, or an item of jewelry, investors usually realize a flow of returns extending beyond the next production period. This, of course, does not preclude liquidating the investment at any time. Lengthening of the planning horizon is prerequisite to sustained economic development. This attitudinal change also introduces new uncertainties not encountered when traditional production and consumption patterns are maintained. When investment in nontraditional inputs is contemplated, additional managerial inputs may be necessary. This should be reflected in estimates of the MPP of various inputs, estimates which usually are not synonymous with results achieved on experimental plots and demonstration farms. Additional price uncertainty is involved when new outputs are added to the firm. Several "friction points" appear in the investment decision function, as in Equation 10.12, stated earlier as Equation 2.67.

\[
PV = -(I) + \sum_{t=0}^{n} [R(t) - E(t)] (1+\rho)^{-t} + I_n (1-\rho)^{-n} \tag{10.12}
\]

**Initial investment cost**

The initial cost is represented as I; the magnitude varies with type of investment. The construction of an irrigation system is more costly than purchasing a new plow. Consequently, the potential investor's financial position which includes both accumulated reserves and access to external financing affects the number of feasible investment opportuni-
Most small-scale producers, whether tenants or owner-operators, simply do not have the financial capacity to invest in an irrigation system.

When external financing is used for part of the investment cost, credit costs also enter into Equation 10.12. These costs may be reflected in the \( E(t) \). Alternatively, the credit component of \( I \) may be represented by \( C \) where the total credit cost to the investor is \( C(1+i)^n \). Thus, the incentive and capacity for private investment are conditioned by the availability of credit and its cost.

**Estimated net returns**

Not only are the estimated net returns important; i.e.,

\[
\sum_{t=0}^{n} [R(t) - E(t)],
\]

but also the distribution of these returns over the investment planning period. If net returns are negative during an early part of the period, producers having limited financial resources may not be able to undertake the investment. This is particularly true when external financing is used for part of the initial investment. Interest payments may have to be made before the investment becomes profitable. Similarly, those potential investors experiencing low levels of living may not be motivated to assume the uncertainty of an unsure distribution of net returns through time. The values of \( R(t) \) and \( E(t) \) depend on prices received and paid and on the physical productivity of the inputs. These "friction points" have been discussed previously.

**Discount factor, \( \rho \)**

As \( \rho \) is increased, ceteris paribus, the PV of the investment under consideration decreases. Several factors are or can be implicit in \( \rho \).
The opportunity cost associated with investment funds is included. This component is similar to \( \mu \) in Equation 10.3. As economic expansion provides alternative uses of investment funds outside the firm, as savings institutions become more widely dispersed, and as government bonds and corporation stocks assume greater familiarity and reliability, the opportunity cost in \( P \) also changes. Each of these alternative, competing investments has its own uncertainty which should be reflected in the opportunity cost.

Price and technical uncertainties associated with the potential investment are also included in \( P \). As these uncertainties increase, so does \( P \) and PV is lowered. Public pricing policies through, for example, marketing boards can reduce near-term price uncertainty.

Technical uncertainty is associated with investment in nontraditional inputs. This uncertainty is particularly crucial for producers who are "survival-oriented" and for those embodying fatalistic attitudes and reliance on supernatural phenomena for ensuring their well-being. Improved education and communications systems together with the work of extension personnel should partially alleviate this technical uncertainty.

Length of planning horizon, \( n \)

The length of the planning horizon is the period over which the investment provides a flow of returns or a more constricted period over which the investment must show a favorable PV. Tenurial insecurity, the need for net positive returns within a short time period, and the uncertainty of agrarian reform and land redistribution may be reflected in either or both \( n \) and \( P \). Effective legislation guaranteeing tenants'
rights and providing owners with secure titles to land reduces one element of uncertainty. Access to low cost, long-term financing lessens the need for net positive returns soon after the investment is made. Relatively-low cost credit for essential consumption purposes would complement the above.

The length of planning horizon is conditioned not only by the individual's economic position; but his attitude toward planning to influence his economic well-being and his orientation toward increasing income demand are important.

As already noted in the preceding discussion on consumption, income demand is function of the availability of consumer goods and individuals' aspirations and expectations for raising their levels of living. Without an increased demand for income and(or) wealth, there is little motivation for private investment.

Summary

The inappropriateness of manipulating or concentrating on one factor or "friction point" in developmental processes has been stressed at several points throughout the study. These interrelationships among factors emphasize the importance of simultaneous action at several points. Relaxing one obstacle is not sufficient for mitigating or removing other impediments to agricultural and general economic expansion. Yet, the call for a simultaneous attack on developmental problems is incompatible with many of the realities which confront national planners in less-developed areas. Resources are scarce everywhere but capital and administrative inputs are particularly scarce in these areas. Thus, re-
sources which may be committed to building roads, radio stations and monuments have alternative uses in education facilities, health systems, and irrigation networks. The best use of these resources is conditioned by planning objectives and the length of the planning horizon. Furthermore, planning alternatives are constrained by the existing distribution of economic and political power. Most countries have evolved to their present state over a period of several centuries. Those individuals currently vested with economic and political power are often reluctant to admit change. Finally, planning requires facts and planning principles.

