1975

Estimated impacts of variation in wheat price policy in northern Iran

Farrokh Ghobadi
Iowa State University

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Estimated impacts of variation in wheat price policy in northern Iran

by

Farrokh Ghobadi

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

Major: Economics

Approved:

Signature was redacted for privacy.

In Charge of Major Work

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For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa

1975
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</tbody>
</table>
NOTE ON IRANIAN AND GREGORIAN CALENDARS AND CURRENCY

The Iranian solar year, with approximately 621 years lag behind Gregorian calendar starts at the beginning of spring (March 21). Thus the Iranian calendar year 1340, covers the period between March 21, 1961 to March 20, 1962 of the Gregorian calendar. The following table relates the Gregorian to the Iranian calendar years for the period 1960-1975:

<table>
<thead>
<tr>
<th>Gregorian Calendar</th>
<th>March 21-March 20</th>
<th>Iranian Calendar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1961</td>
<td></td>
<td>1339</td>
</tr>
<tr>
<td>1961-1962</td>
<td></td>
<td>1340</td>
</tr>
<tr>
<td>1962-1963</td>
<td></td>
<td>1341</td>
</tr>
<tr>
<td>1963-1964</td>
<td></td>
<td>1342</td>
</tr>
<tr>
<td>1964-1965</td>
<td></td>
<td>1343</td>
</tr>
<tr>
<td>1965-1966</td>
<td></td>
<td>1344</td>
</tr>
<tr>
<td>1966-1967</td>
<td></td>
<td>1345</td>
</tr>
<tr>
<td>1967-1968</td>
<td></td>
<td>1346</td>
</tr>
<tr>
<td>1968-1969</td>
<td></td>
<td>1347</td>
</tr>
<tr>
<td>1969-1970</td>
<td></td>
<td>1348</td>
</tr>
<tr>
<td>1970-1971</td>
<td></td>
<td>1349</td>
</tr>
<tr>
<td>1971-1972</td>
<td></td>
<td>1350</td>
</tr>
<tr>
<td>1972-1973</td>
<td></td>
<td>1351</td>
</tr>
<tr>
<td>1973-1974</td>
<td></td>
<td>1352</td>
</tr>
<tr>
<td>1974-1975</td>
<td></td>
<td>1353</td>
</tr>
</tbody>
</table>

Currency:

The currency of Iran is Rial. Throughout this study a fixed rate of exchange between Rial and U.S. dollar has been assumed: $1.00 = Rls. 68.
CHAPTER I. INTRODUCTION
Agriculture in Iran

Agriculture has an important place in the Iranian economy. It employs about 40 percent of the country's labor force and price and production levels for agricultural products have a direct bearing on the level of living of over 50 percent of Iran's population who live in rural areas. In the year 1351 (March 1972-March 1973) the farm sector accounted for 16 percent of the gross national product of Iran indicating that GNP per worker in agriculture is less than 1/3 of the national average.

About 5.3 percent of the country's area is currently under cultivation. According to official government statistics about 60 percent of this is nonirrigated while 40 percent is irrigated land. However, not all the irrigated land receives the same amount of water. The IBRD mission estimates the "fully" irrigated land as comprising only 5 percent of the total land under utilization. Thirty-four percent of the land is categorized as "partially irrigated" and 60.5 percent as

"Agriculture" includes farming, forestry and fishing and stock breeding.
dry land farming.\(^1\)

The production level of wheat, barley, lentils, chick peas and other crops from this large percentage of dry land farming area makes the total product of Iran's agricultural sector extremely vulnerable to the changes in weather conditions. Production of various crops fluctuates violently from year to year.\(^2\) This variation in production level, on the one hand, makes life quite difficult for the farmers whose standard of living is accordingly varied from year to year. On the other hand, fluctuation in total wheat production makes planning difficult, as estimating the amount of imports of farm products needed for maintaining a given level of consump-

\(^1\) The total size of the country is about 165 million hectares. Presently about 8 million hectares of it are under cultivation in any one year, with about 11 million hectares lying fallow. It is estimated that some 40 million hectares of land in Iran could become suitable for farming if adequate water were available. Even without provision of more water, however, more land could become suitable for farming than is presently utilized (41, pp. 6-7).

\(^2\) For instance, production of wheat -- by far the most important crop in Iran, increased by 11% from 1962 to 1963 and decreased by 13% in 1964. In 1968 production increased by 10% over 1967 but decreased by 11% in 1969 (43, Annex 14, Table 2.4). See also (42, Annex I, p. 1). Wheat production in 1350 (1972) was 18% less than that in 1349 (75, p. 267). Although the area under wheat in 1350 was 4% more than that in 1349 (75, p. 30).
sumption is virtually impossible.\textsuperscript{1} The yearly fluctuation in
the amount of agricultural imports in Iran is indeed large.\textsuperscript{2}

Crop production accounts for about 71 percent of total
value added in the farm sector. Livestock operations ac­
counted for about 27 percent and forestry and fishing for
1.5 percent (17, p. 25). Major crops include wheat,
barley, rice, cotton, sugar beets, potatoes and feed crops.\textsuperscript{3}
Major livestock activities include production of mutton,
beef and veal, dairy products, poultry, wool and silk.\textsuperscript{4}

A major characteristic of Iranian agriculture is the low
yields per unit of land and man hours of nearly all produced
although probably the output per unit of purchased

\textsuperscript{1}A hypothetical example illustrates this point. During
the 3 year period of 1349-51, the average annual production
of wheat in Iran amounted to 4.15 million tons, and the
average annual import of wheat to 598,000 tons. If, in an
"average" year, domestic production of wheat should fall
by 15%, maintaining the previous consumption level requires
an increase in imports of 622,000 tons. Thus a 15% decrease in
wheat production results in an increase in imports by more
than 100%.

\textsuperscript{2}For instance, import of wheat decreased from 755,535
tons in 1345 to 65,293 tons in 1346. In 1349, net import of
wheat increased by more than 8 times over 1348, and in 1350
it increased by more than 42 times over the previous year.

\textsuperscript{3}In the year 1352, the area of cultivation for these crops
were: in 1000 hectares—wheat 5565, barley 1446, rice 344,
cotton 307, sugar beets 150, potatoes 108, feed crops 460
(75, p. 301).

\textsuperscript{4}In 1350, output of these products were, in 1000 tons:
red meat (mutton, beef and veal) 303, milk 1900, poultry meat
55, wool 35, and silk 3.3 (17, p. 29).
input and fossil fuel is high. Table 1 shows the average yield per hectare of major crops in Iran.

Table 1. Average yield of major crops in year 1350, tons/hectare (72, pp. 84-86 and 5, p. 7)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Irrigated</th>
<th>Nonirrigated</th>
<th>Total</th>
<th>Percent on Irrigated Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>1.3</td>
<td>.42</td>
<td>.65</td>
<td>26</td>
</tr>
<tr>
<td>Barley</td>
<td>1.2</td>
<td>.41</td>
<td>.58</td>
<td>21</td>
</tr>
<tr>
<td>Rice</td>
<td>2.5</td>
<td>--</td>
<td>2.5</td>
<td>100</td>
</tr>
<tr>
<td>Cotton</td>
<td>n.a.</td>
<td>n.a.</td>
<td>.61</td>
<td>n.a.</td>
</tr>
<tr>
<td>Sugar beets</td>
<td>n.a.</td>
<td>n.a.</td>
<td>23.8</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

As Table 1 shows, the yields for nearly all crops are quite low by world standards.¹

¹The following data compares the yields of selected crops in Iran with other parts of the world. This table is extracted from the F.A.O. Production Yearbook of 1972, and thus the figures for crop yields in Iran are different than those given above. All figures are tons/hectare (87).

<table>
<thead>
<tr>
<th>Crops</th>
<th>Iran</th>
<th>U.S.A.</th>
<th>Europe</th>
<th>Asia</th>
<th>World Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>0.9</td>
<td>2.2</td>
<td>2.9</td>
<td>1.25</td>
<td>1.63</td>
</tr>
<tr>
<td>Barley</td>
<td>0.7</td>
<td>2.3</td>
<td>3.2</td>
<td>1.3</td>
<td>1.8</td>
</tr>
<tr>
<td>All Cereals</td>
<td>0.99</td>
<td>3.9</td>
<td>3.0</td>
<td>1.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Rice (Paddy)</td>
<td>3.2</td>
<td>5.2</td>
<td>4.0</td>
<td>2.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Cotton</td>
<td>1.7</td>
<td>1.5</td>
<td>1.9</td>
<td>0.77</td>
<td>1.1</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1.2</td>
<td>2.3</td>
<td>1.3</td>
<td>0.97</td>
<td>1.2</td>
</tr>
<tr>
<td>Sugar beet</td>
<td>2.5</td>
<td>47.5</td>
<td>37</td>
<td>28</td>
<td>30.2</td>
</tr>
<tr>
<td>Potatoes</td>
<td>7.7</td>
<td>26.2</td>
<td>18.8</td>
<td>9.2</td>
<td>12.7</td>
</tr>
</tbody>
</table>

The yields are particularly low for cereals, where the yields in Iran are lower than the average yield in all of Asia.
What is even more surprising is the low yield of the irrigated land. The only explanation for the low yield of the lands categorized as irrigated may be found in the definition of the "irrigated" land used in arriving at these figures.\(^1\) The trends in the yields of various crops over the past decade have been mixed. The average yield for wheat and barley in 1350 were lower than what they were in 1339, while that of rice increased during the same period.\(^2\)

The rate of growth of the agricultural sector in Iran has been low in the past decade, and partly as a result of this the share of the farm sector in the country's Gross National Product has been declining rapidly. Table 2 shows this trend for selective years through 1351. While more recent data is not available, the trend observed in Table 2 had undoubtedly continued with accelerated rate in the years 1352 and 1353 (1973 and 1974).\(^3\)

\(^1\)See p. 1.

\(^2\)(72, pp. 84-85). The yield of wheat in 1339 was .72, that of barley was .67 and that of rice was 2.1. Similar figures for cotton, oil seed and sugar beets were not listed.

\(^3\)It would not be unreasonable to estimate that share of agriculture in the GNP has dropped well below 10%. In 1351, Iran's GNP amounted to about $17.4 billion at current prices (14, p. 142). In 1352, the oil revenues alone amounted to over $20 billion. Thus GNP more than doubled in one year. If agricultural sector had a growth rate of 4% in 1352-53, its share still would amount to less than 8% of total GNP. This however, is not relevant to our discussion. While oil revenue did increase in the period of 1339 to 1351 by a substantial amount, the drop in farm sector's share in the country's GNP had other reasons as well.
Table 2. Share of value added for various sectors in the GNP

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Industries and Mines</th>
<th>Oil</th>
<th>Services</th>
<th>Net Foreign Earnings Excluding Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-84</td>
<td>30.3%</td>
<td>18.4%</td>
<td>12.2%</td>
<td>39.9%</td>
<td>- .8%</td>
</tr>
<tr>
<td>1982-86</td>
<td>25.2%</td>
<td>21%</td>
<td>15.4%</td>
<td>39.8%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>1987-88</td>
<td>19.9%</td>
<td>22.7%</td>
<td>18.7%</td>
<td>41.2%</td>
<td>-2.5%</td>
</tr>
<tr>
<td>1991</td>
<td>16%</td>
<td>23.4%</td>
<td>19.5%</td>
<td>43.5%</td>
<td>-2.4%</td>
</tr>
</tbody>
</table>

*aSource: All years, except 1991 from (17, p. 8), for 1991, (14, p. 141).*

*bThis includes industries and mines, constructions, water and power.

Most of the rapid decline in the share of the farm sector in Iran's GNP is, of course, explained by the more rapid increase in the other sectors, notably oil. But this explanation is incomplete. A principal source of this decline may be sought by looking at the agricultural sector itself.

In the past decade, the farm sector in Iran has had the smallest rate of growth among all major sectors. In one year the rate of growth of this sector was negative (see Table 3). Moreover, in nearly every year, the rate of growth of agriculture has been less than half of that of the gross national
This has caused food imports to rise, and agricultural prices to rise faster than the general price level\(^2\) (14, p. 55 and 66).

Table 3. The rate of increase in the value added in various economic sectors. Selective years (at constant costs)\(^a\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Oil</th>
<th>Industry and Mines</th>
<th>Services</th>
<th>GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1339</td>
<td>2%</td>
<td>11.7%</td>
<td>8.2%</td>
<td>5%</td>
<td>4.7%</td>
</tr>
<tr>
<td>1342</td>
<td>1.7%</td>
<td>6.3%</td>
<td>13.5%</td>
<td>5.2%</td>
<td>5.7%</td>
</tr>
<tr>
<td>1345</td>
<td>3.5%</td>
<td>15.4%</td>
<td>12.8%</td>
<td>8.7%</td>
<td>10.4%</td>
</tr>
<tr>
<td>1348</td>
<td>3.1%</td>
<td>14.1%</td>
<td>9.2%</td>
<td>11%</td>
<td>9.3%</td>
</tr>
<tr>
<td>1350</td>
<td>-3.7%</td>
<td>18.9%</td>
<td>18.2%</td>
<td>15.8%</td>
<td>13.1%</td>
</tr>
<tr>
<td>1351</td>
<td>8%</td>
<td>13.3%</td>
<td>14.8%</td>
<td>17.2%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

\(^a\)Source: For the years 1339 to 1350 (17, p. 6), for 1351 (14, p. 140).

\(^1\)At this point a word about agricultural data in Iran is in order. The statistics relating to the farm sector in Iran is -- to say the least -- inaccurate. There is a tendency on the part of the officials to inflate the production figures. In as much as this bias is inherent in all figures, and for all years, the relative trends may not be as inaccurate as the figures for a particular year. What is even more troublesome, however, is the inconsistency between the data about the farm products as collected by different ministries. For instance, "...average production of wheat over 1967-69 is reported as 4.7 million tons by the Ministry of Agriculture, but only 4 million tons by the Central Bank. From 1962 to 1963 wheat output increased by 11% according to Central Bank, but declined by 10% in the Ministry of Agriculture's estimates...", (43, Annex 1, p. 1). Thus the data presented in this chapter must be considered in this light.

\(^2\)Also see (41, p. 4), "... food prices have been the fastest rising cost items in the cost of living index".
For a number of reasons the farm sector in Iran has always failed to achieve the rate of growth envisaged by the economic planners. The Third Development Plan (1341-1346) had set as its goal an increase in the agricultural output of 4% per year. The actual rate of growth, however, turned out to be 2.5% (69, p. 29). Considering the fact that during the same period the country's population increased at an annual rate of 2.7% (69, p. 14) then the per capita production of farm products actually decreased during the Third Development Plan. 1

The Fourth Development Plan (1968-1972) had as its goal for the farm sector an annual rate of growth of "at least 5%" (70, p. 42). According to the figures released by Bank Markazi (Central Bank), the actual growth rate amounted to 3.9% per year (14, p. 65). 2 The Fifth Development Plan (which

1 Using the production indices prepared by the USDA, the IBRD group reaches the same conclusion for the period 1957-69, where it is concluded that "... (considering) the... good and poor crop years, food production has barely kept pace with and probably has fallen short of, population growth " (42, Annex 1, p. 2).

2 The actual performance of the farm sector in Iran has been worse than what is indicated by these figures. "The growth record of agricultural output during the past decade has been poor. A combination of adverse weather conditions during the early 1960's and extremely favorable weather in the late 1960's is largely responsible for the 4-5% annual growth reported in official statistics. Available economic indicators consistently point to low growth of farm output..." (41, p. 4). The IBRD economists have estimated the rate of growth of farm output as a whole, during the decade of 1960, to be 2.5% per annum, which is less than the annual rate of growth of the population (41, pp. 4-5).
runs from 1973 to 1978) has seen an annual rate of growth of 5.5% for the farm sector. It remains to be seen whether or not this expectation will materialize, although early indications are not promising.¹

The slow rate of growth of the farm sector has created many problems. One of these has been the country's ever increasing need for imports of farm products.

Until relatively recently, Iran was more or less self-sufficient in agricultural products (18, p. 133). Since the mid sixties, however, domestic production of most crops has fallen short of domestic consumption, thus creating a widening gap between local consumption and production of farm products. While imports of agricultural products fluctuate a great deal from year to year - to a large extent in response to weather conditions - the upward trend has been unmistakable in recent years. The net imports of farm products in Iran has been growing at a rapid rate.

In the decade of 1957-67, Iran's exports of farm products

¹Wheat production -- which is a reasonable index of overall performance of the farm sector, if merely for its importance in the total crop production -- seems to have dropped in 1975. Iran's imports of wheat in fiscal 1975 is projected at 1.3 million tons, more than twice that of fiscal 1974. Although this figure is a projection, by August of 1974, Iran had purchased more than 1 million tons of wheat from the United States (27, p. 5; 11, p. 5).
as a whole increased by an annual rate of 2 percent.\(^1\) During the same period, imports of agricultural products increased by about 7 percent (42, Annex 2, p. 9) annually. Between 1968 and 1972 -- duration of the Fourth Development Plan -- the net imports of farm products increased by more than six times, from rls. 1.3 billion in 1968 to rls. 8.5 billion in 1972 (14, p. 66). During the five year period of this plan, Iran's net imports of farm products amounted to rls. 18.4 billion (14, p. 66). These figures leave no doubt that Iran is becoming increasingly dependent upon imports for her food.\(^2\) Table 4, and Figure 1 show the foreign trade aspect of Iran's farm sector quite clearly. As indicated by Figure 4, Iran changed from a net exporter to a net importer of agricultural products in 1349. The import gap, furthermore, is

\(^1\) (42, Annex 2, p. 9). It must be noted that only a few products were responsible for this increase in exports. Over the 11 year period of 1957-67, export of cotton increased by 81%, that of hides and leather by 220% and pistachios by 121%.

\(^2\) Baldwin, writing in 1966, says that "Iran has normally enjoyed a favorable trade balance in agricultural products; except in years of crop failure, it exports more food and fiber than it imports" (6, p. 74). And again that "The country is fortunate in that it does not normally have to import its staple foodstuffs, especially wheat, the leading grain" (6, p. 64). The situation has changed a great deal since the time of these statements. A combination of increasing demand and slow growth of output has made the country a net importer of farm products. Import of wheat, for instance, has averaged more than 600,000 tons a year since 1350. Rice and barley are also imported heavily.
Table 4. Value of imports and exports of farm products, 1346-1351 (in million Rials) (Source: 5, pp. 9-11)

<table>
<thead>
<tr>
<th></th>
<th>1346</th>
<th>1347</th>
<th>1348</th>
<th>1349</th>
<th>1350</th>
<th>1351</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock products</td>
<td>1,597</td>
<td>1,509</td>
<td>1,847</td>
<td>1,706</td>
<td>2,227</td>
<td>2,927</td>
</tr>
<tr>
<td>All crops</td>
<td>6,822</td>
<td>8,187</td>
<td>9,020</td>
<td>9,657</td>
<td>10,546</td>
<td>13,651</td>
</tr>
<tr>
<td>All farm products</td>
<td>8,419</td>
<td>9,696</td>
<td>10,867</td>
<td>7,363</td>
<td>12,773</td>
<td>16,578</td>
</tr>
<tr>
<td><strong>Imports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock products</td>
<td>1,883</td>
<td>2,196</td>
<td>2,638</td>
<td>3,561</td>
<td>3,437</td>
<td>5,422</td>
</tr>
<tr>
<td>All crops</td>
<td>5,876</td>
<td>5,248</td>
<td>6,697</td>
<td>9,817</td>
<td>16,943</td>
<td>19,333</td>
</tr>
<tr>
<td>All farm products</td>
<td>7,759</td>
<td>8,444</td>
<td>9,335</td>
<td>13,378</td>
<td>20,380</td>
<td>24,755</td>
</tr>
<tr>
<td><strong>Net Exports (X-m)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock products</td>
<td>-286</td>
<td>-687</td>
<td>-791</td>
<td>-1,855</td>
<td>-1,210</td>
<td>-2,495</td>
</tr>
<tr>
<td>All crops</td>
<td>+946</td>
<td>+1,939</td>
<td>+2,323</td>
<td>-160</td>
<td>-6,397</td>
<td>-5,682</td>
</tr>
<tr>
<td>All farm products</td>
<td>+660</td>
<td>+1,252</td>
<td>+1,532</td>
<td>-2,027</td>
<td>-7,607</td>
<td>-8,177</td>
</tr>
</tbody>
</table>
Figure 1. Value of imports and exports of farm products (million Rls.)
increasing quite rapidly.

Considering the recent turn of events, with the oil exports of the country in excess of $20 billion, it might seem irrelevant to call attention to rising agricultural imports. Total net imports of agricultural products to Iran in 1972 amounted to only $125 million (14, p. 66), which could be considered negligible at 0.006% of foreign earnings. The foreign exchange earnings of Iran in the last two years could easily cover many years and a considerable increase in food imports.

This line of reasoning, plausible as it may seem on the surface, misses the agricultural development issue. Has the growth performance of the farm sector in Iran been up to its reasonable potential? The improvement and development of potential in the agricultural sector and rural areas of Iran should be enhanced not precluded by what has happened in the oil sector. In all likelihood the long run future prices of agricultural products will be higher and in the short run will continue to increase in line with world-wide inflation. In 1974, for instance, Iran paid twice as much for a ton of wheat purchased from the United States as what she paid in 1973 (27, p. 5). The cost in foreign exchange of Iran's widening gap between domestic production and domestic use of food will thus be much greater in 20 or 40 years than it is in 1973-74. It is
dangerous to use the exhaustible resource of oil to finance a permanent and growing food deficit.

In addition to the question of balance of payments, the slow improvement of the farm sector is an important inhibition for the development of the economy in general and leads to a deterioration in the relative position of rural residents in particular. The slow rise in total output and low labor productivity in agriculture directly limits the living level of more than half of Iran's population who live in the rural areas. Their standard of living is much below that of urban dwellers at the present time.\(^1\) If there is any desire on the part of the policy makers to narrow the gap between urban and rural income, then one of two

\(^1\)(18, pp. 139-140). Income distribution data are not available for Iran. Some sort of indirect estimates, however, is possible. Assuming that 50% of the population derive their livelihood from agricultural activities, the per capita GNP in the farm sector amounts to rls. 12,097 or roughly about $183. (GNP information from 14, p. 142.) The GNP per capita for the nonfarm sectors amounts to rls. 55,097 or roughly about $835. (All figures for 1351.) Thus the ratio of per capita GNP between the people living off of agriculture to those outside of it is 1 to 4.5. Obviously, this figure does not reflect the exact ratio of income between rural and urban centers. It does, however, give us a very rough estimate of the actual case. A Plan Organization study (unpublished) calculates the ratio of the consumption expenditure of urban dwellers to that of rural residents as being about 3 to 1. The same study concludes that this disparity has been widening in the past decade and unless some measures are taken to counter it, it will continue to widen in the future.
alternative policies must be pursued.¹ Either workers must be transferred from farm to nonfarm occupations, or the farm sector must expand more rapidly productivity and employment than it has done in the past.

Finally, there is the argument for balanced growth. It seems that no country can hope to have improvement for all its people if the sector in which most of its population is engaged remains of low productivity and stagnating in total output. The slow growth of the output level of the farm sector in Iran can act as a brake on the growth of other sectors, particularly transport, manufacturing and services.

There are many reasons for the slow growth of the Iranian agriculture. Though there is no consensus on the causes of the poor performance of the Iranian farm sector, nearly everyone agrees that the problem does not stem from lack of potential.² Being mainly concerned with the impact of wheat price policy upon product substitution and relative factor use, this study does not attempt to explain the causes of the sluggish growth of the Iranian farm sector. This is a subject which deserves an entirely separate study and must

¹All development plans have specified more equal distribution of income as one of their objectives. See (66, pp. 2-3). It seems however, that in implementing the objectives of the plans, this goal has been relegated to a subordinate position.

²See, for instance (41, p. 5).
incorporate an analysis of the social and political structure of the country.

Prices and Price Policy

During the decade of 1960-70, prices of most farm products in Iran was above that of world market prices. This made import of farm products quite attractive. The foreign exchange earnings of the country - almost exclusively from oil export - made large volume of imports tolerable. In some cases the government pursued a deliberate policy of subsidizing imports to keep food prices low. This had a discouraging effect upon agricultural investment.