While most "friction points" are interrelated, their importance and strength in inducing or permitting favorable change among other growth points vary. Land tenure systems appear to be the "friction point" with the strongest, most important secondary effects. Several reasons are applicable:

(1) As tenure arrangements vary among squatters, communal holdings, tenant-operators, and owner-operators, differential arrangements for sharing costs and returns result. The level of net returns affects the individual's economic well-being and his motivation and opportunity for increasing future returns;

(2) The tenure situation affects access to alternative sources of external financing. Those public and cooperative agencies providing credit at relatively-low costs usually require collateral to secure the loans. Land is usually the preferred form of collateral. Since squatters, tenant-operators, and those participating in communal organizations do not have title or an unambiguous title to land, they must secure credit from private sources. The real terms of this credit are more onerous
often with adverse consequences for the debtor's future economic and social well-being;

(3) The certainty or uncertainty associated with alternative tenure systems affects production practices, length of planning horizons, and incentives for private investment. Squatters and tenants having short-term, unwritten leases are rationally motivated to extract the maximum present production without concern for longer-term resource productivity. Their planning horizons are often coterminous with the production period with little incentive for private investment even if they have the capacity to invest. Small-scale owner-operators may have the incentive to invest but not the capacity. The inadequacy and ineffectiveness of tenure legislation to provide security and an equitable sharing of costs and returns were noted in Chapter III. Estate owners and absentee landlords are not motivated to undertake private investment in the firm when the uncertainty of agrarian reform is high, particularly if compensation for expropriated land is unlikely or only at a low level; and

(4) The prestige and security associated with ownership motivate individuals to invest in land, per se, with less emphasis given to investment in complementary inputs. Large, extensively-cultivated estates are maintained because owners are more interested in maintaining the economic and, in turn, the social and political status quo than in increasing agricultural productivity. This orientation coupled with the political power wielded by these individuals dampens any prospects for legislated agrarian reforms which if implemented and enforced would benefit the majority of agriculturalists.
Rural credit institutions are an additional important "friction point". The lack of collateral with a secure title and the relative lack of publicly-regulated institutions in rural areas force borrowers to obtain the majority of external financing from private sources. While the terms of credit may reflect the risks and costs of making a large number of small loans to individuals having tenuous financial positions, the high effective interest rates impede most producers from improving their economic position, especially through private investment.

Where favorable economic opportunities exist and producers have the incentive and the means, both intellectual and financial, to exploit these opportunities, they appear to do so. What may be viewed as low aspiration levels and values inimical to economic improvement may be manifestations of an infrastructure generating low monetary returns, weak incentives for raising demand for consumer goods, and a variety of uncertainties. Evidence of a perverse marketing relationship between market prices and quantities marketed is likely applicable to particular situations and stages of economic development. As real, per capita incomes rise, prices and marketings will move in the same direction.

To some degree, change has its own built-in momentum. Improvements in communications, transportation, and educational facilities not only increase individuals' aspirations but awareness of their relative economic well-being. Inequitable distributions of wealth and income which condition all aspects of life coupled with few, effective means for reducing these inequalities generate frustration and tendencies for social and political instability. Instability accentuates economic and political
uncertainty; neither is conducive to private investment and to longer-term planning.
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ACKNOWLEDGMENTS

The author expresses appreciation to Professor Earl O. Heady for making arrangements for the generous financing of this project. The dissertation problem was suggested by Professor Heady.

Thanks to Mrs. Ladena Bishop for her timeliness in checking the final copy for thesis office approval.

Thanks to Mrs. Helen Brown who not only did an excellent job of typing but who also made several changes in format so that the dissertation conformed to the required style.
Table 1. Percent of total population in the agricultural sector for selected countries as of 1965*

<table>
<thead>
<tr>
<th>AFRICA:</th>
<th>Percent</th>
<th>LATIN AMERICA:</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>60</td>
<td>Mexico</td>
<td>52</td>
</tr>
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<td>Ethiopia</td>
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<tr>
<td>Ghana</td>
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<td>Honduras</td>
<td>62</td>
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<td>Kenya</td>
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<td>Panama</td>
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</tr>
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<td>Brazil</td>
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<td>South Africa</td>
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<td>Peru</td>
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<td>Venezuela</td>
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<td>Tanzania</td>
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<td>Argentina</td>
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<td>Zambia</td>
<td>81</td>
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</tr>
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<td></td>
</tr>
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<td>Iraq</td>
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<td></td>
<td></td>
</tr>
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<td>Jordan</td>
<td>33</td>
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<td></td>
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<tr>
<td>Turkey</td>
<td>73</td>
<td></td>
<td></td>
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<tr>
<td>Pakistan</td>
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<td>India</td>
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<td>Indonesia</td>
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<td>Malaysia</td>
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</tr>
<tr>
<td>Philippines</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Average value and percent of imports and exports of three classes of commodities to total imports and exports for selected countries, 1964-67*