In general, the agricultural sector was experiencing terms of trade vis-à-vis the world that were unfavorable to output expansion. It seemed reasonable to import many farm products at a lower cost than could be possible to produce them domestically. "Comparative advantage" seemed to indicate that Iran should take resources out of agriculture and employ them in the other sector, especially oil. But this is patently impossible. The oil sector - by far the most important sector in Iran's economy - presently employs less than 0.6 percent of the country's labor force. There is no way for the oil sector to create jobs for the workers presently engaged in farm activity. Furthermore, the concept of comparative advantage is static in nature, and does
not take into account potential gains that could accrue to an economy by investing in a sector which is presently - due to a number of reasons - at a comparative disadvantage with respect to the other sectors.

To put agriculture in better balance with the world, prices of agricultural imports and exports could be increased. This will encourage investment in Iran's agriculture. It also creates additional jobs for the rural unemployed and helps to reduce the country's unemployment problem. There are however several factors which must be considered before a judgment can be made on the plausibility of such a policy.

First of all, it is not clear that the agricultural trade deficit would decrease if prices were raised. The supply increase response to higher prices may be small, or near zero. The demand reduction response to higher prices may also be near zero. Alternatively, the agricultural output response may be large. Investment in output increasing capital in agriculture and the adoption of agricultural techniques - costing more but also producing more - might increase substantially. If so, then the increase in agricultural prices might stimulate the output expansion and productivity of the farm sector. These, however, are questions which cannot be answered a priori. Research is needed to estimate, among other things - the price responsiveness of the farmers in Iran.
Another important point to be considered, is that a general rise of agricultural product prices is impossible to tolerate because of the low level of living of the masses of the workers. The workers' real wages are presently at the subsistence level and cannot be further reduced.

The price increase to consumers, especially low income consumers, might be "passed forward" through wage increase demand by the workers. If the wages of low income workers rose sufficiently to offset food price increases, the reduction of food consumption would be slight but would take place mostly in high income elastic "luxury" items such as meat and confectionary goods. It must be noted, however, that increases in the worker's wages cannot be taken for granted as the bargaining power of the workers is very weak, to say the least.

This study is concerned with a particular aspect of the question of increased agricultural prices as an agricultural policy conducted by the Iranian government. To be more specific, one of the objectives of this study is to assess the plausibility of the policy of wheat price increases - absolutely and relatively - in Iran. The hope is to identify expansion potential, its shortcomings, and its side effects, such that its implications could be compared with alternative policies. The data used for this analysis have been collected by interviewing some 47 farm "units" in Northern
Iran (see Chapter II). It also involves a study of bread consumption and expenditure by urban workers of different income levels.

These interviews will be used to bring out some of the crucial problems of output expansion obstacles confronting these Iranian farmers. Obstacles such as lack of credit, high cost of credit, uncertain markets, lack of competition in markets, shortage of water for irrigation, shortage of labor, etc. will be discussed in some detail, each in separate chapters. Some of these obstacles may be partially overcome by higher product prices, while others may require fundamental changes in the farm sector. All of the farm problems discussed refer to the existing situation in Northern Iran. It is possible that in some cases the conclusions drawn may be relevant for other parts of the country as well but since no investigations were conducted outside Gorgan and Gorgan Plain no generalization can be made to the whole country. It is hoped that this study, small as it is, will throw some light on a part of the issue of "farm prices" and development in Iran. It is also hoped that this clarification of the nature of the impact of wheat price changes could lead to more accurate speculation on the consequences of alternative price policies on other crops and in other areas.
CHAPTER II. THE INTERVIEWS

The main objective of this study was to investigate the impacts of absolute and relative increases in the price of wheat in Iran, upon several economic variables. To the extent that a higher price of wheat increases the total land devoted to its production, the level of production of other crops - especially those which compete for land and other factors of production with wheat - must be reduced by wheat price increases as well. Also, to the extent that wheat has lower labor requirements per hectare than the competitive crops, a substantial increase in the price of wheat reduces the level of employment in the farm sector. This reduction in total employment in the farm sector will in turn affect income distribution in the rural areas.

To analyze quantitatively the effects of wheat price increases upon the economy, one needs information about the nature of the wheat supply curve. Information is also needed about those crops, the production of which are most likely to be significantly affected by increases in the absolute and relative price of wheat.

It is virtually impossible to estimate the supply equation for wheat by aggregate time series data and the usual statistical methods. There exists little variation in the price of wheat over time because wheat prices are controlled
by the government, and have been kept almost constant for the past decade. Furthermore, the published data on domestic wheat acreage, output, and prices received by the producers are at best inaccurate, and at worst nonexistent.\(^1\) To try to derive the supply equation for wheat as a function of prices by regression analysis is thus judged to be infeasible.

Still, if the price of wheat were raised there would be an effect. What would this effect be? To answer this question, it was decided to interview a number of farmers in one part of the country and - confronting them with a hypothetical set of wheat prices - solicit their projected estimated "supply response". This method is not perfect and may be criticized as inaccurate or unreliable. To begin with - and this is the most important problem - farmers may behave differently when confronted with a given price situation in reality than when the same situation is depicted to them by mere words. Farmers do not usually decide on a course of action at a moment's notice. An important decision such as what to produce and by how much is usually reached after days and even weeks of contemplation as well as discussions with other farmers. This process of deliberation is particularly drawn out when a drastic change in the crop

\(^1\)(75, p. 301) where "areas under different crops" are listed. In the eleven year period between 1339-1350, the data is not available for wheat in seven years.
routine is contemplated. A farmer who has for many years grown a particular combination of wheat and cotton does indeed think about many things besides an increase in the price of wheat, when he is contemplating an increase in wheat acreage. Caution is especially likely by the poor farmers for whom a bad judgment may be tantamount to financial ruin and starvation.

Secondly, projected survey responses acquired by interviews are at best rough estimates. The sample is small and there is much variation among farmers. Several efforts were made, however, to increase the accuracy of farmers' estimates. Every farmer - the village farmers in a group and the commercial farmers on an individual basis - were given ample time to discuss and analyze different aspects of the hypothetical situation before giving an answer. The village farmers - who were interviewed in numbers ranging from 5 to 20 - were encouraged to talk things over among themselves in detail before responding to each question. Of course these techniques were time consuming and since research time was limited, the total number of farmers who could be interviewed was not as large as one might have liked.

Thirdly, only the more willing and articulate farmers could be interviewed. Occasionally one would confront a farmer who did not wish to be interviewed. More often, in the village interviews, the responses of a few more articulate
farmers seemed to influence other farmers' responses. It could be said that the more articulate farmers respond more quickly to price changes, and thus the price responses gathered by these interviews may be biased. There is, however, no simple way to avoid this problem.

In the final analysis, however, the interviews proved very fruitful and much more satisfactory than at first imagined. By direct conversation with farmers many problems in supply response were discussed and clarified, which could hardly have been recognized by studying even good secondary data.

The Secondary Objectives of the Interviews

While the primary motive for the interviews was to acquire an estimate of the farmers' reactions to wheat price variations, a considerable amount of other information was also gathered by these interviews. The general purposes of the interviews may now be summarized as follows:

1. To estimate the absolute and relative production responses of the farmers to increases in the price of wheat.

2. To compare these responses and determine the effect - if any - of the type of the farm operation and its size (i.e. commercial vs. the village farms), upon the price responsiveness of the farmers.

3. To understand the present production economics of agriculture in this area. This includes gathering information on the present crop pattern, yields, and production techniques. It also includes questioning the farmers on the limiting resources, such as water, credit, labor, etc.
The Area of the Study

The area covered by this study is known as "Gorgan va Dasht". Its area is about 23,614 square kilometers, located in the northeastern part of Iran. It is bounded on the north by the U.S.S.R., on the west by the Caspian Sea, on the east by the Khorasan province, and on the south by the Alborz mountains.

Though its size is only 1/69th of the total area of the country, Gorgan and Dasht produces a much larger proportion of the country's total farm products. It produces more than 60% of the country's cotton (53, Table 1), and it is a major producer of wheat, barley, soybean, sunflower, tobacco, and rice. This region is without a doubt the most technologically progressive agricultural area in Iran. Wheat and barley production is almost totally mechanized (with the exception of some small village farms). Tractors are used for planting in nearly all farms, irrigation is often with the help of pumps and tube wells, and wheat is harvested by combine harvesters. Fertilizer is used in larger quantities per hectare than in other parts of the country.

1 Meaning Gorgan and its plain.

2 It is still more profitable to harvest cotton by hand. Cotton harvesters are very expensive whereas labor is quite cheap. At the peak of the harvest season - when wage rates are at their highest level - in 1352, the wage rate was 150 Rials per day in this area ($2.20).
Higher yields are achieved by farmers in Gorgan and the plane region than in any other part of the country. The area selected for this study, therefore, is very significant in Iran's agriculture, but is not "average" or typical. Thus the response to price increases may be greater in this region than elsewhere in the country.

This region was divided into five subregions, according to their soil types and the present - as well as potential use to which these soils are - or may be put.

Each of these "subregions" are represented in our survey by at least five "commercial" farms and three "villages". These terms are used frequently in this study and have specific meanings (see Appendix C).

The sampling procedure

For each of the five subregions, the following procedure was used to obtain a representative sample of the farmers to be interviewed. A detailed map of each subregion had to be obtained. These maps contain the names of all villages in the region as well as the names of the large farmers of the area.¹ These names were written on pieces of paper and

¹These maps show the ownership of the farm lands. Thus if a particular piece of land belongs to the village X, this is indicated on the map. Similarly, the land belonging to individual farmers (large farmers, of course) are listed on the map, under the owner's name.
placed in two containers, one holding the village names and the other containing the names of the large farmers in the area.

From the container with the village names, six names were drawn one by one. The first three were the villages which were to be interviewed. The other three villages were designated as "alternates", to be interviewed if interviews in any one of the first three villages proved impossible.

Similarly, ten names were drawn from the container holding the commercial farmers' names. The first five to be interviewed, and the second five as alternates.

The Farm Problems

A principal objective of the interviews, was to provide an understanding of the economics of the farms operated by this area's farmers. The farmers were asked to discuss the problems, or obstacles, which they considered particularly crucial to their operation. By implication, they mentioned what they thought prevented them from accomplishing their objectives.

Ranking the problems proved to be difficult. The large farmers were interviewed one at a time and listed their prob-

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1 The word "problem" is used to convey a specific meaning. In particular, a condition is considered a problem, if it limits the production activity of the farmers.
lems without ambiguity. The small village farmers who were interviewed as a group, had several reasons for differences of opinions about the ranking of various problems. Naturally some purely personal differences which exist, among the members of any group, was present here, which made ranking of the problems difficult. More importantly, however, the technical problems actually faced by farmers in a single village were not uniform. Sometimes, for instance, half the villagers considered the shortage of water as the most pressing problem, while the other half actually possessed water rights from the nearby river and disagreed. To bypass such problems, the following definition was adopted. A problem was defined to be "prevalent" in a village if it affected a majority of the farmers in the village. Table 5 presents the findings of the survey with respect to the percentage of the commercial farmers and villages who said each of the six conditions were serious farm problems for them.  

In the next four chapters, the more important problems listed in Table 5 will be discussed. It may be noted in

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1 It must be mentioned that the villagers - and for that matter even the commercial farmers - refused to discuss any problem which could be considered "political". Thus problems such as widely unequal distribution of land, possession of water rights, etc. were not discussed.
Table 5. Percentage of commercial farms and villages in which each of the 6 problems were reported as prevalent:

<table>
<thead>
<tr>
<th>Type of Farmers</th>
<th>Insufficient Water</th>
<th>Insufficient Credit</th>
<th>Shortage of Labor</th>
<th>Marketing Problems</th>
<th>Availability and Terms of Farm Machinery</th>
<th>Availability and Price of Improved Seed, Fertilizer and Insecticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>68%</td>
<td>20%</td>
<td>88%</td>
<td>96%</td>
<td>36%</td>
<td>20%</td>
</tr>
<tr>
<td>Village</td>
<td>70%</td>
<td>95%</td>
<td>20%</td>
<td>100%</td>
<td>50%</td>
<td>45%</td>
</tr>
</tbody>
</table>

The above table should be read as follows: e.g. 88% of the commercial farmers interviewed considered labor shortage (at peak seasons) as a serious problem for their operation at the present time, while only in 20% of the villages in which interviews were conducted this was considered a pressing problem.
passing, that - as Table 5 shows - the village farmers seem to face more problems than the commercial farmers. As judged by their own statements, all of the problems except the "shortage of labor" are more prevalent among the village farmers than their large, commercial counterparts.

Before discussing the extent and significance of the problems listed in Table 5, it may be useful to discuss the one problem which is a reflection of all of the problems to be discussed later; that of the low yield of various crops.

**Yields**

Though the average yields for most crops are higher in Gorgan and the plain than in other parts of Iran, they are still quite low relative to the "potential" yields of the land. Furthermore, the low "average" yield in this region is subject to wide variation which cannot be wholly attributed to variation in the quality of the land, or the variation in the climate, or any other physiological or biological factors. It is not unusual to find two farms, with similar soil types, to give widely different yields. The factors accounting for such variations in the yields from two farms, with similar soil properties, are the level of technology applied to the farm, fertilizer use, application of insecticides and adequate irrigation facilities or practice, just to name the more obvious ones. Table 7
Table 6. Actual yields of major crops in Gorgan and the plain in 1973 and comparison with "potential" yields of this region, and average yield in Iran and "similar countries" (tons/Ha.)\textsuperscript{a}

<table>
<thead>
<tr>
<th>Crops</th>
<th>Present Yield (Gorgan)</th>
<th>Potential Yield (Gorgan)</th>
<th>Average Yield (All Iran)</th>
<th>An Average of Good Yields in Similar Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>1.64</td>
<td>3.5</td>
<td>0.61</td>
<td>4.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.5</td>
<td>4.0</td>
<td>0.65</td>
<td>5.5</td>
</tr>
<tr>
<td>Barley</td>
<td>0.92</td>
<td>3.0</td>
<td>0.58</td>
<td>4.0</td>
</tr>
<tr>
<td>Rice</td>
<td>2.42</td>
<td>4.0</td>
<td>2.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Oil Seed</td>
<td>0.74</td>
<td>2.5</td>
<td>0.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1.6</td>
<td>1.8</td>
<td>1.2</td>
<td>2.0</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Source: For all columns except column 3, see (58, Vol. 1, p. 9, Table 3). For column 3, see Chapter 1, p. 4, herein.

summarizes the data gathered on yields of the most important crops in this region, cotton and wheat.

Table 7 indicates the significant range of yields which exist between farms, of the same type, in the same soil area. The difference between the lowest and the highest yields are indeed large. This is partly due to variation in soil within a classification of the "soil types", and partly to the differences in farming methods, water availability and application, and the level of technology used, in various farms in the same subregion. While the soil
Table 7. Average yields of cotton and wheat in various subregions of Gargan and the plain, and variation in yields in each subregion

<table>
<thead>
<tr>
<th>Area of Farm</th>
<th>Wheat yields tons/ha.</th>
<th>Cotton yields tons/ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest</td>
<td>Highest</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Village</td>
<td>0.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Village</td>
<td>1.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Village</td>
<td>1.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Village</td>
<td>0.9</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*Source: Farm interviews.

Properties are quite uniform within a given subregion, the amount of water available in each farm need not be the same. This is the most important reason for the observed yield differences between various farms of the same "type" in each subregion. Other, secondary, factors accounting for such yield variations include the farmers judgments and abilities to use fertilizers, insecticides, land improvements, etc.
Table 7 also reveals another significant point. The yields of the commercial farms, for both crops and for all subregions, are consistently larger than the yields associated with the village farms. The differences in yields between the commercial and the village farms are indeed statistically significant.

An analysis of variance was conducted to test the statistical significance of the observed yield differences between the commercial and village farms.\(^1\) The hypotheses to be tested were "there is no significant difference between the yields for wheat (or cotton) derived from the commercial and the village farms". For cotton the t value derived was 2.498. The "critical value" of t for \(\alpha = .025\) is \(t = 2.36\).\(^2\) Thus the above hypothesis is rejected at .025 level of significance. Thus it may be concluded that there is a strong evidence suggesting that the yields of cotton received by commercial farmers is larger than the yields received by village farmers, using similar farm lands.

A similar test was conducted for wheat yields. The

\(^1\)A multiple regression was run with the yields as the independent variable, and using a system of "coding" to separate the "area effects" and the effects of the "farm types".

\(^2\)With \(n = 44, k = 10\), we have \(n-k = 34\) degrees of freedom. The t value for 34 degrees of freedom is \(t = 2.36\) for \(\alpha = .025\).
t value derived was $t = 1.867$. The "critical value" of $t$ for $\alpha = 0.1$ is $t = 1.697$.\(^1\) Thus the above hypothesis is rejected at 10% level of significance. Thus what we said in regard to cotton yields may be repeated - though less strongly - for wheat yields as well.

The fact that yield differences between the commercial as opposed to the village farms are more pronounced in case of cotton than wheat, has a simple explanation.

A commercial farmer is, by and large, a profit maximizer. In deciding "what to produce" he considers such factors as the costs of the inputs, the expected yields and the price he expects to receive for each crop. If cotton production seems to be the most renumerative enterprise, he will devote his land to cotton, that is of course if the land is suitable for cotton production.

During the last few years, price of cotton has increased tremendously. In 1352, cotton prices in Gorgan\(^2\) was twice that in 1348. The price of wheat, on the other hand, being government controlled, remained virtually constant. An increasing number of farmers switched to cotton production. The price of cotton relative to that of wheat was so at-

\(^1\)With $n = 40$, $k = 10$, the degree of freedom is 30. The $t$ value listed in the "tables" for $\alpha = .1$ is $t = 1.697$.

\(^2\)Price received by farmers who sold their crop at harvest time.
tractive that nearly every commercial farmer who had a land suitable for cotton production devoted his land entirely to cotton. Only the lower quality farm lands - which were utterly unsuitable for cotton production, were used for wheat. This explains the relatively low yields of wheat associated with the commercial farms.

The situation is totally different for small, village farmers. Most of the small farmers grow some wheat. In many cases this is contrary to the objective of profit maximization, as the lands used for wheat could be devoted to cotton production and yield higher returns. Thus on the basis of "profit maximization", it makes no sense for each village farmer to use part of his land for wheat production.

Nevertheless, considering the prevailing conditions in the rural areas, the village farmers' decisions has a logical basis. The small farmers don't feel "secure" with cash crops. Traditionally, they have grown their food supplies on their land and marketed only what was left. If there was no market for wheat in some years, the surplus grains were stored and consumed - or sold - the next year. The absence of a buyer meant only that the farmer would have to abstain from purchasing such items as cloth, watches, bicycles, or anything that must be purchased with cash. It would not, however, mean starvation.

With cotton, the farmer does not have any such assurance
against starvation. "I cannot eat cotton", a farmer asserted when asked why he is growing one hectare of wheat on a land which could give him two or three times as much profit if devoted to cotton. "I always grow one hectare of wheat for my family's consumption, the other 3 hectares I use for cotton and barley", he explained.¹

The fact that the village farmers receive a relatively large yield for their wheat can be explained by the fact that they do not grow their wheat on the lowest quality land. When a majority of small farmers use a portion of their small holding to grow wheat, then considering the village as a unit, it cannot be maintained that the lower quality land in the village is used for wheat production, even if each farmer uses his worst piece of land for wheat. Thus there is a difference in the quality of the land used for wheat production by the village farmers and the commercial farmers.

Therefore, while the yields for both crops are higher in the commercial farms than in the small, village farms, the

¹This phenomenon has a number of significant implications. The fact that each small village farmer will grow some wheat, regardless of its price and the price of other crops, indicates that - at least in the villages - there is a minimum amount of land devoted to wheat production. The supply curve for wheat is so to say, totally price inelastic at some level of wheat output. It must be noted, however, that this is only true so long as the present "fear and uncertainty" of the village farmers, in respect to an available market, continues. If they are assured of a reasonable price for other crops, as well as of a quantity of wheat that they could purchase for their consumption, the need for the present behavior disappears.
difference is greater in case of cotton than that of wheat.

But the more important point, emphasized by Table 7, still remains: What are the factors accounting for the significantly higher yields for both cotton and wheat, associated with commercial farms, as opposed to the small village farms?

The most important factor enabling the large farmers to get larger yields from their lands is their greater financial ability. This enables them to improve the quality of their land by various means such as land leveling and drainage. They can afford to spend large sums of money on such remunerative projects as digging new wells and building drainage and irrigation channels. They usually possess the most modern farm equipment. They apply fertilizer and insecticides. They are also in a position to hire workers and supervisors - in sufficient numbers - to perform various farm tasks whenever these tasks need to be performed. They also sell their crops at higher prices than the small village farmers. All of these have a positive impact on the efficiency of the land use and thus raise the yields.

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1In the past few years, it has become increasingly difficult to find temporary farm workers at the prevailing wage rate. This point will be discussed below. Furthermore, the above argument should not be taken to mean that the commercial farmers are perfectly efficient and that every large or medium size farmer actually does all of the things mentioned above. What is important is the relative efficiency, and the relative ease with which commercial farmers - as compared with small farmers - can and do - undertake these yield increasing steps.
In contrast, the small village farmer is in no position to take most of the above mentioned, yield increasing steps in his farming. The village farmer is by definition a small farmer and almost invariably quite poor. Not only is he unable to obtain credit to spend the sums necessary for the yield increasing projects mentioned above, it is not even economically feasible for him to do so.

Digging wells, constructing irrigation canals, purchasing tractors and combines, all represent examples of yield increasing projects which are large scale and beyond the financial resources of any individual small farmer. Furthermore these projects are lumpy or indivisible and so costly that - in view of the small size of the farms - are by no means profitable for any single small farmer. The village as a whole could, of course, afford to undertake large investment projects, and this would undoubtedly prove profitable for all of the farmers. Such joint ventures, however, are almost nonexistent in this region.

In the villages where a source of water exists (a river, or ghanat, or a well dug by the government or the villagers themselves), each farmer gets a share of the water for his land. Nearly in all cases this is not sufficient for high yield irrigated farming. Most of the village farms, therefore, are faced with a chronic shortage of water.

As for tractors or combines, the small farmers either do
without them or rent them. In either case the crop yields are affected negatively. Some of the small village farmers still use the centuries old animal drawn plows. Aside from the enormous amount of manpower which is required by this method of plowing, the quality of such tilling is poor. The cultivation is shallow, the land is not turned and seeds are not well covered. Since only the surface of the earth is tilled, the roots have little room for activity.

Renting tractors is also prevalent. But those who rent tractors must usually wait until the owners of the tractors have finished plowing their own lands. In some cases this means plowing the land quite late in the season which may delay the planting operation and reduce yields for the small farmers.

Though fertilizers, insecticides, and pesticides are used by some of the small village farmers, the extent of their use are quite limited. These "supplementary farm inputs" are rather expensive and a large number of the small village farmers cannot afford to purchase them. As it will be discussed in a later chapter, a majority of these village farmers lack the financial means to support their families for a full year, after having put aside a sum for the most essential costs of their farm operation. Not having access to other sources of credit, they are forced into selling their crops long before the harvest season - at a large discount - to make
ends meet. As it will be shown in another chapter, the effective rate of interest paid by these farmers frequently exceed 200% a year. Obviously there are very few cases where the use of "supplementary inputs" can increase the productivity of the farm enough to warrant paying the full costs of inputs including the cost of borrowing at such rates of interest.\(^1\) The large commercial farmers can borrow money much more cheaply - from 8-15% rate of interest - and have much more incentive to use these supplementary inputs and thus receive higher yields.

Finally, it must be noted that the village farmer has less incentive to increase the efficiency of his farm than a commercial farmer. Due to the prevalent "green selling" among the small village farmers, the actual price received by the farmers is invariably lower for the village farmers than that received by the commercial farmers.\(^2\) Surely such high input costs and low output prices are negative incentives which reduce the village farmers' efficiency in production. This input-output price ratio is yet another factor causing the observed yield differences between the "village" and "commercial" farms.

\(^1\)(81, pp. 162-174). Schultz discusses other reasons for the reluctance of "traditional" farmers to use modern farm inputs.

\(^2\)See Chapter III on credit problems.
The preceding discussions have several important price policy implications. The low relative price of wheat - which is the consequence of the government policy - has probably caused a reduction in the yields of both wheat and cotton. Because of high relative profitability of cotton a large amount of land not highly suitable for cotton production is sown to cotton. The cotton price provides a return sufficiently large to make cotton profitable relative to wheat even with low yield for cotton. It seems likely that an increase in the price of wheat will bring wheat into more competition with cotton. Low yielding cotton will be replaced by wheat and this will increase the yields for both wheat and cotton.

Perhaps more important than the yield increase from wheat price increases is the credit and price policies implied by the large yield differences between the large and the small farmers. Substantial yield increases are possible on the small farms if they are supplied with "supplementary" farm inputs, more and cheaper credit, etc. These points will be further elaborated in the following chapters.
CHAPTER III. THE CREDIT SITUATION

The distinction between a "commercial" and a "village" farmer is most pertinent in the availability and terms of farm credit. The commercial farmers require larger amounts of credit, acquire it from different sources, and by and large for different purposes, than is the case for the small village farmers. It is thus necessary to discuss the credit problems of these two types of farmers separately.

Beside simplifying the problems, this two-fold analysis of credit has other advantages as well. It reveals the weaknesses, as well as the strength, of the Iranian credit system more accurately. For, as it will be shown in this chapter, the effectiveness of the present credit system is much greater for the commercial farmers than for the small village farmers. Furthermore, this type of analysis will identify the areas where improvements are most urgently needed, thus helping to set credit improvement priorities.

The Commercial Farmer

"Everyone in this area can remember a time when all farmers or nearly all of them had to sell their crops "green",¹ thus sharing a part of their profits with the merchants.

¹"Green" selling means selling the crops before it is harvested. See "green transactions" below, pp. 50-57.
Things are quite different today." This statement was made by the president of a large commercial bank in Gorgan, who has been observing the farmers' financial activities in this area for a long time. His assertions were corroborated by many other people, some of them farmers themselves, as well as by this writer's personal observations. Of some 30 commercial farmers interviewed for this study, only two had sold their crops "green" last year (1352), and they both admitted that they were motivated to make the "green" deal more by an inclination to avoid the risk of large price declines than by an urgent need for production or consumption credit, which is the primary motive in green selling by the small farmers.

The significance of the above statement is tremendous. Selling green is a transaction which is usually very profitable to the green buyer, and one a farmer likes to avoid if at all possible.

1 Probably not all commercial farmers in Iran are this well off. In other parts of the country, where land is not as productive, I was told, even large farmers are forced to sell green. Nevertheless, I believe that in all parts of the country, the large farmers have better access to credit and much less need to sell green than their smaller, village counterparts.

2 In nearly all cases, a farmer sells green to acquire credit. In some cases, however, a farmer may find "future prices" attractive and sell prior to harvest time to assure himself of a reasonable profit. As will be cleared below, however, this has very little similarity with the great bulk of green selling undertaken by the poor farmers. The large farmer may sell green to avoid risk in exceptionally uncertain years, while the small farmer sells green to acquire credit.
possible. Green selling is resorted to when all other attempts at finding credit have failed. Thus while the absence of green selling does not indicate a platora of credit available to the commercial farmers, it nevertheless signifies that alternative sources of credit, more desirable than green selling, are available to commercial farmers. What are these options?

A commercial farmer in need of credit has a number of sources of credit to which he can apply for loans. These sources are:

a. The Agricultural Development Fund of Iran
b. The Commercial Banking system
c. The Agricultural Cooperative Bank
d. The private money lenders
e. The green buyers

These are briefly described below:

a. The Agricultural Development Fund of Iran (ADFI): This is a government owned corporation, set up in 1968 to help finance large agricultural investment projects of the private sector. The minimum amount of a loan extended by the fund was set at Rls. 5 million (roughly $70,000). This is a large amount by any standard. In practice, however,
the loans extended by the ADFI were much larger. ¹ Lately, for a variety of reasons, the minimum amount of a loan has been drastically reduced. The fund now extends loans of as little as Rls. 50,000 ($9000). Thus while in the early years of its operations, the ADFI was of help to only very large farmers,² ³ presently its services can be used by nearly all farmers of "commercial" type.

To qualify for these loans, the farmer must present collateral (usually land) of a value at least equal to the amount of the loan, as well as a plan for use of the loan. The interest charged is 8% with a long term repaying schedule and varying grace periods. An increasing number of commercial farmers are using this "bank" as a source of long term credit, partly because the interest rate is 8% and the deferred payment

¹During the first three years of its operation (1347-1349), the fund extended 50 loans totalling Rls. 1208.3 million. Thus an average loan amounted to Rls. 20.4 million or $300,000. In the year 1350, the average loan of the fund decreased, but not significantly. It amounted to Rls. 19.77 million, equivalent to roughly $290,000. See (12, p. 58 and 13, p. 42).

²Some of the early recipients of these loans may be better described as industrialists or merchants, because of their proportionately large nonfarm activities, even though among their enterprises were included large farms.

³The minimum size of a loan extended by the fund is set at Rls. 2,000,000. But this is only a technical limit. The fund now extends loans of as little as Rls. 500,000. These smaller loans, however; are extended through Bank Melli Iran, though the decisions are made by the ADFI's officials.
opportunities are generous and valuable.\(^1\) The only shortcoming of the ADFI as a source of long term credit to large commercial farmers, is the fact that available funds are not sufficient to satisfy their needs. In the year 1350, for example, only 6.5% of the total "institutional" credit going to the agricultural sector, came from the ADFI.\(^2\)

b. The Commercial Banks: In recent years commercial banks have mushroomed everywhere in Iran. The number of bank branches increased by more than five times between 1964 and 1972, and continues to increase. In Gorgan area I counted 14 different banks, some with numerous branches. None of these banks, however - with the exception of the government owned agricultural cooperative bank - have any special provisions for lending to the farmers.\(^3\) The farmer is treated exactly as other bank customers. In other words, there are no "farm loans" as such. To borrow money, the farmer, like any other applicant, must meet the bank's requirement.

\(^1\) Last year, 1973, when the ADFI was charging 8% interest on its loans, the Commercial Banks' rate was 12%, and private money lenders' rate was much higher. This has induced many wealthy urbanites to borrow from the ADFI and engage in large scale farming or livestock (or poultry) operations.

\(^2\) This figure was calculated from (13, p. 42 and 5, p. 8).

\(^3\) The Bank Melli Iran, a government institution and the largest commercial bank in Iran, participates in the ADFI and operates in its behalf. But this could not be considered Bank Melli's policy because all the decisions for granting the loans are made by the ADFI and not by Bank Melli officials.
Generally, these requirements include:

a. having an account with the bank

b. having a net worth substantially higher (3 or 4 times larger) than the amount of the loan requested

c. having a reputable merchant, or a "good credit risk" bank customer as a co-signer.

Stringent as these conditions may be, a commercial farmer usually has no problems satisfying them. A commercial farmer in Gorgan is usually a bank customer. He has many friends, merchants or other farmers, etc. - eligible and willing to co-sign a loan for him.¹ Finally, being a large farmer, he usually has enough assets to serve as security for a loan to operate or improve his farm.

Thus it may be concluded that a commercial farmer in Gorgan could, in nearly all cases, borrow all of his short term credit needs from the commercial banks in his area. With his credit needs satisfied, the commercial farmer chooses not to sell his crops green, and thus receive a higher total value for his crops. Only those without access to cheaper sources of credit are forced to sell green or pay the exorbitant interest rates of the money lender or the green buyer. In this area, rarely a commercial farmer needs to seek other short term credit sources than the commercial banks or the ADFI.

¹He, in turn, is eligible and willing to co-sign loans for them.
It must be emphasized that the present stage of relative abundance of short term credits for commercial farmers in Gorgan is a recent development. More than 90 percent of the commercial farmers interviewed asserted that they were forced to sell green, or borrow from private money lenders, as recently as four or five years ago. None of the farmers in this list felt that they are forced to seek nonbank credits anymore. If they do sell green now, it is not because they are in need of credit. It seems some commercial farmers sell green because they find the "green" sell rate higher than their own subjective price and yield expectation and desire to take advantage of it.¹

¹What is said above should not be taken to mean that all is well as far as the credit situation of the commercial farmers is concerned. Undoubtedly there are many commercial farmers who do not receive credit in the amount-or the terms-they consider desirable. Moreover- and this point cannot be over-emphasized-our discussion above is only with regard to short term credit, money borrowed for current farm operations and repaid at harvest time. All we are saying is that this type of credit, which was previously furnished by the private money lenders or the green buyer, is now provided by the commercial banking system, at lower rates of interest. The expanding banking system, thus, has replaced with more adequate and lower cost loans, those former lending institutions, and so far as the farmers in our samples are concerned, this replacement has been more or less complete. The significance of this development can be appreciated by observing the situation of the village farmer, for whom such replacement has not occurred.

Now the long term credit needs of a commercial farmer is an entirely different matter. Commercial banks, as was mentioned before, do not make "farm loans" as such. Thus a farmer cannot rely on the commercial banks to borrow for an irrigation project which requires huge amounts of capital and takes many years to construct. For such purposes, about the only "institutional" source of credit available to a large farmer is the ADFI. Limited as the ADFI's funds definitely are, many farmers may have to borrow from private lenders, or more likely, forget about the project altogether.
c. The Agricultural Cooperative Bank of Iran: This is a government institution, set up to make loans of various duration to farmers.\(^1\) The loans are made either directly to the farmers or are given to the rural cooperatives, which in turn lend the money to the village farmers.\(^2\) The loans may be short term (annual), intermediate (up to six years) or long term (up to 15 years). The interest charge is 6% on all loans, plus an additional fee of 1% for the first year only. To qualify for the loans, the farmer must either put up collateral or an acceptable co-signer.

Clearly, most commercial farmers easily qualify for the loans of the Agricultural Bank of Iran. Few of them, however, take advantage of this opportunity. There are a number of reasons for the reluctance of the commercial farmers to use this source of credit.

To begin with, the loans extended by the Agricultural Cooperative Bank of Iran are too small to interest most com-

\(^1\)The origin of this bank dates back to the year 1309, when it started as a part of the Bank Melli Iran (National Bank of Iran). In 1312 "The Agricultural and Industrial Bank of Iran" was set up as an independent government bank. This bank may be considered the parent of the present Agricultural Cooperative Bank of Iran. Since 1312 this bank has changed its name 5 times, the last one in 1349.

\(^2\)In the year 1971, roughly 67 percent of the loans extended by the Agricultural Cooperative Bank of Iran went to the village cooperatives. The village cooperatives lend this money to their members, i.e. village farmers. Thus only 33 percent of the ACBI's lending funds are available for non-cooperative member farmers, including commercial farmers (13, p. 41).
commercial farmers. While the bank does occasionally lend large sums of money, this is the exception, rather than the rule. Furthermore, as we mentioned before, the short term credit needs of the commercial farmers are satisfied by the commercial banking system, which operates with far less bureaucracy than the ACBI. Only to acquire long- or medium-term credit does a commercial farmer have any reason to go to the Agricultural Bank. Yet that does not seem to be happening either. Roughly 99 percent of the people who borrowed money from the ACBI received loans of less than Rls. 100,000 or $1470 (11, pp. 126-127). Thus nearly all the borrowers were village farmers or small commercial farmers. Very few large commercial farmers would go through the bureaucratic channels of the Agricultural Bank to borrow such relatively small amounts of money.

We may therefore conclude that while a commercial farmer rarely borrows from the ACBI, he nevertheless is in a position to do so.

A commercial farmer, having exhausted all of the above mentioned possibilities for acquiring credit, and still needing more, can obtain funds through green selling or borrowing from

1During the five years from 1340 to 1345, the banks loans averaged about $159.00 (66, p. 91). Presently, the average size of the loan is higher than this, but not high enough to interest commercial farmers in general.
private money lenders. In either case, the effective rate of interest he must pay depends upon the size of his farm - or more generally upon his overall wealth. The larger his holdings of various assets, the less the interest rate charged by the money lenders and the higher the price of his "green" crops.

In addition to these sources of credit, commercial farmers usually obtain credit from the machinery dealers. This source of credit is totally absent for the small farmers.

The Village Farmer

Green selling, while practically a thing of the past for the large farmer, is still a viable institution in the villages. With very few exceptions, green transactions were being carried out - in varying degrees - in every village I visited last year. Though not every small farmer is forced to sell his crops green every year, the vast majority of village farmers do sell green more often than not.

What is green selling?

Green selling - or salaf as it is locally called - means selling the crop before it is harvested, at a discount.¹

¹Sometimes the crop is sold even before it is planted. In that case, of course, the price of the crop is accordingly lower. In general one can assert that, other things being equal, the earlier the deal is made, the lower the price of the crop, or to say it another way, the higher the discount in question.
Despite its superficial similarity with the concept of "future transactions" prevalent in the United States, green selling is an entirely different phenomenon. This will become clear later on as the nature of green transactions is discussed.

While there exists several types of "green" transactions, the major feature of all of them are more or less the same. Below a variant of green transaction prevalent in the area of this study will be discussed.

The farmer in need of credit finds a prospective green buyer, usually a merchant. They sign a contract according to which the farmer is bound to deliver a specific quantity of the crop (of a specific quality) during the harvest season. The farmer, in return for his pledge of future delivery, receives the price of his crop presently.¹

The buyer, as a hedge against unforeseen circumstances - such as poor crops, death of the farmer, or his unwillingness to deliver for any reason - asks for a check from the farmer. The amount of the check is equal to the money received by the farmer as well as an additional sum to cover interest, risk, etc. For instance, let us suppose that the price of "green" cotton agreed upon in June is $250/ton. Upon the signing of the agreement the farmer receives this price for every ton of cotton he promised to deliver. At the same time he gives the

¹How this price is determined will be discussed below.
buyer a check - dated several months hence - for $300/ton.

Now come harvest time, the price of cotton most probably will be different than what both parties had predicted. Whatever the price of cotton however, both parties have a legal right to ignore the original agreement about crop delivery and consider the check as the real issue in question. To use our previous example, suppose the price of cotton at harvest time rises to $350/ton. In that case the farmer stands to gain by abstaining from delivering his crop. The buyer in that case, unhappy as he may be, will cash the farmer's check and thus receive his "loan" back with an interest. Conversely, should the price of cotton drop appreciably below that envisaged by the buyer (say to $250/ton), he can refuse the crop and simply cash the farmer's check he holds in his vault.

It must be mentioned that as an "unwritten law", both parties are expected to abide by their original pledges. This means that it is "expected" of the farmer to deliver his crop, and of the buyer to accept it no matter what the price happens to be at harvest time. Altering one's word, legal as it may be, is not good business practice. But as it is the case for all such unwritten laws in business dealings, once the financial rewards are sufficiently high, they are simply
ignored. It is therefore safe to assume that the difference between the amount of money received by the farmer when he sells green, and the amount for which he writes a check, represents the "interest" on the "loan".

This is a very important point. By observing a few of these "green" contracts, one can get an estimate of the rate of interest paid by the small farmer on his "loans". This is what was done in this study. Many farmers who had sold green,

1 Another variant of green transaction differs at this very point with the above version. This variant is as follows:

The buyer pays money to the farmer in return for his agreement to deliver a specific quantity of the crop (of a specific quality). There is no provision for a substitute payment, as was the case in the version discussed in the text.

Obviously, in this type of "green" transaction the risk is higher. At the same time, however, there is a possibility for huge profit for the buyer, and in a sense also for the seller.

In general, green buyers engage in this type of green transaction only when future prospects are unusually bright. Thus in 1973, a year of rising prices, an extremely large volume of green transactions in Gorgan area was of this variant. The result was that the green buyers reaped huge profits. Two years before, a very small part of green transactions were of this sort in the Gorgan area.

2 It must be noted that in the transaction just described there is no risk to the buyer, simply because he has a hedge against extreme price declines. The least he can gain is the amount specified on the check. Thus the difference between the money paid to the farmer and the amount specified on the check is the minimum amount of interest charged.
as well as a few who were in the business of buying green, were interviewed. The rate of interest the farmers had to pay on these transactions ranged from exorbitant to shocking!

Last year - the year 1973 - was a wild year for farm prices everywhere in the world. In that year the price of cotton increased by more than 140 percent. This was a year when the farmers did not deliver their crops and paid up their checks instead. Most of the people who could legally abstain from delivering did so, their "word" notwithstanding. But, of course, as was mentioned before, this was also the year when "green" contracts were quite emphatic about crop delivery. No substitute was acceptable. The unsuspecting village farmer who could not - in his wildest dreams - have foreseen such high prices, had accepted the deal. In all likelihood the buyers themselves had not expected prices to go as far as they actually did.

What was the result of all this? For farmers everywhere in the world, including commercial farmers in Gorgan area, this was a greatly rewarding year. For most of the village farmers in Gorgan area, however, it was a year full of regrets. Many of the village farmers interviewed had sold their cotton for $180/ton in June, only to see cotton prices rise to a staggering $540/ton at harvest time. Thus they had actually paid about 200% "interest" for a money they had kept only three months, making an interest rate of 800% a year!
Such cases are of course exceptions rather than the rule, reflecting an exceptionally volatile year for farm prices. What was turned out to be the norm, however, was not much more comforting.

I was lucky enough to be confided in by a green buyer who, being a relatively small merchant, had most of his dealings with small farmers of the neighboring villages.\(^1\) He said that

\(^1\)Green buyers are usually merchants. They are actually the same people who buy the crops at harvest time as well. The size of their operations determines their business counterparts. Thus a small merchant deals with a small farmer, and a large merchant with large farmers. In general, one observes three types of green buyers in Gorgan area.

a. The village bonakdar: In most villages there usually exists one or more of these local shopkeepers who act as green buyers and usurers as well. They sell their goods (sugar, tea, etc.) to the farmers on credit, to be paid back at harvest time. At the same time they also lend small amounts to farmers who need money - with interest of course - as well as buying "green" crops from the farmers. The interest charged by these bonakdars is exorbitant, to say the least. A rate of 200% is not unusual. Being politically influential at the village level, these people exert great power over the small farmers. Should a farmer fail to pay up his debt (or crop), his land is confiscated (see 29, pp. 382-383).

b. The travelling green buyers and usurers: As the name implies, these people conduct their businesses by travelling from village to village. One could perhaps call it a mobile green buying unit. They arrive in a village in their jeeps or on their bikes, bringing a variety of goods needed by the farmers - groceries, household utensils, etc. - as well as some cash. These are then distributed to the villagers in need of cash or commodities. The farmer is thus indebted to these travelling peddlers. He may pay back his debt in cash - with interest - or in kind (that is his crops). Just how the debt is repaid depends upon mutual agreement. In either case the farmer pays an interest rate in excess of 100%, sometimes even twice that.

c. The city merchants: These are the most important group of green buyers. They operate on a larger scale and usually charge lower (footnote continued on following page)
early last summer he "plunged" into the market and bought "green" crops to the limits of his financial ability. Having sensed the future price increases to some extent, he had asked for a deal in which crops were to be delivered, and no substitutes were accepted. Nevertheless he had also bought a great volume of "green" crop in the usual fashion (described earlier in the text).

He bought cotton at $270/ton and asked for a check from the farmers. The amount of the check requested varied according to the farmer's reputation, net worth, and the like. The rates, though by no means uniform, had definite limits. The following table is constructed on the basis of this merchant's deals during the year 1352.

<table>
<thead>
<tr>
<th>Minimum Rate</th>
<th>Cotton bought ($270/ton)</th>
<th>Effective rate of interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charged the best customers, i.e. large village farmers, old customers, etc.</td>
<td>The amount of check requested = $314/ton</td>
<td>Yearly rate = 49%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Rate</th>
<th>Cotton bought ($270/ton)</th>
<th>Effective rate of interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charged the unknown, &quot;average&quot; village farmer</td>
<td>The amount of check requested = $360/ton</td>
<td>(4 months loan) Yearly rate = 99%</td>
</tr>
</tbody>
</table>

(Footnote continued from previous page) interest rates. Members of this group range from small merchants - with one of whom I have interviewed, to super large merchant-exporters. These merchants, in addition to their own substantial funds, use bank credits to buy green crops from the farmers. They are also the ultimate buyers of the green crops bought by smaller green buyers. The village bonakdars, as well as the travelling buyers resell their crops to one of these merchants, receiving a fee for their services (29, pp. 382-387).
Between these two extremes, there was a great number of transactions at "intermediate" rates of interest.

A question that immediately comes to mind is this: Why does a village farmer sell his crops green, and thereby pays such exorbitant rates of interest? The answer is quite simple; he has no choice. He would not sell green if he were able to avoid it. He cannot avoid it because he has very few alternative sources of credit. Having failed to acquire the amount of money he needs in any other way, he resorts to green selling.\(^1\) To see this, let us briefly examine the alternatives open to a small village farmer when he needs credit.

The Agricultural Development Fund or Iran (ADFI) can

\(^1\)It must be noted that "not borrowing" is not an option open to the small farmers. Farming on a very small scale, his annual income is not very large. Out of this he must pay off previous loans, buy the necessary inputs for next year's crops, and pay for his family's living expenses. Nearly in all cases, his income does not stretch to the next harvest season. Since he must pay for the "production expenses" to assure himself of a means of livelihood, and since he must pay off old debts, or risk losing his land, he is left with a sum insufficient to support his family for a year. The need to borrow, therefore, is as urgent as the need to survive.

It is well to remember that prior to the Land Reform, the credit needs of these village farmers (peasants) were supplied by the landlord. The landlord furnished the seeds, water, fertilizer, etc. and also forwarded a sum to the peasant to enable him to make ends meet till the next harvest.

With the land distribution program the farmer has lost this source of credit. Not only must he pay for the cost of production himself, he must also pay a part of his revenue as payments on the land he has bought from the landlord (41, p. 13). With no landlord to forward him an advance, he must borrow from other sources, or sell his crops green.

The farmer will reap the full benefits of his ownership of the land he farms, only if he is helped financially to the extent that he no longer is forced to borrow at usurious interest rates just to stay alive.
readily be eliminated as a supplier of credit to the village farmers. The small farmer's credit needs, in most cases, are not for well planned agricultural investments, and even if they were, they would not be large enough to interest the ADFI's officials.\(^1\)

Similarly, the commercial banking system - as it exists today in this area - may also be eliminated as an important source of credit for the village farmers. Recalling the requirements of these banks for extending a loan, it is immediately realized that a villager has many difficulties in meeting them. Having his home in the village in which there is usually no bank, the village farmer has no account in any bank. Neither does he know a reputable bank customer or a merchant well enough to be able to furnish a co-signer for his loan. Thus the commercial banking system - so helpful to the commercial farmers in this area - is of very little help to the village farmers.\(^2\)

Then there is the Agricultural Cooperative Bank of Iran, or its village representative, the Rural Cooperatives, which

\(^1\)Part of the money needed by the small farmer is for consumption purposes. Surely a village farmer cannot apply for such a loan to the ADFI!

\(^2\)In recent years Bank Saderat Iran, the largest privately owned commercial bank in Iran, has opened up branches in large villages and small towns. The extent of this bank's effectiveness as a supplier of credit to the small farmers, however, is quite limited.
according to the government data exists in about half of the villages in Iran, and receive nearly all of their lending capital from the Agricultural Cooperative Bank of Iran.¹

A great number of village farmers borrow from the Rural Cooperatives.² They pay an interest of 6% a year on these loans. The greatest shortcoming of these loans are their small amount. The maximum amount of a loan extended by these cooperatives is specified at Rls. 20,000 (about $300). But the average loan is much less than that; a mere $93.0 per borrower in 1348 (43, Annex 10, p. 4). The loans are simply too small to keep the villagers away from the green buyers' doorsteps. In nearly every village in which interviews were conducted for this study, the complaint was the same; too much hassle for too small a sum. Though bureaucracy is less in the Rural Cooperatives than the ACBI's offices, many farmers admitted that they did not even bother to apply for a loan from the Cooperatives or the ACBI. They reasoned that even after all of their efforts to get the loan, the amount they would receive would not suffice for all of their expenses and they would have to go to the green buyers anyway. So

¹In 1350, about 94% of the loans extended by the Rural Cooperatives came from the ACBI (13, pp. 41-42).