<table>
<thead>
<tr>
<th></th>
<th>(1) Total imports</th>
<th>(2) Food and live animals</th>
<th>(2) as percent of (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFRICA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ivory Coast(^a)</td>
<td>61,794</td>
<td>(8,584)</td>
<td>13.9</td>
</tr>
<tr>
<td>Morocco(^b)</td>
<td>2,396</td>
<td>(648)</td>
<td>27.0</td>
</tr>
<tr>
<td>Nigeria(^c)</td>
<td>252</td>
<td>(23)</td>
<td>9.1</td>
</tr>
<tr>
<td>Sudan(^d)</td>
<td>80</td>
<td>(17)</td>
<td>21.2</td>
</tr>
<tr>
<td>UAR(^e)</td>
<td>407</td>
<td>(108)</td>
<td>26.5</td>
</tr>
<tr>
<td><strong>ASIA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India(^f)</td>
<td>17,025</td>
<td>(4,903)</td>
<td>28.8</td>
</tr>
<tr>
<td>Pakistan(^g)</td>
<td>4,806</td>
<td>(723)</td>
<td>15.0</td>
</tr>
</tbody>
</table>

\(^a\) Million francs C.F.A. Agricultural exports include food and live animals, oil-seeds and oil nuts.

\(^b\) Million dirhams. Agricultural exports include food and live animals, alcoholic beverages, wool and other animal hair, and cotton.

\(^c\) Million Nigerian pounds. Agricultural exports include food and live animals, oil-seeds and oil nuts, natural rubber and rubber-like gum, and cotton.

\(^d\) Million Sudanese pounds. Agricultural exports include food and live animals, oil-seeds and oil nuts, and cotton.

\(^e\) Million Egyptian pounds. Agricultural exports include food and live animals, and textile fibres and waste.

\(^f\) Million rupees. Agricultural exports include food and live animals, beverages and tobacco, and textile fibres and waste.

\(^g\) Million rupees. Agricultural exports include food and live animals and textile fibres and waste.

<table>
<thead>
<tr>
<th>Manufactured goods and machinery</th>
<th>(3) as per-cent of (1)</th>
<th>(4)</th>
<th>(5) as per-cent of (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(36,696)</td>
<td>59.4</td>
<td>74,980</td>
<td>(49,271)</td>
</tr>
<tr>
<td>(1,010)</td>
<td>42.2</td>
<td>2,169</td>
<td>(1,099)</td>
</tr>
<tr>
<td>(166)</td>
<td>65.9</td>
<td>248</td>
<td>(126)</td>
</tr>
<tr>
<td>(43)</td>
<td>53.8</td>
<td>70</td>
<td>(59)</td>
</tr>
<tr>
<td>(158)</td>
<td>38.8</td>
<td>249</td>
<td>(176)</td>
</tr>
<tr>
<td>(7,445)</td>
<td>43.7</td>
<td>9,901</td>
<td>(3,611)</td>
</tr>
<tr>
<td>(2,827)</td>
<td>58.8</td>
<td>2,700</td>
<td>(1,501)</td>
</tr>
</tbody>
</table>
Table 2 (continued)

<table>
<thead>
<tr>
<th></th>
<th>(1) Total imports</th>
<th>(2) Food and live animals</th>
<th>(2) as percent of (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines</td>
<td>893 (146)</td>
<td></td>
<td>16.3</td>
</tr>
<tr>
<td>Thailand</td>
<td>19,364 (1,244)</td>
<td></td>
<td>6.4</td>
</tr>
<tr>
<td>W. Malaysia</td>
<td>2,592 (635)</td>
<td></td>
<td>24.5</td>
</tr>
<tr>
<td>LATIN AMERICA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>1,124 (65)</td>
<td></td>
<td>5.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>1,381 (266)</td>
<td></td>
<td>19.3</td>
</tr>
<tr>
<td>Colombia</td>
<td>552,700 (31,470)</td>
<td></td>
<td>5.7</td>
</tr>
<tr>
<td>Mexico</td>
<td>20,010 (768)</td>
<td></td>
<td>3.8</td>
</tr>
</tbody>
</table>

\(^h\) Million U. S. dollars. Agricultural exports include food and live animals, beverages and tobacco, copra, vegetable fibres, and animal and vegetable oils and fats.

\(^i\) Million bahts. Agricultural exports include food, beverages and tobacco, oil-seeds, crude rubber, jute and vegetable fibres.

\(^j\) Million Malaysian dollars. Agricultural exports include food and live animals, beverages and tobacco, oil-seeds, and natural rubber and rubber-like gum.

\(^k\) Million U. S. dollars. Agricultural exports include food and live animals, hides and skins, and textile fibres and waste.

\(^l\) Million U. S. dollars. Agricultural exports include food and live animals, beverages and tobacco, oil-seeds, wool and animal hair, cotton, and vegetable fibres.