²In 1350, about 47% of all members borrowed from their Rural Cooperatives (13, p. 42).
they just sold green and saved themselves the trouble!\footnote{Going through the bureaucratic procedures of receiving a loan from the ACBI, or the Rural Cooperatives, is a frustrating experience, to say the least. This "red tape" is of course present - though in varying degree - in all other government offices.}

The small size of these loans, and the lengthy procedure that a farmer must go through to acquire it, is a serious problem. Any rural development policy which fails to provide for a substantial increase in the size of these loans (and of the total loanable funds as well) is bound to fail. As things stand presently, not only must a farmer have collateral or a co-signer in order to qualify for a loan from these government institutions, but he must spend a long time "going after" his applications. Even then he does not receive as much as he has asked for, or as much as he must necessarily have to make it through the year. To avoid this frustrating experience, as well as avoiding the loss of many working days, the villager goes to his neighborhood Bonakdar, or the town's merchant. He makes "one stop" at the green buyer's store. There he is well received, is offered a cup of tea, and is back in the village - with all the money he had asked for - before the day is out. For this he will have to pay at harvest time.

That the ACBI or the Rural Cooperatives do help the farmers to some extent is clear. That they have failed to
provide him his needed credit is equally obvious. One needs only to observe the lucrative businesses of the green buyers and money lenders to realize the extent of this failure. The fact that their businesses are prospering despite their exorbitant interest rates reflects the farmer's lack of better alternatives.\(^1\)

The village farmer is thus faced with grim alternatives. He cannot borrow from "institutional" sources of credits to the extent that he needs it. He has no choice but to pay the exorbitant rates asked by the private money lenders or to accept the deals offered him by the green buyer. Moreover, the poorer the farmer, the more limited his choices of credit sources, and the higher the rates of interest he must pay for his loans.

The present credit situations of the small village farmer is undesirable both from a moral as well as an "economic" standpoint. Not only is it unfair for a poor farmer to have to share the greater part of his meager profits with the city.

\(^1\)It is estimated that between 3/4 or 2/3 of all loans obtained by Iranian farmers are supplied by "noninstitutional" sources of credit, i.e. by private money lenders, traders, etc. (43, Annex 10, p. 1). Noting that the commercial farmers have much easier access to "institutional" credit sources, it is reasonable to conclude that for the small village farmers, "noninstitutional" sources account for a lot more than 3/4 of the credit they receive.
merchants, it is also unsound from a purely "economic development" standpoint.

The villager, seeing his living condition deteriorating no matter what farm prices happen to be, gradually loses his incentive, as well as his ability, to invest in his farm. If he is not getting enough to eat, he obviously is not in a position to invest in yield increasing projects. It is well recognized that one of the most important kinds of incentives for a yield increase is favorable farm prices. But this is not enough. The crucial point is that "the people on the land must be the principal beneficiaries of favorable prices" (21, p. 247).

In the area covered by this study, the small farmers "on the land" are not the "principal beneficiaries" of farm price improvements, whereas the commercial farmers surely are. This could be part of the reason for the significantly higher yields per hectare obtained by the commercial farmers over that obtained by the small village farmers in this area.¹

¹Since there are many factors affecting crop yields and since most of these factors are not the same for commercial and village farmers, this conclusion cannot be proved to be true for this area. One can say, however, that the observations in this area do not disprove the general proposition that there is a relationship between prices received by the farmers, and yields. "While adequate incentives at the farm level will not guarantee that all farmers will make the additional efforts needed to increase production, their absence will certainly mean that such efforts are unlikely to be made" (1, p. 350).
As far as the economic development of the agricultural sector is concerned, the present credit situation has other undesirable consequences. The most important one in this respect being a perpetual flight of capital out of the farm sector, and more specifically, out of the rural areas. The money lenders or green buyers, who share a large part of the profits of the small farmers do not reinvest their profits in the villages (except for money lending or more green buying). Thus capital is transferred out of the villages, and in most cases out of the farm sector altogether.

To summarize the above arguments, this study confirms the generally recognized notion of inadequate agricultural credit in Iran. It reflects the general neglect of the farm sector by the policy makers during the past few decades. In 1972 agriculture accounted for 20% of the country's gross national product, yet farm credits amounted to a mere 6% of the total "institutional" credits to the private sector. In the year 1350, all of the credit extended to the farmers by the government institutions (ADFI, ACBI, and the Rural cooperatives) amounted to only 6% of the value of the goods services produced in the farm sector (13, p. 42 and 95). Thus the official report of Iran's Central Bank admits that "...the farm sector is still faced with an acute credit shortage" (13, p.
42). What is less obvious, and what this study has revealed, is the fact that the credit shortage is much more acute for the small village farmers than for the commercial farmers.
CHAPTER IV. UNEMPLOYMENT, UNDEREMPLOYMENT AND SEASONAL UNEMPLOYMENT

Nearly all of the commercial farmers interviewed considered labor shortages to be one of their main problems. Many of these farmers maintained that shortage of labor, more than any other thing, prevents them from choosing the crop pattern they consider optimal. More specifically, a number of farmers believed that there exists at the present time, an upper limit for the amount of cotton produced in this area, and that this limit is set primarily by the number of workers available.

In a country like Iran, where unemployment and "underemployment" is supposed to be rampant, such statements are indeed surprising. In fact, one expects to find in this area an overabundance of workers seeking jobs, an "unlimited supply of labor" available to be used in commercial agriculture or industry. According to the commercial farmers interviewed, however, this is simply not the case. Farm workers are hard to find during some months of the year. Employers compete for the available workers and thus pay higher wages.  

These observations seem to imply that in Gorgan and Dasht

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1It must be emphasized that wages are still quite low in this region, as well as in other parts of the country. At the peak of the cotton season, when wages in this region are at their highest level, a farm worker receives $2.20 for a full day of work.
the problems of unemployment and "underemployment" do not exist. This conclusion, however, may be erroneous. The simultaneous existence of widespread "underemployment" and "labor shortage" is a problem which has plagued most of the underdeveloped countries. To understand this apparent paradox one must be familiar with the term "underemployment" and what it implies. This, however, is not a simple matter! In the next section, the theoretical discussions of underemployment are reviewed and a workable definition of underemployment is adopted for this study.

The Underemployment Controversy
Some Theoretical Problems

The recent debate over the unemployment problem in the less developed countries has its theoretical basis in W. A. Lewis's paper entitled "Economic Development with Unlimited Supply of Labor" (49). Lewis considers the process of economic development in a "Dual" economy. Such an economy is one with two distinct, dissimilar, and more or less unrelated sectors. These two sectors can be called the "Capitalist" and the "Subsistence" sectors. The capitalist sector usually consists of relatively capital intensive, profit motivated firms who hire labor. The subsistence or "traditional" sector uses very little capital, and does not hire labor. In the traditional sector, people are self-employed and the
marginal productivity of labor is quite low and perhaps even zero. The people involved in this sector consume the average product of the farm workers.¹

The process of development in Lewis' framework consists of the capitalist sector being expanded and the subsistence sector being contracted. The capitalist sector draws from the pool of laborers coming out of the traditional sector. At the going wage rate (slightly above the average product of labor in the traditional sector) the capitalists can count on a perfectly elastic supply of labor. Thus, the supply of labor for the capitalist sector is unlimited in the sense that at the going wage rate supply exceeds demand. The process of development continues until all of the "redundant" or "surplus" labor is absorbed in the modern sector and the supply curve of labor becomes less than perfectly elastic.

The proposition that the capitalist sector in a developing country can count on an "unlimited supply of labor" has caused a great deal of controversy in recent years. Some

¹"...what determines the agricultural real wage? Clearly if the agricultural sector is commercialized (i.e.) it is organized in the form of a competitive market economy, profit maximizing behavior would imply a zero level of real wage wages (since the marginal productivity of labor is zero). However, a zero level of real wages is patently impossible as this would imply starvation for the mass of agricultural workers...(thus) (an) institutionally determined real wage level is set, usually not far from the caloric subsistence and related more or less to the average productivity of agricultural labor" (26, pp. 21-22).
economists have accepted Lewis' Hypothesis concerning the existence of unemployment and underemployment in the developing countries and have made it a cornerstone of their theories (78). Others have attacked the hypothesis as unrealistic, simplified, or simply wrong. In what follows, the two sides of this controversy are reviewed.

Perhaps the most famous of the theories based on the phenomenon of "unlimited supply of labor" is that put forward by Ranis and Fei (78). This model has attracted a great deal of attention in the "development" literature, despite its inherent weaknesses.

The Ranis-Fei model also divides the economy into two sectors, with agriculture being the traditional sector of this dual economy. The industrial (modern) sector is assumed to be small, though growing, and utilizing labor efficiently. Once again, the process of development consists of a transfer of "unproductive" labor out of the farm and into the industrial sector.

It is assumed that the farm sector of such an economy is characterized by an abundance of "disguised unemployment", and zero marginal productivity of labor. It is thus concluded that "...it is possible to transfer labor from the subsistence sector to the commercial-industrial sector without reducing agricultural output and without increasing the supply price of labor to the industrial sector during the
The existence of "idle workers" in the farm sector is the cornerstone of this model. On the one hand, assumption of disguised unemployment in the rural sector is needed to conclude that transfer of workers out of the farm sector and into the industrial sector does not reduce total farm output. For if the transferred workers were in fact engaged in productive activities, their removal from the agricultural sector would lead to a reduction in the farm output. The assumption of widespread existence of "disguised unemployment" allows Ranis and Fei to assert that this transfer of labor does not change the total farm output and may even increase it.\(^1\) This then leads to the conclusion that as the labor transfer proceeds, an agricultural surplus is created which can be used for capital formation.\(^2\)

\(^1\) "Up to now we have assumed that while the redundant (zero-MPPL) workers are (transferred), total agricultural output remains constant. It is, however, perfectly possible -- perhaps even likely -- for agricultural productivity to increase at the same time" (26, p. 23).

\(^2\) "The existence of such a redundant agricultural labor force is a highly significant phenomenon in view of the fact that we have here a portion of the population which, while consuming agricultural output, is unable to make a productive contribution to it" (26, p. 13). Thus it is concluded that marginal productivity of farm workers is zero (26, p. 21). When part of the (idle) workers are transferred out of the farm sector, a surplus is created because farm consumption is reduced while production has remained unchanged (26, pp. 22-23). "It is in this sense that we can think of the removal of the redundant agricultural labor force as freeing a hidden source of rural savings for deployment in the development effort. This surplus can be siphoned out as an investment fund for the development of the industrial sector" (26, p. 23).
On the other hand, the existence of "disguised unemployment" is used as a justification for assuming a constant real wage rate for the industrial workers during the first phase of the development process. It is assumed that in the farm sector "...there exists an institutionally determined real wage equal to the initial average productivity of labor" (26, p. 22). This wage rate is more than the (zero) marginal productivity of labor and represents the minimum amount required for subsistence. It is further assumed that during the initial phase of development, the industrial wage rate is also equal to this minimum subsistence amount, and will remain constant so long as there exists underemployment in the farm sector.¹

The constancy of industrial wage rate in the initial phase of development is essential for a rapid development in the Ranis and Fei framework. It ensures high levels of profit in the industrial sector which are assumed to be reinvested and thus bring about further growth. All during the initial phase of development, even though the industrial sector demands

¹"...It is intuitively obvious that the existence of a pool of redundant agricultural workers constitute a potential source of labor supply for the industrial sector, preventing a rise in the industrial real wage..." (26, p. 18).
more and more labor, the wage rate remains constant.\(^1\)

It is thus reasonable to assert that the validity and relevance of the Ranis and Fei model — as well as that of other models based on Lewis' analysis — depends upon the validity of assuming the existence of widespread "disguised unemployment" in the less developed economies. If it can be shown that in the majority of the underdeveloped countries "underemployment", as defined by Lewis and his "followers", does not exist, then it can be concluded that the models of economic development based on the widespread existence of "surplus labor" are void of any relevance for these underdeveloped economies. Furthermore, if it could be shown that "underemployment" does not exist in the less developed economies, to the extent assumed by these writers, the models based on "surplus labor" lose much of their appeal, which stems from the models' promise of "getting something for nothing".\(^2\) This explains, to a great extent,\(^1\)

\(^1\)"The operational significance of the (constant institutionally determined wage rate) prevailing in the agricultural sector is that it governs the value in exchange of the industrial wage rate.... This means that changes in the demand for industrial workers cannot appreciably affect the level of industrial wages since the existence of a pool of disguised unemployed in the agricultural sector serves to cushion the impact on the industrial real wage" (26, pp. 156-157).

\(^2\)"The popular appeal of the "disguised unemployment" arises from its claim to offer something for nothing in the way of a major potential for economic development" (39, p. 90).
the heated arguments about the existence, and the extent of, "disguised unemployment", that have filled the pages of various economic journals in the past two decades.

The terms "disguised unemployment", "underemployment" and "surplus farm labor" have all been used to convey the same meaning. Underemployment, defined precisely, refers to a situation where removing a part of the labor force from the farm sector leaves the agricultural output unaffected, even though nothing else has been changed. The underlined segment of the definition is of crucial importance. For if the removal

1 The term "disguised unemployment" was originally used by Joan Robinson in a discussion of the Great Depression of the 1930's. She used the term to refer to those who had lost their jobs as a result of the depression and were performing odd jobs -- e.g. selling matches, etc., -- to stay alive (50, p. 150). The sense in which the term are used in the current development literature is, however, entirely different. The current interpretation refers to underemployment in the farm sector of the less developed countries. Robinson believes that calling rural unemployment "disguised unemployment" is wrong. "...The characteristic of disguised unemployment in the original sense is that it could be cured by an increase in effective demand. Rural underemployment requires some basic reorganization of the conditions of production" (79, p. 328). These terms, however, are used interchangeably in this study.

2 The United Nations experts in the field have defined the "disguised Unemployed" as "those persons who work on their own account and who are so numerous, relative to the resources with which they work, that if a number of them were withdrawn for work in other sectors of the economy, the total output of the sector from which they were withdrawn would not be diminished even though no significant reorganization occurred in this sector, and no significant substitution of capital" (62, p. 2,044).
of the agricultural labor is accompanied by providing the remaining labor force with more modern technology, then the fact that farm output would not fall, or even increase, is not a strange phenomenon. Indeed ignoring the underlined segment of the above definition, one can use it to conclude that even the farm sector in the United States is plagued with disguised unemployment. Hardly anyone can deny that some portion of the labor force can be removed from the United States' farm sector without affecting the farm output, provided that more sophisticated machinery is given to those remaining in the agricultural sector.¹

The point made above may seem too obvious to require reiteration, but the fact is that many writers who have come up with the conclusion that disguised unemployment is all prevalent in the underdeveloped countries have overlooked this point. To make this point clear, we can use the following exaggerated example. Consider an underdeveloped country with 80 percent of its population engaged in farming. If we could provide the most modern farm technology now available - say those used in the U.S. farm sector - then it would probably be true to say that all but a small part of the farm workers in

¹As it was mentioned previously, the appeal of the "surplus labor" models stem from the proposition that labor can be extracted from the farm sector, without a fall in the farm output, "...without improving the techniques of production" (39, p. 90).
this country could be removed without changing the farm output. Is it then legitimate to conclude that, say, 90 percent of the farm workers in this country are redundant, or are underemployed? Ludicrous as this seems, there are nevertheless empirical studies that have used this kind of reasoning and have come up with impressive figures for the rate of "underemployment" in some less-developed countries. (See 91, p. 39)\footnote{Some economists have simply "assumed" the existence of a particular amount of underemployment (e.g. Rosenstein Rodan, see (81, p. 54). For examples cited to prove the nonexistence of disguised unemployment see 81, especially pp. 63-70 and p. 44.}

Another point mentioned by the critics of the underemployment hypothesis is the seasonality of agriculture. Agriculture by its very nature requires a great amount of working hours in some months while in other months it needs very little. If we are to adhere to the "ceteris paribus" condition mentioned above, and if the farm output is not to fall, then the number of workers required in the farm sector is that which is needed in the peak season. A number of studies have ignored this point. They have calculated the total labor hours required in the agricultural sector of an underdeveloped country and subtracting this from the total labor hours available in agriculture, they have reached wild conclusions regarding the percentage of underemployment. What these studies
have done, and what is obviously illegitimate, is that they have ignored the seasonality of farming.¹ (81, p. 58)

Another source of confusion has been the whole question of zero marginal productivity of labor. It is generally assumed by most writers in the field that the existence of underemployment necessarily implies zero marginal productivity of labor. Thus many writers who oppose the underemployment hypothesis have attempted to show that marginal product of labor in the farm sector of the less developed countries is not indeed zero or negative. The fact is, however, that marginal productivity of labor being zero is not a necessary condition for the existence of underemployment, and thus rejecting the former does not mean nonexistence of the latter (62, p. 2,052). Underemployment can be present even where marginal product of labor is above zero (62, p. 2,054).

¹To make this point clear, let us consider this example. Suppose that harvesting a peach orchard requires 20,000 labor hours. If, as is usually the case in agriculture, the harvesting must be completed within a short period of time, say 20 days, then we need 100 workers, each working 10 hours a day for 20 days to do the job. Now if one were to calculate the required labor hours without considering the very crucial time constraint -- which requires the job to last no more than 20 days -- one could conclude that all that is needed are 10 workers, working 10 hours a day for 200 days. This - to say the least - is an exercise in futility. If the work is stretched far beyond the specified 20 days, the output is lost and services of the workers mentioned above can find no employment after the 20 days of harvesting. The seasonality of agriculture is a natural fact that everyone, including the economists, must come to accept. The only cure for this problem must be found in additional employment, designed to provide jobs for farm workers during the off season, or in providing the farmers with farm machinery and thereby free the laborers.
Much effort has been channeled (wasted?) into proving that marginal product of labor in the less developed countries is not zero, which would supposedly (wrongly) imply that underemployment does not exist in these countries.

The source of confusion in this respect has been the failure on the part of these writers to make a distinction between "zero marginal product of a unit of labor and the zero marginal product of a worker" (29, p. 86). One must distinguish between the number of people on the farm and the number of hours worked by each worker. The workers may only work 4 hours each day, remaining idle the rest of the day. This, however, does not mean that marginal product of a unit of labor is zero.\(^1\) There is, of course, some potentially productive labor being wasted in this instance. But the important thing to recognize is that the waste is not because of zero marginal productivity of labor, but is due to the fact that workers are not working "full time".\(^2\)

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\(^1\)"The concept of marginal productivity of labor must of course, logically refer to the labor input, which in the ordinary way must be reckoned, not by the size of the labor force, whether it is working or not, but by the hours, days, and weeks of actual work. If that is clear, it cannot be taken for granted that underemployment in terms of actual idleness on the part of the labor force implies a zero marginal productivity of labor.... There could of course be, and should be, underemployment at a marginal productivity of labor higher than zero..." (62, p. 2,052).

\(^2\)This, however, makes the definition of underemployment quite arbitrary. In this instance "the amount of disguised unemployment depends on what we consider to be a full day of work for each (worker)".
Another feature of the theory of underemployment is its static nature. As we saw before, underemployment is present if a portion of the labor force can be removed from agriculture without a fall in the farm output. It is also assumed that the techniques of production, capital equipment, etc., are not changed (increased) when the part of the labor force is removed. Thus we are keeping everything the same and only change the number of workers engaged in farming. The time period, however, during which this change is to take place is not specified. In this connection Myrdal raises the important point that if everything else -- including the institutional framework -- are to remain the same, then when some laborers are withdrawn, farm output does not fall if the remaining farmers work more hours. Under the static condition of the complementary factors, this is the only conceivable way for the farm output not to fall when a part of the labor force is removed. Can we make such assumptions about the workers in the less developed countries.¹

¹Note that even granting the validity of this assumption, we are still left with the problem of violation of the "ceteris paribus" condition. As we have seen before, "underemployment" is present if a portion of the labor force can be removed without a reduction in the output, even though everything else remains unchanged. "Everything Else", of course, includes the number of hours worked by the remaining workers. Otherwise, it can be shown that underemployment is present in every sector of every country. Can anyone deny that we can remove, say 10% of the workers in the United States' farm sector without a reduction in her (footnote continued on following page)
There are many reasons which make the validity of the above assumption doubtful. To begin with, the workers might be underemployed "voluntarily" due to poor health. In many areas widespread diseases reduce the ability of the individuals to work more than a few hours each day, or a few months each year. Until recently one such disease was malaria which affected a great many people in the less developed countries. While malaria is more or less vanishing as a major threat to the people of the third world, there are still many other illnesses victimizing these people. To these must be added the ever present state of undernourishment which the people of the less developed countries have come to accept as a fact of life. All of these, obviously, reduce the efficiency of the farm workers in the underdeveloped countries and explain -- at least in part -- their less than "full time" employment.

(Footnote continued from preceding page) farm output, given that the remaining workers work a bit more each day? Thus the fact that a part of the farm workers in the less developed countries can be removed with no loss of output, providing that others work longer hours, does not prove the existence of "surplus labor" in these countries. In fact, it does not prove anything except the fact that if everyone worked longer hours we would need fewer people to do the work!

1 Mal-de-Chagas, prevalent in northern parts of Argentina, a disease caused by Schistosoma Mansoni in Egypt, various other diseases caused by parasites prevalent in Asia and Africa are some examples. This list, unfortunately, is not exhaustive.
Another factor to be considered is participation by women, children and elders in the work force. One cannot simply "assume" that these groups will participate in the "productive works" once a part of the present work force is transferred out of the farm sector and remunerating jobs are made available in the rural areas. Such assumptions lead to erroneous conclusions. Women do not participate in outside activities because they must run the home, take care of children and -- in many instances -- because such works are not considered "proper" for a woman.

No one can deny -- as this is supported by overwhelming evidence -- that with a basic reconstruction of the village economy, and with a fundamental transformation of people's attitude, women do indeed increase their participation in the labor force. But these basic alterations in people's ways of life cannot be simply "assumed". This assumption becomes particularly unrealistic when it is emphasized that "...total output... would not be diminished even though no significant reorganization occurred in this sector....".¹ The fact is that if "no significant reorganizations occurred", things would remain as they are. If there is no day care center to take care of the children, if there is no group care for the children and the elders -- who invariably live with their

¹See p. 69, herein.
families -- then the women will stay at home to perform these traditional functions.

It may thus be concluded that the theory of "disguised unemployment" suffers from serious shortcomings. It is based on a number of implicit assumptions which are not consistent with the facts of the real world, and the conclusions it leads to are contrary to observable facts.\(^1\) This conclusion runs

\(^1\)Thus far, we have said very little about the theoretical foundation of "disguised unemployment". This has been in line with the tradition as far as this concept is concerned. The main problem with the concept of "disguised unemployment" is not that theoretically is not conceivable, it is not difficult to see that, given a particular stock of capital, addition of more and more workers may ultimately bring about a situation where the last worker adds nothing to total output. For this to happen, it is only necessary for the production function to have a zero slope at some (high) level of labor application. Moreover, this does not necessarily imply no substitutability between labor and capital at each point on the isoquant. It is merely sufficient for the labor-capital substitutability to be impossible at some range on the isoquant. If it is accepted that, as additional labor is applied to the land, with a given stock of capital, a point will be reached beyond which opportunities for substituting labor for "other factors" is no longer possible, then the proposition of zero marginal product of labor must be accepted (25, pp. 539-565).

The problem, however, is that this hypothesis does not represent the situation existing in the less developed countries. Viner asserts that "I find it impossible to conceive of a farm of any kind on which, other factors of production being held constant in quantity, and even in form as well, it would not be possible, by known methods to obtain some addition to the crop by using additional labor in more careful selection and planting of the seed, more intensive weeding, cultivation, thinning, and mulching, more painstaking harvesting, gleaning, and cleaning of the crop" (81, p. 60). Thus, once again, we are faced with the problem of an unrealistic assumption (in this case lack of factor substitutability) and reaching a conclusion which, though logical, is unsound.
contrary to what is alleged to be a "consensus" on this matter. Ranis and Fei assert that "for the case of the typical labor surplus underdeveloped economy...there exists a general consensus that the pervasive phenomenon is one of widespread disguised rural unemployment and underemployment" (26, pp. 11-13). In the light of what has been said before there is a strong doubt that widespread "underemployment" in the sense used by Ranis and Fei, exists in any underdeveloped country. One may add that the emphasis on this concept has confused the issue and has diverted attentions from the basic problem of the less developed countries.

Many attempts have been made to specify the concept of "disguised unemployment" in terms which would not be subject to the criticisms mentioned in the previous pages. It is immediately recognized, however, that such an attempt reduces the concept of underemployment to a mere statement about obvious facts. Thus one writer concludes that: "The only definition of disguised unemployment which has empirical justification or logical consistency is that...labor is so abundant in the agricultural sector that all workers cannot be productively employed for an arbitrary set "normal" working day, month, or year; therefore, the entire labor force is idle part of the time judged by this arbitrary norm. (Furthermore) ...This does not mean that labor transfer results in no decline in (the farm) output" (94, p. 470). And another writer
believes that after all that is said and done about "underemployment" and "disguised unemployment" we are left with the empty statement that "if it were possible to improve the methods of production in agriculture, if the skill of farm laborers is increased, if social habits could be changed,..., if technology in industry could be changed so as to employ unskilled rural workers, if capital and other cooperating factors...could be provided in larger quantities and better quality, if and to the extent that all these things happen or are done, agriculture can release a lot of labor without loss of output and industrial output be stepped up at the same time" (30, pp. 150-151).

Obviously, these statements are a far cry from the concept of "disguised unemployment" as used by Arthur Lewis and which constitutes the foundation upon which the Ranis and Fei model is based. We may therefore conclude that the concept of "underemployment", and the models which are built on the assumption of its widespread existence, are void of practical significance for the underdeveloped countries. Empirical evidences seem to support this conclusion as well.¹

¹Estimation of the amount of "disguised unemployment" is inherently difficult. Aside from the choice of methods, which could affect the results to a large extent, there is the problem of defining various concepts. For instance who is "economically active"? How many hours a day, and how many days a year constitute "full time" work? Should a distinction be made between voluntary and involuntary unemployment?, and so on. Clearly, (footnote continued on following page)
The conclusion that "underemployment", as defined by Lewis and his followers, does not exist in any substantial amount in the underdeveloped countries, should not be interpreted as saying that the farm sector in these countries cannot supply the industrial sector with labor and surplus food. What we have concluded is that the concept of "disguised unemployment", and the related models of development, treat the process of economic development in an unrealistic, and mechanical manner.

The fact is that in most underdeveloped economies a great percentage of the population are engaged in farming, and that this percentage is much higher than that existing in the more "developed" countries. The average productivity of the farm

(Footnote continued from previous page) the result of the study varies a great deal according to which set of definitions is used. Added to all these, is the problem of collecting data. A direct approach -- one which some experts believe to be the only satisfactory method (80, p. 2) requires questioning the farmers directly and may be quite costly. In most cases, therefore, indirect methods are used. Because of all these problems, it is not unusual to find different authors coming up with widely different figures for the rate of underemployment for the same area (91, pp. 36-40).

T. W. Schultz uses a historical event to prove that "underemployment" does not exist even for an overpopulated country like India. After the influenza epidemic of 1918-1919, it is estimated that about 6% of the total population (but about 8% of the agricultural labor force) were left dead. This was accompanied by a reduction in the amount of land under various crops by an average of 3.8%. Furthermore "...the provinces... with the highest death rates...had also the largest percentage declines in acreage sown to crops" (81, p. 67). It can be, therefore, concluded that the part of the labor force which fell to the disease were not in fact "redundant" (see 81, pp. 61-70). Also see (81, pp. 41-44).
workers in the less developed countries is much lower than that of their counterparts in the industrial countries. These are undeniable facts. What is denied, and what the concept of disguised unemployment implies, is the notion of "getting something for nothing".

In the process of development, an underdeveloped country can indeed count on large numbers of workers being released from the farm sector without any substantial reduction in the farm output, given an increase in the "complementary" inputs, such as farm equipments, fertilizers, etc. Alternatively, labor can be released from the farm sector, with no reduction in the volume of farm output, given that those remaining are persuaded - be it by additional monetary incentives or ideological campaigns -- to work more hours each day. One or both of these alternatives are quite likely to be successful in most underdeveloped countries. But this is not the same thing as treating the process of capital accumulation as a "costless" transfer of people from villages to the cities. Moreover, in all likelihood, a successful implementation of such policies requires not only improvements in the techniques of production, but a drastic change in the structure of the village economy. Ignoring these basic requirements of economic development, the models based on "unlimited supply of labor" become irrelevant as a guide for policy making in
the underdeveloped countries, as they direct the attention to "the wrong thing" (39, p. 90).

Using the foregoing review of the concept of "underemployment", we shall now proceed to construct a practical framework for analyzing the process of labor transfer from the farm sector to the other sectors in the Iranian economy. This framework will then be used to estimate the "surplus labor" available in the farm sector of the northern Iran.

The farm sector in Iran is characterized by all traits of a stagnating, traditional agricultural sector including many partially idle and - compared to the other sectors - less productive workers. More than half of the population live in the rural areas and are engaged -- directly or indirectly -- in agricultural activities. Yet, the farm sector produces less than 16% of the country's G.N.P. The rate of population growth in Iran is among the highest in the world, being in excess of 3% a year.

All of this may be taken to mean that there exists substantial amounts of "underemployment" in the Iranian farm sector. However, if by this it is meant that some of the farm workers can be removed from the farm sector without any reduction in the volume of farm output -- while at the same time all "other things" are kept constant -- then this

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1This is indeed the assessment of the I.L.O. economists, (See 88, pp. 127-128).
statement is simply incorrect. It was mentioned at the begin­ning of this chapter that even at the present time, in the area of this study, many farmers are faced with a shortage of labor at the peak months of the farming season. Obviously, if some of the farm workers should migrate out of the rural sector -- with no increase in the stock of capital with which the remaining farmers work, or with no increase in the level of participation by women, etc. -- then the level of farm output would undoubtedly fall.¹

To be sure, there does exist a potential "surplus labor" in Iran's farm sector. But this "surplus" is a changing phenomenon, and it is something other than what the proponents of "underemployment" theory have in mind. The "surplus labor" used in our context is not a timeless, abstract phenomenon. In particular, it depends upon the level of technology, the mix of the crops being produced, the amount of "complementary inputs" being used, and finally on "institutional factors". In this context, it is meaningless to talk about "surplus labor" in abstract terms (62, p. 2509). "Surplus labor" can be large or small depending upon the level of various factors

¹To be sure, seasonal unemployment is prevalent in this area. Literally millions of days of potentially productive labor are wasted during the off-seasons. But at the peak of the season there are very few farm workers going unemployed. In fact, during the cotton harvest season even the household servants are drawn into the cotton fields to pick cotton.
which determine its level.\(^1\)

Myrdal asserts that the concept of underemployment depends upon a particular policy assumption (62, p. 2069). One can talk about a particular level of "surplus labor", and the process of utilization of this pool of "redundant" farm workers not in abstract terms, but rather in the context of a particular economic policy (62, p. 2059). This point will become clear as we use this framework to estimate the potential "surplus labor" available in the farm sector of northern Iran, using different policy assumptions.

Potential Surplus Labor in Gorgan and Dasht

It is now possible to estimate the present, and the potential, level of surplus farm labor in Northern Iran, using the framework developed earlier. The technical coefficients used here are based on the estimates of 47 "farm units" who were interviewed.

---

\(^1\)We may define the amount of surplus labor, at time \(t\), to be a function of several variables: 
\[ S_t = f(a_t, b_t, c_t, d_t, ..., z_t) \]
where the variables inside the parentheses are those mentioned above. These variables can change over time, either due to market forces, or because of deliberate government policies. There exists a particular amount of "surplus labor" for every combination of variables \(a_1\) through \(z_t\). Thus while "surplus labor" may be nonexistent at a particular time in a country, it can be "created" by various policies which affect the variables \(a\) to \(z\).
Table 8 shows the hectares of land under various crops in this region. It also shows (columns 3 through 13) the number of man-days of work required for production of each crop during the different months of the year. The last two columns of this table show the number of man-days of work, and the number of workers, required for the production of the prevailing crop mix during the peak month of the year. As Table 6 shows, during Khordad, the third month of spring, about 124,886 people are working on the farm of this region. Performing similar calculations for the other months of the year, we can calculate the number of workers involved in agricultural work in this region during each month of the year. These numbers are used to plot Figure 2 which shows the fluctuation in demand for farm workers in this region.

For reasons to be explained later, the currently available supply of farm workers may be taken to be at least 124,886. This number of workers are assumed to be available

1It is assumed that each worker works, on the average, 28 days in each month.

2Iranian calendar year starts in the first day of spring. Khordad, being the third month of the year, starts on the 22nd of May and ends on 22nd of June.

3The actual number of workers in the farm sector of this region may be slightly more than the above figure. The reasons for this statement are stated in Chapter VIII, below. However, since at the present time we are mainly interested in the concept of "potential surplus labor" and not its exact magnitude, the accuracy of this figure is not crucial to the argument presented.
<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Number of</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3</td>
<td>4 5 6</td>
<td>7 8 9</td>
<td>10 11 12</td>
<td>man days</td>
<td>workers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>required</td>
<td>required</td>
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<td></td>
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<td></td>
<td></td>
<td>during the</td>
<td>during the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>peak month</td>
<td>peak month</td>
</tr>
<tr>
<td>Wheat</td>
<td>259,440</td>
<td>.5 1</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
<td>259,440</td>
</tr>
<tr>
<td>Cotton</td>
<td>197,400</td>
<td>.5 1</td>
<td>15 13</td>
<td>5 1</td>
<td>15 7</td>
<td>4</td>
<td>2,961,000</td>
</tr>
<tr>
<td>Barley</td>
<td>75,012</td>
<td>- - 1</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>75,012</td>
</tr>
<tr>
<td>Sunflower</td>
<td>14,100</td>
<td>- 7 2</td>
<td>4 6</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>28,200</td>
</tr>
<tr>
<td>Soybean</td>
<td>1,015</td>
<td>- 4 15</td>
<td>13 3</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>15,225</td>
</tr>
<tr>
<td>Rice</td>
<td>7,896</td>
<td>- 20 3</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td></td>
<td>157,920</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8,158</td>
<td>10,720</td>
<td>124,886</td>
<td>32,380</td>
<td>10,977 0 105,750 49,350 44,777 0</td>
<td>1,511 124,886</td>
</tr>
</tbody>
</table>
Figure 2. Number of workers needed in the farm sector during different months.
for hire throughout the year.\textsuperscript{1} In view of this assumption, fluctuations observed in Figure 2 represent the seasonal unemployment in the farm sector of this region.\textsuperscript{2}

Figure 2 shows that during the month of Khordad, all of the available farm labor force is "employed" in the farm sector of this region. Thus, if a part of the farm people of this area are removed from the farm sector — with "everything else" remaining unchanged — agricultural output will undoubtedly fall.\textsuperscript{3} We can therefore conclude that "disguised unemployment" or "surplus labor" — in the strict sense of these terms — do not exist in the rural areas of this region.

\textsuperscript{1}For elaboration on this point see Chapter VIII, pp. 150-153.

\textsuperscript{2}We have taken one month as a "unit" in this argument. The amount of work necessary for production of a crop during each month is assumed to be uniformly distributed throughout that month. Thus, if cotton requires 28 man-days of work during the 3rd month, we have assumed that one worker, working 28 days in this month, can do the job. Obviously this may not be the case. Ideally, one can get the most accurate result using one day as a "unit". Due to lack of accurate data, however, this is not possible in this case. It must be noted, however, that selection of a month as a "unit" underestimates the amount of seasonal unemployment.

\textsuperscript{3}Removing part of the people from the farm sector at this time would mean fewer workers to perform such tasks as weeding the cotton fields, planting the rice, etc. If mechanical equipment is not made available, fewer workers simply cannot do the job that is needed to be performed. A lower yield, therefore, is the inevitable result.
There does exist, however, a potential surplus labor. This surplus labor, however, is not constant. It varies with changes in the degree of mechanization, labor force participation rate, etc. which influence demand and supply of farm labor. The observation that no surplus labor is present is valid only so long as the current conditions prevail, i.e., this conclusion is relevant only so long as the level of technology, the mix of the crops produced, the extent of utilization of complementary farm inputs, the degree of participation by women, the amount of immigration and outmigration of farm workers, etc. remain as they are. Should any of these factors be changed, then there may well appear a substantial amount of surplus labor which could be transferred out of the farm sector with no change in the amount of farm output.¹

To show this, we can assume a change in one of these "factors" and observe its effect upon the level of "surplus labor". In particular, let us assume that cotton production in this region becomes completely mechanized. This requires the introduction of more farm equipments into the farm sector of this region, which we assume is made possible by a government aid program. Such a change in the "level of technology"¹

¹At least in principle, it is also possible for a labor shortage to develop. This could happen, e.g., if mechanization was reduced, or fewer people participated in the work force.
applied in the farm sector reduces the number of man-days of work required for the production of the same crop mix drastically. Table 9 shows the labor requirement in each month as well as the number of workers required during the peak month for this new situation. Figure 3 shows the number of workers needed during the different months of the year.

During the peak month of the year, only 19,136 workers are needed to perform the necessary tasks in the farm sector of this region. Any "worker" who is not "employed" during this month, therefore, can be classified as "redundant". The assumed change in the "level of technology" -- with all other things remaining as they are -- has thus "created" "surplus labor" amounting to more than 105,000 people. This is "surplus labor" in the true sense of the word. Given the existence of an industrial sector which can absorb these workers, a labor transfer out of the farm sector can be expected.

Before continuing this argument an important point must be emphasized. The type of calculations performed in the above example is essentially the same as that used by some economists who have concluded that "underemployment" is prevalent in the less developed countries. We have already stated that reaching such conclusions by such methods is not legitimate.¹ What we have concluded from this example is that

¹See p. 70, herein.
<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Number of man days required during the peak month</th>
<th>Number of workers required during peak month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>259,440</td>
<td>.5</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>259,440</td>
<td>9,266</td>
</tr>
<tr>
<td>Cotton</td>
<td>197,440</td>
<td>.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Barley</td>
<td>75,012</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>75,012</td>
<td>2,679</td>
</tr>
<tr>
<td>Sunflower</td>
<td>14,100</td>
<td>-</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>28,200</td>
</tr>
<tr>
<td>Soybean</td>
<td>1,015</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>13</td>
<td>15</td>
<td>15,225</td>
</tr>
<tr>
<td>Rice</td>
<td>7,896</td>
<td>-</td>
<td>20</td>
<td>3</td>
<td>12</td>
<td>12</td>
<td>157,920</td>
</tr>
<tr>
<td>Total</td>
<td>8,158</td>
<td>10,720</td>
<td>19,136</td>
<td>10,382</td>
<td>10,987</td>
<td>10,987</td>
<td>1,511</td>
</tr>
</tbody>
</table>
Figure 3. Newly "created" surplus labor
"surplus labor" will be present if the level of technology used in the farm sector could be increased. This is obviously not the same thing as saying that 105,000 workers in this region are "redundant". Our example only shows what is most obvious, but which is unfortunately neglected in many cases. The above exercise was a clear indication that "savings" in the form of "surplus labor" is not there for the taking.

There is no doubt that a potential saving, in the form of "surplus labor" does exist. But the process of utilizing this potential is not -- as implied by the adherent of underemployment hypothesis -- a costless one. Not only the "creation" of "surplus labor" will require large amounts of investment -- which in this case happened to be in the form of farm equipments -- but the absorption of these workers requires heavy investment in the urban areas as well (39, pp. 88-89).

Similar though perhaps less drastic results, are obtained by changing other variables in the "surplus labor function". If we assume an increase in the degree of participation by women in the labor force, the total number of workers available increases and -- assuming no decrease in the amount of complementary inputs and no change in the mix of crops produced, "surplus labor" will become available. Once again it must be emphasized that this is not a "costless" process. Increase in the degree of participation by women cannot simply be "assumed". It requires not only a substantial
amount of investment in the form of building day-care centers, etc., but also presupposes fundamental changes in the structure of the village society and people's attitude.

Finally, a change in the relative price of the farm products -- which could be brought about by means of a deliberate government policy -- can result in the appearance of "surplus labor". For instance, should the government of Iran decide to stop its current policy of wheat price control, the price of wheat will rise substantially. This will cause -- in all likelihood -- an increase in the amount of land under wheat production. As will be shown in a later chapter, a bulk of this land is withdrawn from cotton production. Substitution of wheat for cotton -- ceteris paribus -- reduces the number of workers needed in the farm sector\(^1\) and thus creates "surplus labor". Changes in the government's policies, therefore, may be used to "create" "surplus labor" in the farm sector, even if no "underemployment" exists at the present time.

Conclusions

Our theoretical discussions led us to conclude that the concept of "underemployment", as put forward by Lewis and others, is an empty concept. The models based on this notion

\(^1\) Cotton production is much more labor intensive than wheat production. See Table 8 above.
concentrate on the wrong thing and ignore the basic issues involved in the development of an underdeveloped economy. In these models, emphasis is placed upon the widespread existence of a "surplus labor" and "hidden savings" which can be utilized for capital formation in the industrial sector without any change in the level of technology or in the institutional framework existing in the farm sector of an underdeveloped country. This represents, to say the least, a naive approach to the process of economic development.

To be sure, there does exist a "potential surplus labor" and a "potential saving" in the farm sectors of the less developed countries. The problem is how to make the realization of the "potentials" possible. The conditions necessary for realization of such potentials include not only introduction of additional "complementary inputs" into the farm sector, but also a basic reorganization of the socio-economic institutions existing in the rural areas.\(^1\) The theories which

\(^1\)Of equal importance is the creation of an environment, in the industrial sector, which facilitates the absorption of labor in an efficient manner. The Ranis and Fei model takes the existence of such an environment largely for granted. The existence of large masses of unemployed workers living in the newly created "ghettos" around large cities in nearly every underdeveloped country should be ample proof that labor absorption is not an automatic process. Analyzing the conditions necessary for efficient utilization of labor in the "nonfarm sectors", and what these conditions imply in terms of planning for a mass migration of labor from villages to the cities, however, lie outside the scope of this study (see 39, pp. 88-89).
ignore the necessity of such efforts, or simply assume that they will be forthcoming, are, to say the least, irrelevant as a guide for policy making in the less developed countries.

It was concluded that the term "underemployment" — defined in the strict sense of the term — is an empirically empty concept. Once stripped of its unacceptable, implicit assumptions, it becomes a simple statement about obvious facts. It is legitimate to speak of "underemployment" not in abstract terms, but only in connection with a particular policy assumption. Furthermore, it must be recognized that "underemployment", as interpreted here, is a changing phenomenon. This point was illustrated with the help of some examples. It was shown that, while no "surplus labor" exists at the present time in the farm sector of northern Iran, various amounts of "surplus labor" could be forthcoming if certain changes are made in the variables which determine the level of "surplus labor". Furthermore, it was seen that government's policies could be devised to create various levels of "surplus labor". Whether or not such policies are desirable for a particular country depends — among other things — on the labor absorption capacity of the other sectors of the economy. What is important, however, is the recognition that "surplus labor", instead of being a "timeless", abstract
concept, is in fact a changing phenomenon whose magnitude could be varied by — among other things — discretionary policies.
CHAPTER V. MARKET LIMITATIONS

Nearly all of the farmers interviewed expressed dissatisfaction with the existing markets for their crops. Familiarity with the present marketing mechanism is essential to understanding the farmers' dissatisfaction with it. A description of the prevailing marketing system in the area of this study, therefore, is in order. Though problems associated with marketing farm products are present - in varying degree - in all parts of the country, these problems are particularly noticeable in this region. The reason for this being the fact that the crops in this area, more than in any other agricultural region, are produced for outside markets, rather than for local use.

The main crop in Gorgan and Dasht is cotton. Having very little local use, nearly all of the cotton produced is marketed. The same is true of the soybeans and sunflower seeds produced in this area. The situation is slightly different for wheat and barley. Though all of the wheat and barley crops produced by the "commercial" farmers are marketed, a

1 As Table 5 in Chapter II shows, 96% of the commercial farmers and all of the villagers interviewed were dissatisfied with the prevailing market situation. See p. 28, herein.

2 Local spinning of cotton is rapidly disappearing. The availability of cheap, manufactured cloth has rendered local cloth weaving an unprofitable enterprise.
large part of these crops produced by the village farmers are used locally. Nevertheless, the share of the crops produced in this region, which reaches the market is indeed large, in comparison with other parts of the country. Thus the problems associated with marketing in Iran are best manifested in this area.

The problems and shortcomings of the present marketing channels in Iran could be analyzed from many different angles. One could point to the existence of unstable prices for many farm commodities, the absence of any type of forecasting to aid the farmers, government price control for some farm products, high producer-consumer margins, lack of competition in market for some farm commodities, inadequate institutions to deal with the distribution of farm products as well as many other problems. All of these problems exist in Iran's farm sector in varying degrees (see, for instance, 43, Annex 9).

The most important marketing problem - at least in the area of this study - seems to be the results of what can be generally termed "market imperfections". The great bulk of this chapter deals with this important problem.

"Market" may be defined as a medium, where buyers and sellers meet and exchange takes place. The "rate" or "price", may be determined in various ways. In a "planned" economy, where the state is the sole, or major, buyer, the producers sell their crops at a predetermined price. This price
is determined on the basis of the costs of production and in the framework of a national economic policy. In such cases the "marketing problems", along with the "market" itself - in its traditional form - are largely eliminated. This is at least true for the producers who deliver their crops and receive their income from the state. Whatever marketing problems remain (such as storage, transportation, distribution to retailers, etc.) do not concern the producers.

In a "market economy", prices are determined by the "market forces". Competition among the buyers and the sellers creates an "equilibrium" price which must be accepted by all parties involved, since no single buyer, or seller, can exert any influence upon it. In the countries where this "classical" competitive market exists, marketing problems are minimal. The prevailing competition tends to reduce the inefficiencies to a large extent. The producers may, of course, be hurt by the vagaries of the market in some years, but are rewarded with higher prices in other years.

The existing marketing system for farm products in Iran fits neither of the above mentioned "models", though it contains elements of both. The combinations of these elements, however, have given rise to a market system which functions quite poorly. A description of the prevailing marketing channels in the Gorgan and Dasht region will demonstrate this point. For the sake of brevity, only the process of
market wheat and cotton will be described.

Wheat Market

Wheat prices in Iran are, to a large extent, government controlled. Due to the importance of wheat as a food item for Iranians, the government of Iran takes certain actions (such as subsidizing imports) to keep wheat prices at a specific level. The price received by the farmers, therefore, has little to do with the demand for and supply of wheat in Iran. The process of marketing wheat is as follows:

A majority of village farmers—many of whom grow wheat for market as well as personal consumption—sell their crops "green". This is done because the small farmers are unable to obtain the desired amount of credit from any other means (see Chapter III). For these farmers, therefore, the problems associated with marketing and credit are so interrelated as to make an isolated analysis of the marketing situation almost impossible.

The village farmers—those who sell their crops green—have very little to say about the prices they receive. This

1 Most of the literature in this area treats the two problems simultaneously. See for example (1).

2 "The farmer has virtually no bargaining power in the marketing of his output. Channels and institutions for distribution and marketing are such that farmers often have but alternative for selling their products, and this is often intermingled with credit advances" (43, Annex 9, p. 3).
is not the same thing as saying that the farmer is a price taker, though he definitely is one. The point is that such farmers receive substantially less than the price which is determined by forces upon which they have no control - in the case of wheat in Iran by the government's policy. The market price of wheat in Iran has been kept at a low level by the government's intervention (see Chapter 10), yet the price received by these village farmers is significantly lower than the market price. These farmers sell their crops before it is harvested at large discounts because they have no alternative source of obtaining credit. For these farmers, who do not even own their crops when it is harvested, the primary problem is that of credit shortage and chronic indebtedness. This problem - which is not confined to this area or to Iran - is recognized as a crucial obstacle to efficient agricultural marketing.¹

¹"Of all handicaps to efficient agricultural marketing, chronic indebtedness is probably one of the most important for many millions of small producers" (1, p. 108).
either sell their crop to the government agencies at a low price, or to the merchants who offer them a slightly better deal. In the past few years this price has been so low as to make wheat farming an unprofitable enterprise. Only in 1974 did the government raise its purchase price to a level high enough to enable wheat farmers to reap a modest profit.