\(^m\) Thousand U. S. dollars. Agricultural exports include food and live animals, beverages and tobacco, and textile fibres and waste.

\(^n\) Million pesos. Agricultural exports include food and live animals, beverages and tobacco, oil-seeds, and textile fibres.
<table>
<thead>
<tr>
<th>Manufactured goods and machinery</th>
<th>(3) as percent of (1)</th>
<th>(4)</th>
<th>(5) as percent of (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(509)</td>
<td>57.0</td>
<td>825</td>
<td>(463)</td>
</tr>
<tr>
<td>(11,537)</td>
<td>59.6</td>
<td>13,054</td>
<td>(10,408)</td>
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<tr>
<td>(1,083)</td>
<td>41.8</td>
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<tr>
<td>(618)</td>
<td>55.0</td>
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<td>(1,271)</td>
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<tr>
<td>(553)</td>
<td>40.0</td>
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<td>(1,208)</td>
</tr>
<tr>
<td>(333,406)</td>
<td>60.3</td>
<td>526,198</td>
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</tr>
<tr>
<td>(12,468)</td>
<td>62.3</td>
<td>14,047</td>
<td>(8,650)</td>
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</table>
Table 3. Annual average growth rates for selected economic indicators and for population, for selected countries and specified time periods

<table>
<thead>
<tr>
<th>Country</th>
<th>Period 1-2</th>
<th>Total Growth</th>
<th>Per Capita Growth</th>
<th>Agriculture Growth</th>
<th>Period</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFRICA:</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1960-66</td>
<td>4.8</td>
<td>3.0</td>
<td>2.3</td>
<td>I</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>II</td>
<td>1.8</td>
</tr>
<tr>
<td>Morocco</td>
<td>1952-60</td>
<td>0.5&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-2.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.7</td>
<td>I</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>1960-67</td>
<td>3.2&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.4&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2.9</td>
<td>II</td>
<td>2.8</td>
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<tr>
<td>Nigeria</td>
<td>1950-60</td>
<td>10.5</td>
<td>8.4</td>
<td>9.1</td>
<td>I</td>
<td>3.0</td>
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<tr>
<td></td>
<td>1960-66</td>
<td>4.5</td>
<td>2.2</td>
<td>2.0</td>
<td>II</td>
<td>2.7</td>
</tr>
<tr>
<td>Sudan</td>
<td>1955-60</td>
<td>4.0</td>
<td>1.0</td>
<td>2.7</td>
<td>I</td>
<td>3.1</td>
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<tr>
<td></td>
<td>1962-64</td>
<td>4.5</td>
<td>1.7</td>
<td>4.7</td>
<td>II</td>
<td>2.8</td>
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<tr>
<td>Uganda</td>
<td>1954-60</td>
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<td>4.1</td>
<td>I</td>
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</tr>
<tr>
<td></td>
<td>1960-67</td>
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<td>2.0</td>
<td>3.8</td>
<td>II</td>
<td>2.3</td>
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<td>UAR</td>
<td>1962-66</td>
<td>4.9</td>
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<td>I</td>
<td>2.4</td>
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<td>II</td>
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<tr>
<td><strong>ASIA:</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iraq</td>
<td>1953-60</td>
<td>5.6</td>
<td>2.4</td>
<td>-2.7</td>
<td>I</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>1960-66</td>
<td>6.7</td>
<td>3.3</td>
<td>6.1</td>
<td>II</td>
<td>2.5</td>
</tr>
<tr>
<td>India</td>
<td>1950-60</td>
<td>3.5&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>2.0</td>
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<tr>
<td></td>
<td>1960-67</td>
<td>1.0&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-1.5&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-0.4</td>
<td>II</td>
<td>2.4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1950-60</td>
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<td>0.4</td>
<td>1.4</td>
<td>I</td>
<td>2.2</td>
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<td>3.4</td>
<td>3.3</td>
<td>II</td>
<td>2.1</td>
</tr>
<tr>
<td>Philippines</td>
<td>1950-60</td>
<td>6.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>3.6&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>5.1&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4.6</td>
<td>II</td>
<td>3.5</td>
</tr>
</tbody>
</table>

<sup>a</sup>Gross domestic product at constant factor cost.
<sup>b</sup>Includes agriculture, forestry, hunting, and fishing.
<sup>d</sup>Gross domestic product at constant market prices.
<sup>e</sup>Net domestic product at constant factor cost.

Source: GDP and agriculture data are from United Nations (A.3). Population data are from United Nations (A.1).
### Table 3 (continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Agriculture</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Per</td>
<td></td>
<td>Total</td>
<td>Per</td>
<td>Population</td>
</tr>
<tr>
<td></td>
<td></td>
<td>capita</td>
<td></td>
<td></td>
<td>capita</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>1958-60</td>
<td>2.3</td>
<td>--</td>
<td>2.2</td>
<td>-0.2</td>
<td>I 2.1</td>
</tr>
<tr>
<td></td>
<td>1960-67</td>
<td></td>
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f Malaysia and Singapore.

g Gross domestic product at constant market prices.

h Gross national product at constant market prices.