Cotton Market

The government does not interfere - directly at least - in the cotton market. Prices are determined by the "market forces". But the market is far from the competitive model described above. The marketing problems of Iranian agricultural products appears in their most glaring form in the cotton market. Once again, part of the problem is directly attributable to the "credit problems" of the village farmers. But the major defects in the cotton market stem from the "imperfections" in the market.

A majority of small cotton farmers sell their crops green. As it was described in Chapter III, the village farmers sell their unharvested crops to the local banakdar or the traveling green buyer, or perhaps to a small city merchant. But these green buyers are mere middlemen. They resell this cotton - at a profit of course - to any one of the handful of giant trading companies who are among other things
- cotton exporters. These giant conglomerates have virtual monopoly power in their dealings with the farmers. No matter who buys the cotton from the farmers in the first place, it finally ends up in the hands of one of the companies.¹

In this respect - unlike the credit situation - there is little difference between the village and commercial farmers. In the final analysis they all must accept the price offered by these buyers.

Cotton farmers in this region number in hundreds, perhaps much more. Furthermore, they constitute a heterogeneous group with divergent interests. Members of this "group" range from the small village farmer with one hectare of cotton, to the large commercial farmer - merchant with hundreds of hectares of cotton. There is virtually no possibility of collusion among these producers. Opposing this myriad of small and large farmers are a handful of buyers, well organized, all powerful, and closely connected by their common interest.²

They are the major buyers of cotton - both the lint and the seeds - in this area. The lint is mostly exported to foreign markets, and the cotton seeds are used for its oil content in

¹One of these companies, the Behshar Industrial Group, had gross sales of $250 million in 1352.

²There is ample evidence of collusion among the above mentioned trading companies. This collusion is resulted in a de facto monopoly in the cotton seed market and to a lesser extent in the cotton lint market as well (29, p. 218).
their own cotton-seed crushing plants.

For a number of reasons, the cotton farmers must accept the prices offered them by these buyers. To begin with, most of the cotton produced must be exported to foreign countries, as the demand of the domestic industries is well below the country's supply of cotton lint. But exporting cotton requires a "license", or a "permit" from the government. The "permit", however, is given to only a few merchant companies, mainly the same trading companies mentioned above. Thus the cotton producers - or even their cooperatives, to the extent that they exist - have no alternative but to sell to those who are in a position to export the cottons.

One could hypothesize that, were cotton exports free for everyone who had cotton to sell, the price of cotton in Iran would have been the same as the "world market price". In that case the only difference between cotton prices (of the same quality) in Gorgan and, say, Liverpool, would be the transportation costs. Although even at the present time price of cotton in Iran generally moves in the same direction as the world price, at times the difference becomes much more than can
be accounted for by the transportation costs.¹ Such differences are, of course, nothing but monopoly profits accruing to those who possess the "license" to export cotton. These licenses are at times sold, by those who hold them to the merchants or even cotton producers themselves who cannot acquire it in any other way.

The situation is much worse in the cotton seed market. Being extremely perishable, cotton seeds cannot be stored more than a few days in the regular storage houses. Building the necessary storage facilities are well beyond the financial capabilities of the farmers. Thus the farmers sell their cotton seeds at whatever price is offered them.

Cotton seeds are used for their oil contents. There are only a few "vegetable oil" companies in Iran who buy practically all of the cotton seeds produced in this area. Once again, these oil extracting companies - with the exception of one belonging to the army - are the subsidiaries of the giant conglomerates mentioned previously. The cotton seed buyers, therefore, are by and large the same companies that buy the cotton lints. The price of the cotton seeds - which is lower now than a decade ago - is virtually dictated by these com-

¹Due to the differences in the grading system, it is difficult to establish the exact relationship between the price of cotton lint in Gorgan and the world market price. However Dr. M. Gorgani has demonstrated that while the two prices move more or less in the same direction, the correspondence is not exact. It is not unusual to find periods when lint prices in Gorgan remained constant while world prices increased (29, pp. 227-229).
panies. The farmers have the choice of selling their cotton seeds at the "set" price, or let them rot.

Unfortunately, adequate price data is not available to investigate the effects of this "imperfection" in the cotton-seeds market. Nevertheless, with whatever data could be gathered, the general trend can be established. In the eleven years between 1342 to 1352, the price of cotton-seed dropped from 7000 Rls./ton to 6500 Rls./ton. A reduction of 7%.\(^1\)

During the ten year period of 1342 to 1351 (the latest year for which data is available) the general food index rose by more than 28% (75, p. 621). The price index of vegetable oil - the main substance of which is cotton seed oil - increased from 115.7 in 1349 to 133.9 in 1350, and to 156.4 in 1351, and at the end of 1351 it stood at 189.1 (75, pp. 628-629). Thus between 1349 and 1351, price of vegetable oil increased by more than 63%, while during the same period the price of cotton seed in Gorgon, increased by a mere 9%. These data may not be conclusive. But the cotton farmers in this region are convinced that cotton seeds are undervalued, mainly because there is little, if any, competition among the buyers.

Competition, the economic textbooks tell us - is a healthy and driving force in a market economy. It squeezes out the inefficient producers and retains the most viable

\(^1\)Data gathered in Gorgan by this writer.
ones. It prevents the consumer from paying "exorbitant" prices and it provides an environment in which the producers sell their crop where it fetches the highest price.

If there is any truth in the textbook panegyrics of a competitive market, then the source of many of the problems described above may be traced to the "structural" defects of the cotton - or for that matter the wheat - markets. However, there is a fundamental difference between the market "defects" in the two cases of wheat and cotton.

It was mentioned before that nearly all farmers interviewed were dissatisfied with the existing markets for their products. Strangely enough, however, despite the absurdly low price of wheat compared to that of other crops, especially cotton - the dissatisfaction was much more pronounced for the cotton market. The farmers in Iran - unlike their counterparts in the U.S. whom this writer had occasion to meet - do not mind government intervention in their economic affairs. Their complaints were not directed at the government's policy of wheat price control per se. This was particularly true among the village wheat farmers. Their objection was to the fact that the government's purchase price - which ultimately determines the market price of wheat - was set with little regard for the costs of production and the general cost of living. Other objections were directed against the rigidity of the government's specifications, and the corruption of the
buying agents.

One could devise a scheme whereby a single buyer - say the government - buys the crops from the farmers at a specified price. If this purchase price is set at a "reasonable" level, the farmers would probably welcome the offer and sell their crops to the government. Under such a scheme, the disadvantages of not reaping windfall profits in "good" years, is offset by the merits of a guaranteed market and a stable price. Though such policies may create bureaucratic problems and corruption, one must nevertheless admit that they are conceptually workable. The problems with the "wheat market" in Iran, is therefore attributable to the methods of implementation of the policy of government intervention.\(^1\)

The problems in the cotton market, however, stem from different sources. The unequal bargaining powers of the sellers and the buyers has created a lopsided market. Economic theory teaches us that in a market where a single buyer faces a large number of sellers, the buyer is in a position to reap huge "monopsony" profits which he would not have been

\(^1\)The advantages of stable prices should not be underestimated. Abbot considers a "reasonably" stable prices for farm products as one of the main conditions for providing production incentive to the farmers. He adds, however, and this is what has been overlooked in Iran, that prices thus set should have a relationship with the costs of production (see 2, pp. 350-351).
able to reap in a market where the buyers compete for the purchase of the product. While the cotton market in Gorgon area does not represent a "pure" monopsony, for there are more than one buyer, it is nevertheless very close to it. There is every indication of total collusion among the giant companies who buy most of the cotton lints and virtually all of the cotton seeds. For all practical purposes, there is only one "buyer" in the cotton market, thus rendering the situation a - de facto - monopsony.

The "buying party", naturally wants to pay as little as possible for the commodities he buys. This is, of course, true in all markets, and in all enterprises where maximum profit is the motive. In a competitive market this desire to buy cheap on the part of a purchaser is "checked" by the existence of other buyers. If the purchase price is set too low by one buyer, he ends up with no purchase at all.

In the cotton market in this region there is no "checks" of the sort described above. The buyers can set a price which they consider right. The sellers have a choice to sell at this price or not to sell at all. As it works out, and as one may expect, the farmers sell their cotton and their cotton seeds every year at the "market" price. The final outcome of this situation being that every year a substantial amount of capital - which under a competitive market would have accrued to the farmers - is transferred from the farmers to
these "conglomerates". Small wonder that the farmers are unhappy with the markets for their crops.

It may be difficult to solve the major problems of the farm sector in Iran in a short period of time. It may be a long time before the policies aimed at increasing the technical efficiency of the farms bear fruit. But there are many steps, which require no fancy plans, and which can almost immediately improve not only the living conditions of the farmers but technical efficiency as well. If there is any relation between the price received by farmers for their crops, and the efficiency and enthusiasm with which they work, then the mere termination of this yearly transfer of capital may be conducive to agricultural development.¹

The solution to this problem does not seem very difficult. One possibility would be for the government to set a purchase price and buy the produced cotton - at the world market price, less the transportation and the administration costs - and export it, or sell it to domestic industries.

¹The following calculations indicate the magnitude of this "capital transfer".

In 1351, total cotton produced in Gorgan area amounted to 385,501 tons (53, Table 2). This came to 127,816 tons of lint, and more than 250,000 tons of cotton seed.

In the decade of 1341-1351, price of cotton lint has increased by almost 200%. If price of cotton seed had increased by half as much, which the farmers believe it certainly would have in a "free" and competitive market, cotton seed prices would have been 6000 Rls./ton higher than what they are today. Thus the farmers would receive an additional 1,500,000,000 Rls. for their cotton seed (roughly $22,000,000) each year.
The other would be to allow the farmers - or their cooperatives - to export cotton themselves. By increasing the number of exporters and the consequent competition among the buyers, cotton lint prices would cease to be subject to manipulation by any single buyer. As for the cotton seed prices, the solution may not be that simple. Cotton seed crushing plants require heavy investments and cannot be expected to grow in numbers in the near future. Thus the main purchasers of cotton seeds will continue to be the same trading companies for a while.\(^1\) Government price regulations, therefore, seem to be the only possible way for the farmers to receive a higher price for their cotton seeds.

The problems mentioned in the foregoing discussions are just part of the whole set of problems generally referred to as marketing problems. The widespread green selling by the small farmers, and the "imperfect" markets, however are the most important problems faced by the farmers in this area. Furthermore, many other problems have their roots in the shortage of credit and monoplastic markets. Shortage of credit is the main reason for the extremely high producer-consumer "margins" of wheat and cotton sold by the small farmers. The imperfection in the market for farm products reduce the prices the farmers receive and this has a negative

\(^1\) Other uses of cotton seed - such as their use in animal feed - are quite limited at the present time.
effect on their incentive to produce more efficiently.

In conclusion, this chapter has dealt with the most important problems of marketing farm products in this area. Problems such as poor roads and transportation facilities, large number of middlemen and inadequate storage facilities are also present and add to the producer-consumer margin. In the light of the credit shortage and the imperfect markets which characterize the farm sector of this region, however, the former problems are of secondary importance.
CHAPTER VI. WATER SCARCITY

The table on page 28 reveals that about 70% of both types of farmers consider water shortage to be a serious problem, hampering their operations. To be sure Iran is an arid country and water is a limited resource in agricultural production. Shortage of water has been described by some as a major obstacle for agricultural development. \(^1\) This, however, cannot be said for the Gorgan area, which receives more than 24 inches of rainfall annually. While a part of this region receives very little rainfall and is considered "desert", other parts receive as much as 45 inches of rainfall annually. There are more deep and semi-deep wells in this area than in any other part of the country. In fact, about 20% of the semi-deep wells existing in the entire country, are located in this area (75, pp. 323-331). It is therefore surprising to find a large percentage of farmers in this area reporting water shortage as a pressing problem in their operation.

To understand this, one must recognize the manner in which water is used in agriculture. Water, like labor, is used most intensively during certain periods of the year. Furthermore, water unused during the winter and spring is 

\(^1\text{(41, pp. 9-10). It must be mentioned that there is room for improvement in this area to a great extent.}\)
largely gone to waste and cannot be used during summer when it is needed most.\textsuperscript{1} Thus it is crucial to differentiate between the general availability of water and water availability during certain peak periods. Moreover, since each crop requires water in a particular quantity by months of the year, abundance or shortage of water in an area depends upon the types of crops produced in that area as well as the pattern of water availability.

The information on "water problems" conveyed by Table 5 on page 28 may now be seen in a slightly different light. While there does exist widespread shortage of water in this region, the serious water shortage occurs only during certain periods - about two to three months of the year - when cotton fields are in need of irrigation. Due to the rapid increase in the amount of land devoted to cotton production in the past few years, this problem of water shortage has been aggravated.

This is a clear example of the existing interdependence among economic variables. The price of wheat has been kept at a constant level for many years by the government, while price of cotton has been steadily increasing. There has thus occurred a gradual increase in the amount of land used in cotton production, and a concomitant reduction in the amount of water available for other crops.

\textsuperscript{1}Building dams, as well as water reservoirs can, of course, avoid water waste to a large extent.
Table 10. The amount of water in cubic meter needed for various crops in different months (source, farm interviews)

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<tr>
<th>Crop</th>
<th>Spring</th>
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<td>Farvardin</td>
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<td>Poorly irrigated cotton</td>
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<td>Fairly irrigated cotton</td>
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<td>Fully irrigated cotton</td>
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<tr>
<td>Poorly irrigated wheat</td>
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<td>800</td>
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<tr>
<td>Fully irrigated wheat</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Fully irrigated barley</td>
<td>600</td>
<td>800</td>
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land sown to wheat. This product substitution has, among other things, altered the previous pattern of factor use. In the case of water, the substitution of cotton for wheat has meant an increase in the total amount of water used in this region, particularly during the summer months when the ratio between the amount of water available to the amount of water used is at a very low level.

Table 10 shows the amount of water needed, in different months, by the three most important crops in the region. Cotton, if it is irrigated, requires intensive irrigation during the summer months. Wheat and barley, need water during the first two months of spring. The total amount of water required
per hectare of cotton (fully irrigated) is more than twice as much as that needed for a hectare of wheat (also fully irrigated). Thus the increase in the amount of land used for production of cotton, and the resulting concentration of demand for water during the summer months, is at least in part responsible for the present water scarcity in this region.

The recent revision in the government's purchase price of wheat - increasing it from 6,000 to 10,000 Rls./ton - will undoubtedly check the trend towards more cotton production. This in turn, will alleviate the present water shortage to some extent. But to the extent that the government is intent on controlling the price of wheat, drastic reductions in the amount of cotton produced is not likely to occur. The government must, therefore, be willing to undertake the necessary steps towards providing more water, as well as irrigation facilities, for the farmers. This includes construction of dams and water reservoirs to prevent water waste during the off seasons.

The system of water distribution is also in need of improvements. At the present time only the large farmers, who can afford to dig deep and semi-deep wells in their land or to acquire permits to pump water from the rivers, have more or less adequate water. The majority of small farmers have no access to any source of water and must rely only on the rainfall. To alleviate the problem of water scarcity in this
region, therefore, requires not only steps which would reduce the waste of water and increase the total amount of water available for irrigation, but a better distribution of the water as well.
CHAPTER VII. THE PRESENT AND FUTURE CROP PATTERNS

Direct questioning was used to estimate the supply schedules for wheat in Gorgan and the Plane. In each of the five subregions, at least three villages and five commercial farmers were interviewed. The farmers were asked about their production responses at different wheat price levels. More specifically, the questions dealt with:

1. The amount of land currently used for production of wheat (and other crops).

2. The amount of land which would be used for production of wheat (and other crops) if - ceteris paribus - the price of wheat were raised to:

   a - 10,000 Rls./ton
   b - 15,000 Rls./ton
   c - 20,000 Rls./ton

The results obtained for each subregion are summarized in the following section. Before that, however, a few words must be said about an assumption made in analyzing the data. It has been assumed that within the commercial or village groups the individual farmers' response to price variations is not affected by the size of their farms, i.e., the response is randomly distributed. A farmer, so long as the size of his holdings qualifies him as a commercial farmer, is considered a "unit" within the commercial farmers group. Whether he has 100 or 1000 hectares of land, it is assumed, matters little in so far as his price responsiveness is
concerned. The same reasoning applies to the villages. The size of the village, it is assumed, does not affect the supply response of its farmers. This explains the fact that the table on page 121 is in terms of percentages rather than absolute figures.

This table reveals several important facts. To begin with, in all of the five subregions the village farmers devote a larger percentage of their land to wheat production than do the commercial farmers. The difference is much more than can be explained by "chance." Moreover, this phenomenon continues to exist at all levels of wheat prices. This means that now and in the future, the village farmers produce

1 This statement may seem to contradict our basic differentiation of the village (or small) farmer from the large (or commercial) farmer. The above statement seems to imply that size of the farm has no effect upon the nature of decision making, whereas distinction between a village farmer and a commercial farmer is based on the premise that the two groups behave so differently as to merit their categorization into two distinct groups.

The point to be recognized, however, is that the size of the farm does affect the nature of farming, and of farmers' decision making behavior up to a limit. Beyond that, the significance of the farm size diminishes and eventually becomes nonexistent. Thus while there is a world of difference between a farmer with 3 hectares and another with 100 hectares of land, there is very little difference between two farmers, one having 1000 and the other 2000 hectares of land.

2 In Areas I and V, the difference is 12%. In Area II it is 3%. In Area III, 10% and in Area IV, the difference is 20%.
Table 11. The percentage of land sown to cotton and wheat under different wheat price levels

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<th></th>
<th>Currently Wheat</th>
<th>Currently Cotton</th>
<th>Case 1 Wheat</th>
<th>Case 1 Cotton</th>
<th>Case 2 Wheat</th>
<th>Case 2 Cotton</th>
<th>Case 3 Wheat</th>
<th>Case 3 Cotton</th>
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<td>Farms</td>
<td>28%</td>
<td>57%</td>
<td>37%</td>
<td>53%</td>
<td>50%</td>
<td>44%</td>
<td>79%</td>
<td>21%</td>
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<td>Farms</td>
<td>36%</td>
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<td>Commercial</td>
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<td>51%</td>
<td>44%</td>
<td>68%</td>
<td>29%</td>
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<td>Village</td>
<td>44%</td>
<td>40%</td>
<td>69%</td>
<td>24%</td>
<td>83%</td>
<td>12%</td>
<td>94%</td>
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<td>Commercial</td>
<td>42%</td>
<td>41%</td>
<td>48%</td>
<td>35%</td>
<td>63%</td>
<td>30%</td>
<td>82%</td>
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<td>Village</td>
<td>52%</td>
<td>17%</td>
<td>64%</td>
<td>13%</td>
<td>86%</td>
<td>10%</td>
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<td>Commercial</td>
<td>37%</td>
<td>47%</td>
<td>47%</td>
<td>37%</td>
<td>64%</td>
<td>24%</td>
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<tr>
<td>Village</td>
<td>57%</td>
<td>34%</td>
<td>73%</td>
<td>22%</td>
<td>89%</td>
<td>6%</td>
<td>95%</td>
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<tr>
<td>Commercial</td>
<td>48%</td>
<td>10%</td>
<td>60%</td>
<td>12%</td>
<td>82%</td>
<td>9%</td>
<td>95%</td>
<td>1%</td>
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<td>Village</td>
<td>60%</td>
<td>10%</td>
<td>76%</td>
<td>6%</td>
<td>84%</td>
<td>0%</td>
<td>91%</td>
<td>0%</td>
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Figure 4. Percentage of the land in Area I sown to wheat at various wheat price levels
Figure 5. Percentage of the land in Area II, sown to wheat at various wheat price levels
Figure 6. Percentage of the land in Area III sown to wheat at various wheat price levels
Figure 7. Percentage of the land in Area IV sown to wheat at various price levels.
Figure 8. Percentage of the land in Area V sown to wheat at various wheat price levels
relatively more wheat than the commercial farmers.

The reason for this difference in behavior is the nature of the village economy and the uncertainty faced by the small farmer. The small, village farmer depends on the products of his few hectares of land for his survival. There is no savings or credit or welfare programs he can depend on. Should his land fail to provide sufficient income to buy food, his family faces starvation. He must make sure this does not happen. Under such circumstances the farmer fears both the weather and the market and is forced to avert any risk and play it safe. He does not produce a crop which - though highly profitable in normal circumstances - might fail to provide him with the necessary income either because of bad weather or lack of market. Thus, while production of cotton was much more profitable in the years 1351 and 1352, a great majority of small farmers still produced some wheat on their land.

This behavior might surprise the economist who is in the habit of assuming a single valued objective function incorporating only the expected level of profits. But the small farmer in Iran cannot afford to maximize the average expected returns if that plan has a large probability of failure. The risks of starvation involved in maximizing expected level of income are more than he is willing to take. Cotton is a risky crop. It needs a minimum amount of water,
it requires a rather specific weather conditions, it is prone
to diseases - if it is not sprayed with insecticides - and
most important of all it cannot be eaten! It must be marketed.
The uncertainty about future market conditions is an important
detriment to a small farmer's willingness to grow only cotton.

Wheat, on the other hand, has several characteristics
that a small farmer wants. It requires less total water than
cotton per hectare and not as much summer water as cottons.
Dry weather and lack of irrigation reduces the yield of
wheat but seldom to zero in this region. Wheat is less prone
to plant disease and above all it can be consumed directly. In
fact wheat is the most important food item for the Iranian
citizen.\(^1\)

Thus one can safely assume that at the present time, and
for the near future, some wheat will be produced by the village
farmers even at a zero market price for wheat.

The commercial farmers, on the other hand, are mainly
concerned with the maximization of long run profit. They can
afford to average good years with bad years and produce for
the market. Thus they produce what promises to yield them
the highest profit. With low wheat prices of the past few

\(^1\)The "average" per capita consumption of wheat in Iran
is about 187 kg. for the rural areas, however, the relevant
figure is 235 kg. (43, Annex 14, Table 3.3).
years and high cotton prices, cotton pushed wheat off even marginal cotton land.

Another point to be mentioned is the difference in the responsiveness of the farmers to wheat price variations. The following table brings the relevant data together.

Table 12. Percentage increase in wheat production when price of wheat is raised from 6000 Rls. to 10,000 Rls./ton

<table>
<thead>
<tr>
<th>Area</th>
<th>Area I</th>
<th>Area II</th>
<th>Area III</th>
<th>Area IV</th>
<th>Area V</th>
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<tbody>
<tr>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
<td>Vill</td>
</tr>
<tr>
<td>9%</td>
<td>19%</td>
<td>10%</td>
<td>23%</td>
<td>6%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Table 12 indicates that village farmers are more responsive to wheat price increase than the commercial farmers. While the magnitude of the difference varies between different areas, in all areas the village farmers are more responsive to wheat price increase than their commercial counterparts. Indeed, the difference in the price response - in this price range - between these two types of farmers is statistically significant at $\alpha = 0.1$. The reason for this difference is the same as that mentioned previously. For the reasons explained above, there exist a "bias" in favor of wheat production among the village farmers. It must be noted that even at the higher price of Rls. 10,000/ton for wheat, cotton is still more profitable than wheat in most types of land, given the
1352 price levels for cotton. The behavior of many farmers who react strongly to the wheat price increase, therefore, cannot be justified by the motive of maximizing the expected profit alone. It has been mentioned that - for a number of reasons - the small village farmers have an inclination to grow wheat rather than cash crops. But Table 12 shows that even the commercial farmers' response to the increase in the price of wheat is appreciable.

The reason for the rather quick response of both types of farmers to an increase in the price of wheat may be found in the manner in which the questions asked were interpreted by the farmers. The question was: "How many hectares of land would you devote to wheat production, should the price of wheat increase to 10,000 Rls., while other prices, as well as production costs, remained unchanged at their present level?"

Given the price of cotton in 1352, a wheat price of 10,000 rials was still much too low to make a significant difference in profitability of wheat for most types of land. Price of cotton in that year reached the highest level it had ever reached, nearly double that of the previous year. Considering this price of cotton, the farmers' response to an increase in the price of wheat "should" have been much less than it actually was. If, however, we assume a more "normal"
price for cotton, say something lower than the record price of 1352, but higher than that of 1351. Then wheat production -- with a price of 10,000 Rls./ton -- becomes competitive with cotton. The actual response of the farmers becomes much more "reasonable" when a more realistic price is considered for cotton.