APPENDIX B: KRISHNAN'S FORMULATION FOR PRICE ELASTICITY OF MARKETED SURPLUS

The formulation developed below is applicable to short-run situations where the output level is given, and the producer has the options of consuming directly and/or marketing this output. Prior to deriving the construct, the following terms used by Krishnan (7.29) are identified:

- \( Q \): Total output of food grains available for consumption and/or marketing, net of payments in kind and seed requirements
- \( P \): Producer's price received for food grains
- \( Y = \overline{Q}P \): Producer's income if \( \overline{Q} \) is marketed
- \( r \): Proportion of \( \overline{Q} \) directly consumed by the producer
- \( M = (1-r) \overline{Q} \): Producer's marketable "surplus" of \( \overline{Q} \)

Equations B.1 and B.2 indicate that the level of direct consumption is a function of price and income. The terms \( \alpha \) and \( \beta \) are the price and income elasticities of demand, respectively. The market price is the appropriate price term for the consumption function since it is the opportunity cost; i.e., the real cost, associated with direct consumption. The derivation of Equations B.3 - B.5 is straightforward. Upon taking the first derivative of Equation B.5 with respect to \( P \), Equation B.6 is
obtained. Multiplying Equation B.6 by $P/M$ and substituting in the previously-defined symbols, the price elasticity of marketed surplus is derived, as in Equation B.7. Since the term $\frac{r}{(1-r)}$ is always positive,

$$\frac{dM}{dP} = - (\beta - \alpha) \left\{ A(Q)^\beta P^{\beta - \alpha - 1} \right\}$$

or

$$Me = \frac{dM}{dP} \frac{P}{M} = - (\beta - \alpha) \left[ \frac{A(Q)^\beta P^{\beta - \alpha}}{(1-r)Q} \right]$$

$$= - (\beta - \alpha) \frac{r}{1-r}$$

the sign of $Me$ depends upon the relative values of $\alpha$ and $\beta$. Based on the data used by Krishnan, $\alpha \equiv .36$ and $\beta \equiv .52$. The derived $Me$ has a negative value indicating that price and quantities marketed move in opposite directions.

Equation B.7 represents Krishnan's formulation. However, if two separate food grains which are substitutes in consumption are admitted, a more meaningful formulation is readily derivable.

The producer's income is now written as $Y = P_1 \overline{Q}_1 + P_2 \overline{Q}_2$. The counterpart of Equation B.2, representing the proportion of $\overline{Q}_1$ consumed directly, is given in Equation B.8 where $\delta$ is the cross-price elasticity of demand. The positive sign of $\delta$ indicates that $Q_1$ and $Q_2$ are substitutes in consumption. Equation B.10 represents the total differential of Equation B.9.

$$r_1 \overline{Q}_1 = aP_1^{-\alpha} P_2^\delta (Y)^\beta$$

$$M_1 = (1-r_1) \overline{Q}_1 = \overline{Q}_1 - aP_1^{-\alpha} P_2^\delta (Y)^\beta$$
\[ \frac{dM_1}{dP_1} = \left\{ \alpha a P_1^{-\alpha-1} P_2^\delta (Y)^\beta - \beta a P_1^{-\alpha} P_2^\delta Q_1 (Y)^{\beta-1} \right\} \cdot \frac{P_1}{M_1} \]

To simplify the derivation of the price elasticity of \( M_1 \) with respect to \( P_1 \), let \( dP_2 = 0 \). Then, upon dividing Equation B.10 by \( dP_1 \), multiplying by \( P_1/M_1 \), and substituting \( r_1 \bar{Q}_1 \) and \( (1-r_1)\bar{Q}_1 \), Equation B.11 is obtained. The sign of the price elasticity of the marketable surplus of \( \bar{Q}_1 \) with respect to \( P_1 \) when \( dP_2 = 0 \) depends upon the relative magnitude of the two terms within the brackets. In addition to the values of \( \alpha \) and \( \beta \), the sign of \( M_{e1}^1 \) now depends upon the value of

\[ P_1 \bar{Q}_1 / \left\{ P_1 \bar{Q}_1 + P_2 \bar{Q}_2 \right\}. \]

If this value equals about .7, then \( M_{e1}^1 \) is near zero. The term \( M_{e1}^1 \) is negative only if the ratio is greater than .7. Thus the relative value of \( \bar{Q}_1 \) also influences the impact of changes in \( P_1 \) on changes in quantities of \( Q_1 \) marketed.

The qualitative impact of changes in \( P_2 \) when \( P_1 \) is invariant is described below. Dividing Equation B.10 by \( dP_2 \) when \( dP_1 = 0 \), substituting \( r_1 \bar{Q}_1 \) and \( (1-r_1)\bar{Q}_1 \), multiplying by \( P_2/M_1 \), the price elasticity of \( M_1 \) with respect to \( P_2 \) is obtained, as in Equation B.12. As long as \( \delta \) and

\[ M_{e2}^1 = \frac{r_1}{1-r_1} \left[ -\delta - \frac{\beta P_2 \bar{Q}_2}{Y} \right] \]

\( \beta \) are positive; i.e., \( Q_1 \) and \( Q_2 \) are substitutes and \( Q_1 \) is not an in-
ferior good, $dP_2$ and $dM_1$ move in opposite directions. As $P_2$ increases, more $Q_1$, the relatively-cheaper good, is retained for direct consumption.
APPENDIX C: ALTERNATIVE FORMULATIONS FOR PRICE ELASTICITY OF QUANTITIES MARKETED

Krishna's (7.28) formulation for the price elasticity of quantities marketed is not based on an assumption of a fixed output level, as was Krishnan's (7.29) in Appendix B. Rather, changes in the price level are permitted to affect resource allocation decisions and the consequent output level. Krishna's notation is duplicated here.

\[ Q = \text{Quantity of wheat produced} \]
\[ C = \text{Quantity of wheat consumed} \]
\[ M = \text{Quantity of wheat marketed} \]
\[ m = \frac{M}{Q} = \text{Sales ratio} \]
\[ r = \frac{Q}{M} = \text{Reciprocal of sales ratio} \]

\[ P = \text{Relative price of wheat} \]
\[ Y = \text{Total income of the peasants} \]
\[ e = \text{Elasticity of market supply with respect to } P \]
\[ d = \text{Total elasticity of home consumption with respect to } P \]
\[ b = \text{Elasticity of output with respect to } P \]
\[ g = \text{Elasticity of the substitution effect in consumption} \]
\[ h = \text{Elasticity of the income effect in consumption} \]

The market supply equation is given in Equation C.1 where \( Q \) and \( C \) are functions of \( P \). Shocking Equation C.1 with respect to \( P \), Equation C.2 is obtained. Multiplying Equation C.2 by \( P/M \) and using the relation:

\[ M = Q - C \]  \( \text{(C.1)} \)

\[ \frac{dM}{dP} = \frac{dQ}{dP} - \frac{dC}{dP} \]  \( \text{(C.2)} \)

ship \((1-r) = (M-Q)/M\), the price elasticity of quantity marketed is de-
derived in Equation C.3. Since \((r-1)\) is greater than 1, the sign of \(e\) de-
\[
e = \frac{dM}{dP} \frac{P}{M} = rb - (r-1)d
\] (C.3)
dpends upon the relative magnitude of \(b\) and \(d\) and their respective signs.

Since Krishna does not have estimates of \(d = \frac{dC}{dP} / \frac{P}{C}\), he decomposes
the \(\frac{dC}{C}\) term into components for which estimates are available.\(^1\) If
\(C = f(P,Y)\), the total differential is specified in Equation C.4. Then
dividing by \(C\) and multiplying the two right-hand terms by \(\frac{P}{P}\) and \(\frac{Y}{Y}\),
respectively, Equation C.5 is obtained where Krishna terms \(g\) the
elasticity of the substitution effect and \(h\) the elasticity of the in-
come effect.\(^2\) Krishna then indicates that if the individual were a
pure producer in that he produces but does not consume \(Q\) and if
\[
dC = \frac{\partial C}{\partial P} dP + \frac{\partial C}{\partial Y} dY
\] (C.4)
\[
\frac{dC}{C} = g \frac{dP}{P} + h \frac{dY}{Y}
\] (C.5)
occurs, then \(dY = QdP\). Any other sources of income unaffected by \(dP\) do
not enter into \(dY\). Dividing \(dY\) by \(Y\), Equation C.6 is obtained where \(k =
\frac{PQ}{Y}\). Similarly, if the individual is a pure consumer in that he consumes
\[
\frac{dY}{Y} = \frac{QdP}{Y} = \frac{dP}{P} \frac{PQ}{Y} = k \frac{dP}{P}
\] (C.6)
\[
\frac{dY}{Y} = \frac{dP}{P} \frac{PC}{Y}
\] (C.7)

\(^1\)Krishna does not specify the reasoning used in deriving these com-
ponents. Nowshirvani (7.38) systematically derives the components.