One cannot be sure of what actually happened. The farmers' great response to a change in the price of wheat might have been caused by a variety of factors, some of which have been mentioned in connection with the small farmers "bias" towards wheat production. But it is also tempting to speculate that -- regardless of the exact meaning of the questions asked -- the farmers did indeed assume a lower price for cotton than that of 1352. It should not be surprising to find that the farmers -- in making their production decisions -- do not merely consider the previous year's price levels, but rather consider an average of the past few years, as well as the possibility of continuation of the present trends. As it turned out, the farmers were correct in doubting the continuation -- or even the stability -- of that year's unusually high cotton prices.¹

When wheat prices are raised to 15,000 Rls./ton and then to 20,000 Rls./ton, the general trend, observed above,

¹See Chapter 10, pp. 203-216.
continues. Tables 13 and 14 bring the relevant data together.

Table 13. Percent of land used for wheat, when price of wheat is 15,000 Rls./ton

<table>
<thead>
<tr>
<th>Area</th>
<th>Area II</th>
<th>Area III</th>
<th>Area IV</th>
<th>Area V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
</tr>
<tr>
<td>50%</td>
<td>73%</td>
<td>68%</td>
<td>83%</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>84%</td>
</tr>
</tbody>
</table>

Table 14. Percent of land used for wheat, when price of wheat is 20,000 Rls./ton

<table>
<thead>
<tr>
<th>Area</th>
<th>Area II</th>
<th>Area III</th>
<th>Area IV</th>
<th>Area V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
<td>Vill</td>
<td>Com</td>
</tr>
<tr>
<td>79%</td>
<td>98%</td>
<td>91%</td>
<td>94%</td>
<td>79%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>91%</td>
</tr>
</tbody>
</table>

There can be no mistake about the general trend. Village farmers -- for the reasons mentioned previously, produce relatively more wheat than the commercial farmers, at all price levels.¹

¹The only exception occurs for Area V, where at the price of 20,000 Rls./ton of wheat, village farmers grow relatively less wheat than do the commercial farmers. This phenomenon has an easy explanation. Area V is the desert plain of low quality, salty land. The village farmers -- mostly Turkmen tribes -- have no choice but to grow barley in a large portion of their land. Their land, in many cases, is not suitable for wheat production. In addition to this, barley is needed for livestock which most Turkmen villages keep.
Aggregation of the Supply Schedules

It is time now to aggregate the separate supply "curves" of each subregion into a supply schedule for the whole area of Gorgan and Dasht. For the sake of clarity, the separation between the commercial and the village farmers will continue to be maintained temporarily. The village supply schedules for wheat, therefore, will be aggregated separately from the commercial supply curves. Thus we shall end up with two different aggregated supply schedules.

The procedure used for aggregating the supply curves is a simple one. The amount of land used for wheat production -- at each level of wheat prices -- for all areas, are summed up, and then divided by the total land in the area. This gives an "average" of the percentage of the land devoted to wheat production -- at each price level -- for the area of this study. It must be noted that in this method, the size of each subregion is given a "weight" in calculations of the mean, proportional to the hectares of land in that region. The procedure may be stated as follows:

Let

\[ L_{cwij} \]

stand for The percentage of the land used for wheat production \( w \), by the commercial farmers \( c \), in the sub-region \( i \), at a price of wheat \( = j \).

\[ ^1 \]This procedure is carried out once for the commercial farmers, and once for the village farmers.
Let

\[ K_i \] stand for The total amount of land (hectares) in the sub-region (i).

Then

\[ (L_{wcij}) \cdot (K_i) \] is the amount of land used for wheat production - by the commercial farmers - in the subregion (i), when price of wheat = j.

It follows that

\[ Z_c = \frac{\sum_{i=1}^{5} (L_{wcij}) \cdot (K_i)}{\sum_{i=1}^{5} K_i} \]

Z is what we are interested in. It is the percentage of the land used for wheat production, by the commercial farmers, in all of the subregions, when the price of wheat is equal to j.\(^1\)

These calculations must be carried out for \( j = 6 \) Rls./kg, \( j = 10 \), \( j = 15 \), and \( j = 20 \) Rls./kg.\(^2\) An equal number of calculations are required to derive the percentage of land in the area of this study which is devoted to wheat production by the

\(^1\)\( Z_c \) is nothing but the "weighted mean" of the percentage of the land used for wheat by the commercial farmers in all five subregions.

\(^2\)Prices of all other crops are assumed constant.
village farmers. In this case what must be calculated is

\[ Z_w = \frac{5}{\sum_{i=1}^{5} \sum_{j=1}^{5} L_{wW_i} \cdot (K_i)} \]

Table 15 shows the results of these calculations. This information is translated into the supply schedules shown in Figure 9.

As it was mentioned previously, the trend is quite similar for both groups of farmers. The village farmers produced relatively more wheat at all price levels for wheat, and show a greater response to wheat price variations than do the commercial farmers. The reasons for the village farmers' inclination toward wheat production have been explained previously. Basically the same factors give rise to a more elastic supply schedule of wheat (at least in the first segment of the curves) for the village farmers.

There remains one final step in the process of finding one schedule representing the supply of wheat in Gorgan and Dasht. This step, however, is a difficult one. There is no data on the share of each of the above groups -- the commercial and village farmers -- in the total land in Gorgan and Dasht regions.

Using a number of observable facts one will conclude that the "village farms" amount to more hectares of land than the
Table 15. The percentage of land sown to cotton and wheat at different price levels of wheat, for all areas

<table>
<thead>
<tr>
<th></th>
<th>Currently</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wheat</td>
<td>Cotton</td>
<td>Wheat</td>
<td>Cotton</td>
</tr>
<tr>
<td>Commercial</td>
<td>39%</td>
<td>42%</td>
<td>48%</td>
<td>36%</td>
</tr>
<tr>
<td>Farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village</td>
<td>50%</td>
<td>31%</td>
<td>67%</td>
<td>20%</td>
</tr>
<tr>
<td>Farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"commercial farms". This, however, is only a conjecture and cannot be proved. The number of small farmers, obviously, is much more than that of large farmers. But the members of the latter group -- by definition -- hold many times as much land as those of the former categories. While super large farmers are few in this part of the country, there are farmers with 500 or even more than a thousand hectares of land. Many of the small, village farmers, on the other hand, own no more than three or four hectares of land. Thus the mere knowledge that the small farmers outnumber the large ones by a multiple, does not tell us anything about the relative share of each group in the total hectares of land in this area.

Yet a decision must be made. We must estimate the portion of the land farmed by the commercial type farmers and that farmed by the village farmers. This is necessary if anything meaningful is to be said about the consequences of wheat price increases. Thus, conjectural and inaccurate as it may
Figure 9. Percentage of the land in all areas, sown to wheat at various wheat price levels.
be -- we must estimate one supply schedule for wheat, for the area of this study. It must be pointed out that inasmuch as the trends in both the commercial and village supply schedules are very similar, the resulting "combined" supply curve should not be much different than what we could get, if we had adequate information.

One way to construct a single supply schedule for wheat in this area is to take the average of the two curves, i.e. give both types of farmers equal weight. This, however, is not reasonable in the light of our observations. Based on our conversations with the officials of the "Land Department", we can estimate the ratio of land held by "commercial" farmers, to noncommercial farmers as 2 to 3. Using this estimate the aggregate supply function for wheat in this region can be derived, as it is shown in Figure 10.

Table 16. Aggregate supply function for wheat

<table>
<thead>
<tr>
<th></th>
<th>Currently</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>46%</td>
<td>59%</td>
<td>76%</td>
<td>90%</td>
</tr>
<tr>
<td>Cotton</td>
<td>35%</td>
<td>26%</td>
<td>15%</td>
<td>5%</td>
</tr>
</tbody>
</table>

1A literal translation of the title would be "Department of the Properties". In fact, however, this office is concerned with land holdings.
Figure 10. Aggregate supply schedule for wheat in Gorgan and the Plain
CHAPTER VIII. THE EFFECT OF WHEAT PRICE INCREASE ON ACREAGE UNDER VARIOUS CROPS, EMPLOYMENT AND SEASONAL UNEMPLOYMENT

The aggregate supply schedule of wheat, derived in the manner described in the last chapter, can be used to estimate the impact of variations in the price of wheat upon the production of wheat in the area of this study. The additional information gathered through the interviews can also help us to estimate the effects of variations in the price of wheat upon the output of other crops, which compete with wheat for the available factors of production.

When the price of wheat is increased, more wheat will be produced.\(^1\) More land for wheat production means less land for other crops. Thus an increase in the price of wheat results in a change in the amount of each crop produced. As wheat production expands, the production of other crops contracts, in varying degrees.

To the extent that each crop uses a different mix of factors of production, the change in the amount of each crop produced leads to a change in the quantity of these factors being demanded. In particular, should an increase in the price of wheat \(\cdots\) and the resulting increase in the acreage

\(^1\)The extent of the increase in wheat output depends upon the elasticity of the supply schedule.
and the amount of wheat produced -- cause a reduction in the acreage and production of a crop which is more labor intensive than wheat -- e.g. cotton or rice, -- then total demand for workers will fall in this area. Variations in the level of employment, therefore, is one of the possible outcomes of a change in the price of wheat.

Another likely outcome of an increase in the price of wheat is a change in the distribution of income. Wheat is the staple food in Iran. The average per capita consumption of wheat in Iran is about 187 k.g. However, poor people and rural residents consume much more than this amount, while middle and upper income Iranians consume much less than this average. Obviously, an increase in the price of wheat does not affect all sections of the population uniformly. The poorer segments of the population are affected by this price size much more than are the middle and upper income groups. The "employment effect" of an increase in the price of wheat, mentioned before, also mainly affects the low income groups.

Finally, the change in the amount of each crop produced affects the volume of imports - or exports - of that product and thereby the country's balance of trade. Increases in the volume of wheat production reduces the imports of wheat to Iran, but this will be accompanied by either a decrease in the export of cotton, or an increase in imports of other grains, or both.
To summarize, a change in the price of wheat alters the present mix of crop productions and thereby affects the level of employment, income distribution and the balance of trade. With the aid of the collected information, we now proceed to assess quantitatively each of the above mentioned theoretical consequences of an increase in the market price of wheat. Since the primary effect of an increase in the price of wheat is bringing about a change in the amounts of various crops produced - which then brings about the other "secondary" effects - the first step of the analysis should be the estimation of the consequences of wheat price increases upon the level of output of various crops.

The Present Situation

According to the information gathered from the interviews conducted for this study, the production of major crops in Gorgan and Dasht are as shown in Table 15. It must be pointed out that the cropping pattern estimated from our sample survey does not exactly agree with available government data. While the sample survey is subject to sampling error because of the small size of the sample, the official data is not completely

\(^1\)Based on a sample of 28 commercial farmers and 19 villages.
Table 17. Percentage and hectares of land under various crops in Gorgan and Dasht at the present time (from farm interviews)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percent</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>46%</td>
<td>259,440</td>
</tr>
<tr>
<td>Cotton</td>
<td>35%</td>
<td>197,400</td>
</tr>
<tr>
<td>Barley</td>
<td>13.3%</td>
<td>75,012</td>
</tr>
<tr>
<td>Sunflower</td>
<td>2.5%</td>
<td>14,100</td>
</tr>
<tr>
<td>Soybean</td>
<td>0.18%</td>
<td>1,015</td>
</tr>
<tr>
<td>Rice</td>
<td>1.4%</td>
<td>7,896</td>
</tr>
<tr>
<td>Others</td>
<td>1.62%</td>
<td>9,137</td>
</tr>
</tbody>
</table>

Table 18. Percentage and hectares of land under various crops in Gorgan and Dasht at the present time (from government data)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percent</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>47.8%</td>
<td>270,000</td>
</tr>
<tr>
<td>Cotton</td>
<td>30%</td>
<td>170,000</td>
</tr>
<tr>
<td>Barley</td>
<td>14%</td>
<td>80,000</td>
</tr>
<tr>
<td>Sunflower</td>
<td>3%</td>
<td>17,000</td>
</tr>
<tr>
<td>Soybean</td>
<td>0.17%</td>
<td>1,000</td>
</tr>
<tr>
<td>Rice</td>
<td>1.1%</td>
<td>6,500</td>
</tr>
<tr>
<td>Others</td>
<td>4.7%</td>
<td>19,500</td>
</tr>
</tbody>
</table>

Since the differences between the two estimates are not great, we would not be far off the mark by using our

The usual manner in which these "official" estimates are made are as follows. The total amount of the crop produced is somehow estimated. This figure is then divided by a number which is assumed to represent the "average yield" of that crop. The resulting number is the total amount of land under this particular crop. There are several sources of serious error in this scheme. First, it is very difficult -- and for some crops even impossible -- to estimate total production in each year without accurate record keeping. For instance, total production of cotton is derived by the records of the lint separating plants in this area. This may lead to some inaccuracies, but still it is reasonably realistic. For wheat and barley, however, there is no way one can come up with such a reasonably accurate figure. Much of the wheat produced does not reach the market, as it is consumed locally.

Another source of error is the estimate of the "average" yield of each crop. There is no need to point out that if the total product is unknown (footnote continued on following page)
The Output Effect

It has been mentioned before that the primary effect of an increase in the price of wheat is to alter the share of each crop in the total cultivated land. In this region the greatest amount of substitution occurs between wheat and cotton.

Table 19 summarizes the changes that take place as the price of wheat is raised to 10, 15 and 20 Rls./kg from its initial price of 6 Rls./kg.

When price of wheat is raised from 6 to 10 Rls./kg the hectares of land under wheat increases from about 259,000 to 333,000. This is an increase of 28% or about 73,000 hectares of land. A bulk of this land comes from that

(Footnote continued from previous page) (or at best roughly estimated), and the total amount of land under this crop is also not known, then the yield itself cannot be determined except by conjecture. We end up with a vicious circle. The official figures, therefore, are at best rough estimates.

1Using our sample results has the additional advantage of making our work more consistent. The information upon which the subsequent analysis will be based are derived from the same sample survey. It is only reasonable, therefore, to select the starting point also from the information provided by the sample survey. In this way, any overestimations, or underestimations will most likely remain consistent throughout the analysis. Inasmuch as we are primarily interested in the relative magnitude, rather than absolute numbers, the selection of our own estimates is a logical one.
Table 19. Production of various crops when price of wheat is at various levels (from farm interviews)

<table>
<thead>
<tr>
<th>Wheat</th>
<th>Cotton</th>
<th>Barley</th>
<th>Sunflower</th>
<th>Rice</th>
<th>Soybean</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>46%</td>
<td>35%</td>
<td>13.3%</td>
<td>2.5%</td>
<td>1.4%</td>
<td>0.18%</td>
<td>1.62%</td>
</tr>
<tr>
<td>259,440</td>
<td>197,400</td>
<td>75,012</td>
<td>14,100</td>
<td>7,896</td>
<td>1,015</td>
<td></td>
</tr>
<tr>
<td>59%</td>
<td>26%</td>
<td>9.8%</td>
<td>1.6%</td>
<td>1.4%</td>
<td>0.18%</td>
<td></td>
</tr>
<tr>
<td>332,760</td>
<td>146,640</td>
<td>55,272</td>
<td>9,020</td>
<td>7,896</td>
<td>1,015</td>
<td></td>
</tr>
<tr>
<td>76%</td>
<td>15%</td>
<td>4.5%</td>
<td>1.1%</td>
<td>0.97%</td>
<td>0.1%</td>
<td></td>
</tr>
<tr>
<td>428,640</td>
<td>84,600</td>
<td>25,380</td>
<td>6,204</td>
<td>5,470</td>
<td>564</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td>6%</td>
<td>2.6%</td>
<td>0%</td>
<td>0.3%</td>
<td>.02%</td>
<td></td>
</tr>
<tr>
<td>507,600</td>
<td>33,840</td>
<td>14,664</td>
<td>0</td>
<td>1,692</td>
<td>113</td>
<td></td>
</tr>
</tbody>
</table>

a The numbers may not sum up to 100% due to rounding errors.

previously used for cotton production (50,000 hectares). Barley production is also reduced, as about 19,000 hectares of land is withdrawn from barley production and used for wheat. Sunflower production is also reduced. Rice and soybean production are unaffected.

It must be noted that this rather rapid response cannot be fully accounted for by the rise in profitability of wheat production. Presumably other considerations – notably risk aversion – have been taken into account in making this decision.
Although the survey did not cover yield changes associated with acreage changes, it seems safe to assume that less cotton in the mix of the crops will, among other things, raise the average yield of cotton and - to a lesser extent - of wheat. In recent years, due to a gradual reduction in the relative profitability of wheat especially as compared with cotton, more and more land has been transferred from wheat to cotton production. The difference in price levels has been so great as to make cotton production more attractive even on land with little or no summer irrigation possibilities which are much more suitable for wheat production. An increase in wheat prices should raise the average yield for both crops by reducing the demand for summer water. Some lands well suited for wheat production will be withdrawn from marginal cotton production. This will raise the average yield for cotton produced in this region. The increase in the average yield of wheat is likely to be less drastic as some lower quality land - particularly those formerly used for barley production - will be transferred to wheat production when price of wheat is raised.

Part c of Table 19 shows the changes that take place when the price of wheat is raised to 15 Rls./kg. The reduction in the amount of land used for cotton production is indeed drastic. The land under wheat increases by 65% or 169,000 hectares (compared to the current situation). Most of this
land is that formerly used for cotton production (more than 112,000 hectares). However, production of all other crops are reduced as well. In particular, barley production is reduced by about 50,000 hectares, (65%).

Part d of Table 19 shows the situation when the price of wheat is raised to 20 Rls./kg. Almost 90% of the land is now used for wheat production. Sunflower production is reduced to zero and rice production is confined to 0.3% of the land. Cotton is produced in 6% of the land. Barley production is reduced to 14.6 thousand hectares. This amount of land must be the kind of land which is not suited for wheat production by any means and can be used only for barley (the desert, salty land).

The Employment Effect

The primary consequence of an increase in the price of wheat is a change in the share of each crop in the total farm lands of this area. As wheat becomes more profitable, more land is transferred to its production from other crops. Since the degree of labor intensity of wheat production is not identical with that of other crops for which wheat is substituted, an increase in the price of wheat brings about a change in the number of workers needed for farm activities, and consequently in the level of employment in this area.

Table 20 and Figure 11 show the estimated employment
Table 20. The number of man-days of work required by selected crops during different months and the number of workers needed in this area's farm sector during the peak month (price of wheat = Rls. 6/kg) (from farm interviews)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1  2  3</td>
<td>4  5  6</td>
<td>7  8  9</td>
<td>10 11 12</td>
</tr>
<tr>
<td>Wheat</td>
<td>259,440</td>
<td>0.5  1</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cotton</td>
<td>197,400</td>
<td>0.5  1</td>
<td>15  13</td>
<td>5  1  15</td>
<td>7  4  4</td>
</tr>
<tr>
<td>Barley</td>
<td>75,012</td>
<td>-</td>
<td>-  1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sunflower</td>
<td>14,100</td>
<td>-</td>
<td>2  6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Soybean</td>
<td>1,015</td>
<td>-</td>
<td>4  15</td>
<td>13  13</td>
<td>3  15</td>
</tr>
<tr>
<td>Rice</td>
<td>7,896</td>
<td>-</td>
<td>3  12</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total No. of workers needed each month</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,158 10,720 124,886 94,982 38,380 10,978 105,750 49,350 44,717 1,511</td>
</tr>
</tbody>
</table>
Figure 11. Number of workers needed in the farm sector during different months (price of wheat = Rs. 6/kg)
situation at the present time. The technical information con­tained in Table 20 are based on the estimates of the farmers interviewed and related to the prevailing methods of farming.1

As the figure shows, during the third month of spring (Khordad) which is the peak month of the farming season in this region, more than 124,000 workers are engaged in the agricultural activities. Although in no other month of the year so many workers are needed in the farms of this area, one can still take this figure to represent the number of workers which -- given the need for their services -- are available for work. This is equivalent to saying that -- at the going wage rate -- the supply of labor is equal to 124,000, or

1At the present time (i.e. year 1352) most of the operations required for wheat production in this region of the country are performed with machinery. This includes plowing, discing and harvesting. (It has been estimated that about 95% of the wheat fields are mechanized (29, p. 243). The large farmers own their own farm equipment, while the small farmers rent these machines from other farmers. At any rate, it can be stated that wheat growing is -- relative to most other crops produced in this region -- highly capital intensive.

Cotton, on the other hand, is highly labor intensive. At the present time only plowing and discing is performed with machines. Weeding (which requires about 30 man-days of work for each hectare of cotton), as well as harvesting (which requires almost an equal number of man-days per hectare) are performed manually. It must be emphasized, however, that -- should the need arise -- cotton production can become much less labor using. Applications of herbicides can save many man-days of work during the spring, while the use of cotton pickers can save an equal number of man-days during late summer and early fall. This, however, will take place only if labor costs are very high or the machinery prices are reduced. Given the availability and cost of labor, and the very high price of farm equipments cotton production will con­tinue to be labor using for some time.
There are a number of reasons for this statement. To begin with the most important one, Table 20 lists six crops which, taken together, account for 554,000 hectares of land. This means that 10,000 hectares of land is unaccounted for.\(^1\) This is the land used for production of vegetable crops, tobacco, and orchards. These agricultural activities obviously require workers, some of whom will be working on these activities during the third month of spring. To this extent, therefore, the figure of 124,000 is -- if anything -- an underestimation.

It might, of course, be argued that while there may well exist this number of workers in this area during Khordad, some of them may be in this region only for a month or two and leave afterwards. They cannot, therefore, be included in the year-round labor force of this area.

While there are some workers -- whose number may be quite large -- who migrate to this region during the peak months and leave soon after, it still can be maintained that they are part of the labor force of this area. The logic of this statement becomes clear when it is recognized that these migrant workers come to this region because there is no work in their own villages or towns and leave only when they cannot

\(^1\)Total land in the area of this study is 564,000 hectares.
find employment in Gorgan and Dasht. It must be remembered that the country as a whole has an unemployment rate of 10 to 12 percent (41, p. 3). During the off seasons -- when most farm workers are off their jobs throughout the country -- the unemployment rate must be larger than this. The farm workers who leave this area during the off season are, therefore, not very likely to find jobs elsewhere. They usually leave for their home villages where they can be with their relatives until the next season. It is not unreasonable, therefore, to assume that were there employment opportunities available for them in this region throughout the year, they would remain and continue to be part of this area's labor force.¹

Finally, to say that the total available labor force in this region is equal to 124,000 implies the assumption that during the peak month (Khordad) there exists no amount of unemployment. This assumption was made simply because there is no reliable data about the rate of unemployment in this part of the country during Khordad. To the extent that unemployment does exist, the figure of 124,000 is an under-

¹It must be noted that even those workers who -- for any reason -- do leave for their home villages must stay in Gorgan and Dasht for at least 5 months, and maybe more. This is because the two "peak" months are the third and the 7th months of the year. Very few workers leave this region between these two periods.
estimation of the available supply of farm workers in this region.\textsuperscript{1}

Thus we may take the figure of 124,000 to represent the number of workers available for work in the farms of this region.\textsuperscript{2} Figure 12 shows the estimated fluctuation in the use of labor throughout the year. The peak month (when demand

\textsuperscript{1}It must be emphasized that we are talking about farm workers. One must be careful to distinguish between the rate of unemployment in general and the rate of unemployment among the farm workers. This distinction is particularly important for Iran, where feudal values are still prevalent. Not every man - or woman - works for someone else, and particularly not on someone else's farm. Farm work is reserved for the lowest groups in the society's pyramid.

Schultz points out the "...difference in earnings from farm work and from other work" as the explanation for this phenomenon. He maintains that for those people who have any opportunity to work in the cities, for example those who have had a few years of schooling, there exists other, non-farm, jobs which pay much more than farm work. Thus, even if they are unemployed these people would rather wait in the towns and look for other jobs than to go back to the low paying farm jobs (81, pp. 26-27).

Both of these explanations are relevant in the case of Iran. Thus an unemployment rate of 10% in the cities is not inconsistent with a tight labor situation in the farms. In short - and this is consistent with this writer's observation - it is quite likely that nearly all farm workers are employed in the month of Khordad in this region, the unemployment rate of 10% in the towns notwithstanding.