\(^2\) Alternatively, \(g\) and \(h\) are the price and income elasticities of de-
mand for direct consumption, respectively.
but does not produce Q, and expends his entire income so that \( E = Y \), then \( dP \) affects his expenditures for Q in his consumption. Let \( C \) represent the physical quantity of Q consumed where \( PC = PQ \) is one component of \( Y = E \). Then \( dY = dE = CDP \) and upon dividing by \( Y \), Equation C.7 is obtained. Since the individual producer is also a consumer, the relative change in his income is represented by subtracting Equation C.6 from C.7:

\[
\frac{dY}{Y} = \frac{dP}{P} \left( \frac{PO}{Y} - \frac{PC}{Y} \right)
\]

(C.8)

By using the relationships \( M = Q-C \), \( m = \frac{M}{Q} \), and \( k = \frac{PO}{Y} \), Equation C.8 is rewritten as Equation C.9. Substituting Equation C.9 into Equation C.5, Equation C.10 is derived which when multiplied by \( \frac{dP}{P} \)

\[
\frac{dY}{Y} = \frac{dP}{P} \frac{PO}{Y} \frac{M}{Q} = mk \frac{dP}{P}
\]

(C.9)

yields Equation C.11. Substituting the new expression for \( d \) into Equation C.3, Krishna has rewritten e, Equation C.12, in terms of components for which estimates are available. These estimates are listed below:

(1) \( b = b_1 = .1 \) to .2
(2) \( g = -.2 \) to -.4
(3) \( h = .5 \) to .8
(4) \( k = .1 \) to .7
(5) \( b_2 = -.1 \) to -.2

Nowshirvani (7.38) correctly observes that when \( Y = (QP + \text{any other monetary income unaffected by } dP) \), the total differential of \( Y \) should be indicated in Equation C.13. Nowshirvani further questions Krishna's use of Equation C.8 which implies that the individual's change in monetary income, in terms of PQ, is affected by the impact of \( dP \) on consumption. No such effect is implicit in the definition of monetary income in Krishna's model. Using Equation C.13, Nowshirvani rewrites Equation C.5 as follows:

\[
dY = QdP + P \frac{dQ}{dP} dP
\]  

(C.13)

of \( dP \) on consumption. No such effect is implicit in the definition of monetary income in Krishna's model. Using Equation C.13, Nowshirvani rewrites Equation C.5 as follows:

\[
\frac{dC}{C} = g \frac{dP}{P} + h \left[ \frac{Q + P \frac{dQ}{dP}}{Y} \right] dP
\]  

(C.14)

\[
\frac{dC}{C} = g \frac{dP}{P} + hK \frac{dP}{P} + hKB \frac{dP}{P}
\]  

(C.15)

Again, using \( k = \frac{QP}{Y} \), Equation C.14 can be rewritten as Equation C.15. Multiplying the components of Equation C.15 by \( \frac{P}{dP} \), the corrected formulation for \( d \) to be used in Equation C.3 is derived, as in Equation C.16. This differs from Krishna's \( d = g + mhk \).

\[
\frac{dC}{C} \frac{P}{dP} = d = g + hK + hKB
\]  

(C.16)

\(^1\)Behrman (7.5) uses the \( b_1 \) and \( b_2 \) terms in his formulation, Equation C.20. He assumes that \( b_2 \) has the same range of values as \( b_1 \) but with negative signs because \( b_2 \) is in terms of \( p_1/p_2 \) rather than \( p_2/p_1 \).
Behrman (7.5) has a slightly different corrected version of the Krishna model. However, Behrman also constructs a formulation which in addition to the subsistence crop being considered, introduces allowance for income from other sources and for prices paid for other consumer goods. Although time is introduced to represent the adjustment process, only a static version of his formulation is presented below so that comparisons with the Krishna and Nowshirvani formulation can be made. The necessary components and symbols are defined below:

\[ Q_1 = \text{Planned quantity of the subsistence crop to be produced as a function of } \frac{P_1}{P_2} \]

\[ Q_2 = \text{Planned quantity of goods and services, other than } Q_1 \text{ to be produced as a function of } \frac{P_1}{P_2} \]

\[ P_1 = \text{Absolute price of } Q_1 \]

\[ P_2 = \text{Aggregate price for } Q_2 \]

\[ P_3 = \text{Aggregate price of all commodities other than } Q_1 \text{ which are consumed by the producer of } Q_1 \]

\[ I = \text{Total net income of the producer} \]

\[ C_1 = \text{Direct consumption of } Q_1 \text{ by the producer as a function of } \frac{P_1}{P_3} \text{ and } I \]

\[ b_1 = \text{Price elasticity of } Q_1 \text{ with respect to } \frac{P_1}{P_2} \]

\[ b_2 = \text{Price elasticity of } Q_2 \text{ with respect to } \frac{P_1}{P_2} \]

\[ g = \text{Price elasticity of } C_1 \text{ with respect to } \frac{P_1}{P_3} \]

\[ h = \text{Income elasticity of } C_1 \text{ with respect to } I \]

\[ m = M_1/Q_1, \text{ the proportion of } Q_1 \text{ which is marketed} \]

\[ r = 1/m \]
\( k = P_1 Q_1 / I \), the proportion of total net income accounted for by the value of \( Q_1 \) produced; and

\( e = \) Price elasticity of \( M_1 \) with respect to \( P_1 \).

\[ M_1 = Q_1 - C_1 \quad \text{(C.17)} \]

\[
\frac{\partial M_1}{\partial P_1} = \frac{\partial Q_1}{\partial (P_1/P_2)} \frac{\partial (P_1/P_2)}{\partial P_1} - \frac{\partial C_1}{\partial (P_1/P_3)} \frac{\partial (P_1/P_3)}{\partial P_1} - \frac{\partial C_1}{\partial I} \frac{\partial I}{\partial P_1} \quad \text{(C.18)}
\]

\[
\frac{\partial M_1}{\partial P_1} \approx \frac{1}{P_2} \frac{\partial Q_1}{\partial (P_1/P_2)} - \frac{1}{P_3} \frac{\partial C_1}{\partial (P_1/P_3)} - \frac{\partial C_1}{\partial I} \left[ Q_1 + \frac{P_1}{P_2} \frac{\partial Q_1}{\partial (P_1/P_2)} + \frac{\partial Q_2}{\partial (P_1/P_2)} \right] \quad \text{(C.19)}
\]

\[
e_1 = \frac{\partial M_1}{\partial P_1} \frac{P_1}{M_1} \approx rb_1 - (r-1) [g + hk(1 + b_1)]
\]

\[- (r-1)hb_2(1-k) \quad \text{(C.20)}\]

Taking the first partial derivative of \( M_1 \), keeping in mind that \( Q_1 \) and \( C_1 \) are functions of price ratios, Equation C.18 is derived.

Equation C.19 approximates Equation C.18 since \( \partial I / \partial P_1 \) is now in terms of gross income rather than net income. The gross income of the individual is \( P_1 Q_1 + P_2 Q_2 \). Equation C.20 is derived by multiplying Equation C.19 by \( P_1 / M_1 \), rearranging the terms, and substituting in the previously-defined symbols.
APPENDIX D: DERIVED SHORT-RUN DEMAND FOR LABOR AND CAPITAL

This appendix is included so that a mathematical derivation of the producer's input demand configuration for the short-run can be specified. This was partially discussed in the Chapter II section, "Demand for inputs of production." The advantages of the mathematical formulation below are that (1) All prices plus the working-capital constraint are allowed to vary, and (2) Variations in the use-level of one input affect the marginal productivity of other inputs in the production process.

The starting point is the firm in short-run equilibrium. Only two inputs are specified, although the formulation is generalizable to several inputs. Labor is denoted by $L$ and capital by $K$ where $K$ is a proxy for those inputs obtainable with capital. The working-capital constraint in Equation D.1 is represented by $B$ rather than $K^0$; the latter can be easily confused with $K$. The production function is denoted by $f(L,K)$. Implicitly, only one output is produced. The price received for the output is $P$ while $P_L$ and $P_K$ are the prices paid for labor and capital, respectively. The constrained maximization problem is given in Equation D.1. The first-partial derivates are given in Equations D.2 to D.4.

\[
J = P f(L,K) + \lambda[B - P_L L - P_K K] \quad (D.1)
\]
\[
\frac{\partial J}{\partial L} = P f_L - \lambda P_L = 0 \quad (D.2)
\]
\[
\frac{\partial J}{\partial K} = P f_K - \lambda P_K = 0 \quad (D.3)
\]
\[
\frac{\partial J}{\partial \lambda} = B - P_L L - P_K K = 0 \quad (D.4)
\]
The total differentials of Equations D.2 to D.4 are given in Equations D.5 to D.7 which are subsequently rewritten in matrix form.

\[
P f_{LL} dL + Pf_{LK} dK + f_L dP - \lambda dP_L - d\lambda P_L = 0 \quad (D.5)
\]

\[
P f_{KK} dK + Pf_{LK} dL + f_K dP - \lambda dP_K - d\lambda P_K = 0 \quad (D.6)
\]

\[
dB - P_L dL - dP_L L - P_K dK - dP_K K = 0 \quad (D.7)
\]

Applying Cramer's rule, this system of simultaneous equations can now be solved for the three unknowns; i.e., dL, dK, and d\lambda. The solution for dL is given in Equation D.8 and rewritten in Equation D.9. The

\[
dL = \left[ (\lambda dP_L - f_L dP) D_{11} + (\lambda dP_K - f_K dP) D_{21} +

(-dB + dP_L L + dP_K K) D_{31} \right] / D \quad (D.8)
\]

\[
dL = \left[ (\lambda dP_L - f_L dP) (-P_K)^2 + (\lambda dP_K - f_K dP) (-P_K P_L) +

(-dB + dP_L L + dP_K K) (-P_{LK} P_K + P_{KK} P_L) \right] / D \quad (D.9)
\]

term D represents the determinant of the matrix of coefficients. The right-hand matrix is treated as a matrix of constants. The term D_{11} represents the cofactor of the element in the first row and first column of the matrix of coefficients after the right-hand matrix has been
substituted for column 1 in the coefficients matrix. Similarly, $D_{21}$ is the cofactor of the element in the second row and first column.

When the value for $dL$ is determined, $L^* = dL + \bar{L}$ where (1) $L^*$ is the new level of labor demand for the firm, and (2) $\bar{L}$ is the preceding short-run equilibrium use-level for labor.

The terms $dK$ and $K^*$ are derived in a similar manner.