\textsuperscript{2}Livestock activities have been excluded from this analysis. This is because there are very few commercial livestock operations in this part of the country. The villagers do keep sheep and dairy cows mainly for their own consumption, but also partly for sale to others. There is, however, no data on the number of these animals. There is also no data on the number of man-days a farmer spends on his livestock "operation". Most likely, the wife -- while performing other household duties -- takes care of the animals as well.
for workers is at its highest) is Khordad, with the 7th month (Mehr) coming a close second. Table 20 shows the cotton is responsible for a very large portion of demand for labor. During Mehr, in fact, only cotton requires labor. This points out the crucial role of cotton production in the economy of this region, and in particular in the lives of thousands of people who derive their livelihood from their sporadic work in the cotton fields.

Before continuing our discussion, it must be mentioned in passing that here lies a tremendous source of "potential surplus labor". Should the economy begin to grow at a rate sufficiently rapid to hire the available pool of the unemployed in the country, there needs to be little worry about the scarcity of labor. With introduction of modern equipment, tens of thousands of workers will become available for productive activities elsewhere.¹

Table 20 also shows the extreme fluctuation in the level of employment in this part of the country. Being primarily, and almost exclusively, an agricultural region, Gorgan and Dasht can offer very few of these seasonally unemployed farm workers any other job. While a small percentage of these people find such jobs as construction workers, by far the great majority remain idle throughout the "off season".

¹See Chapter IV, p. 62.
Ignoring for the moment the small percentage of workers who do find other jobs, total man-days "lost" due to seasonal unemployment amounts to about 28 million. This is a rough estimate of the waste of potentially productive manpower, which could conceivably be used for the betterment of the lives of these people themselves. To this important problem we shall return shortly.

When price of wheat is increased to 10,000 Rls./ton the situation changes to that shown by Table 21 and the accompanying Figure 12. In this case seasonal unemployment is less than that of the previous case, but this is only because the number of workers needed in the farm sector has decreased. Even in the peak month only 99,000 workers are needed for the new combination of crops produced. About 24,000 workers, therefore, may be classified as truly "surplus labor". Their services are not needed at any time of the year in the farm sector of this region.

When price of wheat is raised to 15 Rls./kg, the situation is altered drastically (see Table 22 and Figure 13). The greatest number of workers needed in this case is about 66,000. This means that -- were the price of wheat to in-

1See Chapter IV, p. 62.

2The alternative use to which these "redundant" workers can be put is discussed below.
Table 21. The number of man-days of work required by selected crops during different months and the number of workers needed in this area's farm sector during the peak month (price of wheat = Rls. 10/kg)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>Spring 1</th>
<th>Spring 2</th>
<th>Spring 3</th>
<th>Summer 4</th>
<th>Summer 5</th>
<th>Summer 6</th>
<th>Fall 7</th>
<th>Fall 8</th>
<th>Fall 9</th>
<th>Winter 10</th>
<th>Winter 11</th>
<th>Winter 12</th>
<th>Number of days required in the peak month</th>
<th>Number of workers needed in the peak month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>332,760</td>
<td>0.5</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>332,760</td>
<td>11,884</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td>146,640</td>
<td>0.5</td>
<td>1</td>
<td>15</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>15</td>
<td>7</td>
<td>4</td>
<td>-</td>
<td>2,199,600</td>
<td>78,557</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>55,272</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>55,272</td>
<td>1,974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>9,020</td>
<td>-</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>18,040</td>
<td>644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean</td>
<td>1,015</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>13</td>
<td>3</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15,225</td>
<td>544</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>7,895</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>3</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>157,920</td>
<td>5,640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of workers needed each month</td>
<td>9,756</td>
<td>7,637</td>
<td>99,243</td>
<td>70,689</td>
<td>28,227</td>
<td>4,165</td>
<td>78,557</td>
<td>36,660</td>
<td>40,749</td>
<td>966</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 12. Number of workers needed in the farm sector during months (price of wheat = Rls. 10/kg)
Table 22. The number of man-days of work required by selected crops during different months and the number of workers needed in this area's farm sector during the peak month (price of wheat = 15 Rls./kg)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>Number of days required in the peak month</th>
<th>Number of workers needed in the peak month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat (1.00)</td>
<td>428,640</td>
<td>.5</td>
<td>1</td>
<td>1</td>
<td>1.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>428,640</td>
<td>15,309</td>
</tr>
<tr>
<td>Cotton (1.7)</td>
<td>84,600</td>
<td>.5</td>
<td>1</td>
<td>15</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>15</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>15</td>
<td>1</td>
<td>1,269,000</td>
<td>45,321</td>
</tr>
<tr>
<td>Barley (1)</td>
<td>25,380</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>25,380</td>
<td>906</td>
</tr>
<tr>
<td>Sunflower (.9)</td>
<td>6,204</td>
<td>-</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>12,408</td>
<td>443</td>
</tr>
<tr>
<td>Soybean</td>
<td>564</td>
<td>-</td>
<td>4</td>
<td>13</td>
<td>13</td>
<td>3</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8,460</td>
<td>302</td>
</tr>
<tr>
<td>Rice</td>
<td>5,470</td>
<td>-</td>
<td>20</td>
<td>3</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>109,400</td>
<td>3,907</td>
</tr>
<tr>
<td>Total number of workers needed each month</td>
<td>8,908</td>
<td>4,653</td>
<td>4,619</td>
<td>4,101</td>
<td>16,497</td>
<td>15,668</td>
<td>45,321</td>
<td>21,150</td>
<td>43,098</td>
<td>0</td>
<td>0</td>
<td>665</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Figure 13. Number of workers needed in the farm sector during different months (price of wheat = Rls. 15/kg)
Table 23. The number of man-days of work required by selected crops during different months and the number of workers needed in this area's farm sector during the peak month (price of wheat = 20 Rs./kg)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Hectares</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>Number of days required in the peak month</th>
<th>Number of workers needed in the peak month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat (1.65)</td>
<td>507,600</td>
<td>.5</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>507,600</td>
<td>18,129</td>
</tr>
<tr>
<td>Cotton (1.7)</td>
<td>33,840</td>
<td>.5</td>
<td>1</td>
<td>15</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>15</td>
<td>7</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>507,600</td>
<td>18,129</td>
</tr>
<tr>
<td>Barley (1)</td>
<td>14,664</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14,664</td>
<td>524</td>
</tr>
<tr>
<td>Sunflower (.9)</td>
<td>0</td>
<td>-</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Soybean</td>
<td>113</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>13</td>
<td>3</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,695</td>
<td>60</td>
</tr>
<tr>
<td>Rice</td>
<td>1,692</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>3</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>33,840</td>
<td>1,209</td>
</tr>
<tr>
<td>Total number of workers needed each month</td>
<td>9,669</td>
<td>1,225</td>
<td>38,050</td>
<td>15,945</td>
<td>6,095</td>
<td>1,994</td>
<td>18,129</td>
<td>8,460</td>
<td>32,551</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>160</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 14. Number of workers needed in the farm sector during different months (price of wheat = Rls. 20/kg)
crease to 15 Rls./kg -- the farm sector in this part of the country could "free" more than 58,000 workers. The man-power lost due to seasonal unemployment also shrinks, as there are fewer workers on the farm at all times.

Finally, when price of wheat is raised to 20 Rls./kg, the previous trend continues. The number of workers who now become "redundant" increases to more than 86,000. This means that an increase of this magnitude in the price of wheat -- and the resulting product substitution -- renders almost 70% of the workers currently engaged in the farm sector absolutely "redundant". Seasonal unemployment -- though still high in a relative sense, is reduced in terms of the absolute number of man-days lost (see Figure 14).

Two subjects, mentioned in passing in the last section, need further discussion.

**Surplus Labor**

It was seen that as price of wheat increases, and as wheat production increases at the expense of other crops -- more and more farm workers become "redundant", in the sense that their services are not needed during any period of the year. There appears, therefore, "surplus labor" in the true sense of the term.¹ The relevant question in this connection,

¹See Chapter IV.
then becomes; what can -- or will - happen to these "freed" workers who have nothing to do in the farm sector as a result of the increase in the price of wheat. The answer to this question determines -- to a great extent -- the desirability of a policy of wheat price increase.

There is no doubt that in a country where more than half of the people are engaged in agricultural activities, and still domestic production of most farm products fall short of domestic demand, the farm sector is quite inefficient. There is no doubt also, that a fraction of the people now engaged in farming activities could -- given a transformation of the farm sector -- feed and clothe the whole population. This, however, is not tantamount to saying that reduction of the number of people engaged in agricultural activities is necessarily a desirable situation.

A number of theories of economic development have attributed to the farm sector in an underdeveloped economy the "role" of providing -- among other things -- the workers that could be used in the industrial sector as the latter grows and is in constant need of cheap labor (26). This is not the place to evaluate the soundness of this prescription. Nevertheless, it can be emphasized that even in the above framework, reduction in the size of the farm sector is considered desirable only if the workers released from the farm sector are transferred to an industrial sector which uses
them more efficiently than the "over crowded" farm sector. A transfer of farm workers -- inefficiently employed as they might be -- to the urban areas is no improvement if these people are not absorbed by the industrial sector and are forced to live in shanty towns and beg or wash car windows to make a living. The basic criteria in judging the desirability of a policy which creates "surplus labor" in the farm sector is, therefore, the need -- in other sectors -- for these people and the efficiency of utilization of human resources in those sectors.

Where can the surplus labor -- formed as a result of an increase in wheat prices -- go to be employed more efficiently?

The leading industry in Iran is oil. Its revenues are so large (especially in the past two years) as to overshadow every other aspect of the economy. It is the most important economic sector in all respect but employment. It hires a mere 0.6% of the labor force of the country. In the past the oil sector has contributed very little to increased employment and in all likelihood it will have a minimal employment impact in the near future as well. The newly created "surplus workers", there, have no hope of being employed in the oil sector.

Judging by its past performance, the industrial sector as a whole is also unlikely to be able to provide employment
for these surplus farm workers. It has been estimated that during the years 1341 to 1346 (duration of the third plan) value added in the industrial sector increased by more than 70%, while during the same period employment in this sector increased by less than 25% (41, p. 3). In fact, the employment creating capacity of the industrial sector is not even sufficient to absorb the addition to the labor force that comes about every year. The industrial and the oil sector combined absorb about 80,000 new workers each year, while the labor force is increasing by more than 300,000 each year (41, p. 3). Even at the present rate of growth of the labor force -- and without the type of migrations which is being discussed here -- it is estimated that the unemployment rate in Iran has been increasing at about 8% a year (41, p. 3).

What all this means is that we cannot simply assume that the "surplus labor" freed from the farm sector can be efficiently employed in the other sectors of the economy. Should price of wheat increase, and should the workers who will then be left without a job leave the villages for the urban areas, the inevitable result would be a swelling in the number of urban unemployed, already estimated at 10-12% (41, p. 3). Furthermore, it must be emphasized that this process cannot push the urban wage rates down as there is very little room for this at the present time. Workers
receive extremely low wages which cannot stand much further reduction. The IBRO economists have estimated that the real wage rate for the construction workers in Tehran was lower in 1967 than what it was in 1959, and only in 1968 increased to a level above the 1959 level (43, Annex 14, Table 7.6). It must therefore be concluded that migration of rural surplus workers to the urban centers can only create more "open" and "disguised" unemployment.

It is in the light of these facts that a policy of wheat price increase must be assessed. An increase in the price of wheat -- ceteris paribus -- will "free" large numbers of workers from the farm sector. It is true that in a rapidly industrializing economy, where the other sectors require vast numbers of workers to expand, creation of surplus labor in the farm sector may be desirable. The case in Iran, however, is quite different. The problem hindering rapid industrialization does not seem to be lack of cheap labor, as there are plenty of unemployed workers in all urban centers. Under these circumstances the employment effect of the envisaged wheat price policy -- i.e. creation of surplus labor -- must be deemed undesirable.

1 Disguised unemployment is used here in its original sense as it was used by J. Robinson. This type of unemployment is quite large in Iran already.
Seasonal Unemployment

Seasonal unemployment in the agricultural regions is thought to be unavoidable. By its very nature, farming requires more work in certain periods and little or no work in other periods within a year. Thus employment in the farm sector fluctuates a great deal in different months of the year. Application of modern equipments in farming can reduce the absolute number of man-days wasted due to seasonal unemployment, but it does little in providing off season jobs for those people who remain on the farms. At any rate, use of modern farm equipments in a large scale is beyond the ability of most underdeveloped economies.

The amount of manpower wasted in the form of seasonal unemployment in Iran is indeed tremendous. Cotton and rice, two important crops in Iran, are produced with methods which are extremely labor intensive. These crops require large numbers of workers during a few months of the year and very few during other months. This fact largely accounts for the prevailing situation in Iran's farm sector where farmers and farm workers are overworked during some months, and totally idle during other months. In this way, millions of potentially productive working days are wasted in the region of this study alone.¹

¹This problem is indeed quite general and applies not only to other parts of Iran, but to most other less developed countries as well.
No one can deny the urgent need of the less developed countries for such potentially productive manpower as are wasted due to seasonal unemployment. One needs only travel through the rural roads, pass through village streets, inspect the village bathhouse or school (if they exist) to recognize how much work needs to be done. Building small bridges, repairing the roads, paving the village streets with stones, repairing the old -- or building new -- bathhouses and schools require very little else except workers. The seasonally unemployed workers could engage in these -- as well as other socially desirable -- projects with very little real costs to the society.

The problem is, however, that harnessing this immense pool of human energy in its full potential is very unlikely -- if not impossible -- given the present structure of Iran's rural society. The fact that many people are idle most of the time in the rural areas does not necessarily imply that they are willing to work on communal projects, such as the ones mentioned before, without some kind of reward.¹

¹The main reason for the lack of enthusiasm of idle workers to work on community projects with little or no monetary rewards may be their position in the society. It is very difficult for a farm worker -- who may have to leave the village to seek jobs elsewhere -- to see the benefits of better roads or a school to himself or his family. It is very unlikely that anyone who owns no land and is in the bottom of the village society should have the "communal feeling" necessary for working without the expectation of some sort of remuneration.
The private sector has proved incapable -- or unwilling -- to utilize the mass of unemployed workers in the rural areas of Iran (or for that matter in any other less developed country) to any considerable extent. This is of course what is to be expected. So long as unemployment exists in the economy, it is unreasonable for the private businessmen to hire workers who have to leave their factory a few months each year. The advantage of lower off-season wage rates is probably more than offset by the loss to the businessman of leaving his plant idle for a few months.

Given the present structure of the economy, only the state is in the position to utilize the seasonally unemployed workers. This, moreover, can be done through subsidizing the public projects in the rural areas by giving the workers some kind of monetary rewards. This has not been done in Iran to any considerable extent.

As it is, seasonal, unemployment must be taken to represent a pure loss to the society in terms of unused human energy. Any activity which gives rise to seasonal unemployment, therefore, must be considered to have an undesirable side effect.

Cotton production, then, confronts us with a paradox. More land under cotton means more work for many people who would not be able to find jobs elsewhere. Yet, more land under cotton also means more seasonal unemployment,
Under the present circumstances -- when unemployment in the country is in double figures -- cotton production -- using the same labor intensive technique -- may be deemed more desirable than wheat production, at least in so far as the employment creating effect of the two crops are concerned. Thus we may conclude that the "employment effects" of the envisaged wheat price policy which leads to more wheat and less cotton production is undesirable.

Should the economy begin to absorb the presently unemployed workers rapidly and a shortage of industrial labor develop, then an increase in the price of wheat would have desirable "employment effect" because:

a. It leads to a decrease in demand for workers in the rural sector and thus provides the other sectors with more workers.

b. It reduces the number of man-days lost in the rural areas due to seasonal unemployment.
CHAPTER IX. INCOME DISTRIBUTION EFFECT

An increase in the price of wheat has a significant impact upon the standard of living of a majority of the Iranian people. Thus to appraise the desirability of any wheat price increase, special attention should be paid to the income increasing or decreasing effect of wheat price change upon specific groups of people. In the first part of this chapter the present "wheat price" policy of the Iranian government -- and its income distribution effect -- will be reviewed. In the second part, the income distribution effect of wheat price increase will be analyzed. In the final section of this chapter a short discussion about the balance of trade effect of wheat price increase will be presented.

Bread is the most important single element in the cost of living for millions of Iranians. On the average, Iranians consume between 150 and 190 kilograms of wheat (mostly as bread) annually. Roughly 63 percent of the total caloric intake (both animal and plant calorie) of an "average" Iranian comes from wheat consumption (43, Annex 14, Table 3.9). However the per capita consumption of wheat among those in the lower income brackets is much more than the 150 to 190 kg.

The IBRD mission estimates the average annual wheat consumption in Iran to be 187 kg per person (43, Annex 14, Table 3.9).
which is the overall average. Table 24 illustrates this point. Thus those in the lowest income bracket spend close to

Table 24. The percentage of income spent on bread, and per capita bread consumption, among various income groups in Tehran

<table>
<thead>
<tr>
<th>Per capita income Rls.</th>
<th>Per capita income U.S. dollars</th>
<th>Percentage of income spent on bread</th>
<th>Annual per capita bread consumption kilogram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 8,000</td>
<td>less than 118</td>
<td>38%</td>
<td>234</td>
</tr>
<tr>
<td>8,001 to 15,000</td>
<td>118 to 221</td>
<td>24%</td>
<td>230</td>
</tr>
<tr>
<td>15,001 to 30,000</td>
<td>221 to 441</td>
<td>11.5%</td>
<td>220</td>
</tr>
<tr>
<td>30,001 to 50,000</td>
<td>441 to 735</td>
<td>6%</td>
<td>193</td>
</tr>
<tr>
<td>50,001 to 100,000</td>
<td>735 to 1,470</td>
<td>3%</td>
<td>173</td>
</tr>
<tr>
<td>100,001 to 200,000</td>
<td>1,470 to 2,941</td>
<td>1.6%</td>
<td>171</td>
</tr>
<tr>
<td>200,001 to 400,000</td>
<td>2,941 to 5,882</td>
<td>0.63%</td>
<td>140</td>
</tr>
<tr>
<td>400,001 to 750,000</td>
<td>5,882 to 11,029</td>
<td>0.34%</td>
<td>140</td>
</tr>
</tbody>
</table>

^Source: Personal sample survey in Tehran, 1352.

40% of their income on bread alone. The percentage of income spent on bread is also very high for the second income group (mostly unskilled workers). This percentage drops rapidly as income is increased.

The popularity of bread as a food item can be explained by its cheap price, compared with other food items. Bread is both filling and has a lot of calories. A kilogram of wheat has 3,080 calories and in June 1974 it cost about
7 Rls.\(^1\) Thus a hundred calories from wheat in that farm costs 0.2 Rls. Just to realize how cheap wheat really is, this price may be compared with the price of 100 calories from mutton which costs more than 256 Rls. at the retail level.\(^2\) Table 25 compares wheat with several possible substitutes, as well as giving the annual per capita consumption of each item.

The annual per capita consumption figures, clearly demonstrate the dominance of bread in the average Iranian's diet. Partly by choice, but mostly by necessity, the annual per capita consumption of bread in Iran is among the highest in the world. It may be noted that annual per capita consumption of bread in Iran is three times as much as the annual per capita consumption of all other food items listed in Table 25, put together. Therefore an increase in the prices of bread is tantamount to a reduction in the standard of living for a large segment of the population of the country. Bread is so important and so cheap relative to other food that an increase in the price of bread has serious income reducing

\(^1\)This is the "average" retail price of wheat at harvest season in Iran. In Tehran, the price of wheat at this time was slightly higher than this level, while in the cities of Northern Iran it was 6.5 Rls. per kg.

\(^2\)The price used for mutton is the retail price in Gorgan, in June 1974. Price of mutton is slightly higher in Tehran.
Table 25. Caloric content, price\(^a\) and annual per capita consumption of selected food items in Iran\(^b\)

<table>
<thead>
<tr>
<th></th>
<th>Calories relative to calories in wheat = 100</th>
<th>Price relative to price of wheat = 100</th>
<th>Annual per capita consumption (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>100</td>
<td>100</td>
<td>187</td>
</tr>
<tr>
<td>Potatoes</td>
<td>20</td>
<td>150</td>
<td>10.5</td>
</tr>
<tr>
<td>Rice</td>
<td>116</td>
<td>400</td>
<td>26</td>
</tr>
<tr>
<td>Beef</td>
<td>73</td>
<td>1500</td>
<td>3</td>
</tr>
<tr>
<td>Mutton</td>
<td>78</td>
<td>2000</td>
<td>9.5</td>
</tr>
<tr>
<td>Poultry Meat</td>
<td>41</td>
<td>1200</td>
<td>1.8</td>
</tr>
<tr>
<td>Fish</td>
<td>43</td>
<td>1500</td>
<td>2.25</td>
</tr>
</tbody>
</table>

\(^a\) The prices used for these calculations are retail prices prevailing in May 1974.

\(^b\) Source: (43, Annex 14, Table 3.9, and for prices, personal survey.)

effects. This renders bread price escalation political dynamite.

The governments in Iran have always found it a wise policy to keep bread prices at a low level even if it means incurring a huge cost to the public treasury. This policy of cheap bread price and urban bread subsidy in Iran goes back many years. In 1936 an organization was set up whose function was "...to secure adequate supply of wheat for the country, and prevent bread price increases..." (55). This
organization, functioning under the auspices of the Treasury Department, was called "The Cereal Price Control Corporation." This "corporation" was to "secure adequate supply of wheat" by buying and storing wheat at harvest time. The purchases would be primarily from domestic producers. Should this prove insufficient, wheat would be imported from abroad. On the other hand, the surplus wheat - if there was any - could be exported to foreign markets. In short this organization was authorized to intervene in all marketing activities involving wheat.

In 1942, the year Iran was occupied by the Allied forces, the Cereal Organization became a branch of the "Food Office". In that year, Iran imported 42,000 tons of wheat and 25,000 tons of flour (55). But this was an exceptional year. For several years after the war domestic wheat production was adequate and there was no need for imports. In fact, in the years 1346 and 1347 (1967 and 1968), the crop was very large and Iran exported more than 300,000 tons of wheat. The situation deteriorated, however, starting in 1969, when domestic production dropped more than 11% below the previous year (43, Annex 14, Table 2.4).

In 1350, the "Cereal Organization" became a subdivision of the department of rural cooperatives and it is now called "The Cereal and Sugar and Tea Organization". The objectives
of this organization are stated as follows: "protection of producers and consumers, purchasing the quantity of cereal deemed necessary for our purposes, and controlling wheat prices in all parts of the country..." (55).

These stated objectives have had a tremendous impact upon the price and the level of production of wheat in Iran. To achieve these goals the government has intervened -- directly or indirectly -- in every aspect of the "wheat subsector". The actions of the government have kept the price of bread, and thus of wheat, at a level below what it would have been without interference. This has held down the cost of living for the low income Iranians to some extent. The present policy, however, has several problems.

a. It has a negative effect on the farmers' incentive to produce wheat. This accounts, to some extent, for the widening gap between domestic production and consumption of wheat. Thus an ever increasing cost of subsidy is needed each year to import wheat and control the price of bread at this low level.  

1 In 1352, price of wheat in the world market increased to its all time record high. It is estimated that in that year the imported wheat cost the government of Iran about 22 Rls./kg (including transportation costs, insurance, etc.). This means that the government incurred a loss of 14.5 Rls./kg on its wheat distribution program. Assuming an import volume of 500,000 tons, this means a loss of 7,250,000,000 Rls. or more than $100 million.
b. The present bread subsidy only helps the urban residents (mainly in large cities). Tehran receives 51% of the imported wheat at a subsidized price. Thus 10% of the population receives more than 50% of the subsidized wheat. Other urban centers receive the remainder of the imported wheat. The rural residents receive none of the imported, subsidized wheat. While it is true that most rural farmers grow some wheat on their own land, a large number of them - who own no land - must pay the regular, unsubsidized, price for the wheat they consume. The farm workers are good examples of this group. They receive the benefits of the government's wheat price policy only to the extent that the imported wheat reduces the overall market price of wheat in Iran to a level below what it otherwise would have been.

c. The present subsidy is indiscriminate in its effect. Rich and poor are subsidized alike. A person who is in the higher income brackets, so that the share of his income going for bread consumption is negligible, can well afford to pay a much higher price for bread. The low income Iranians, on

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1See Appendix A, p. 250.

2In several villages, the price paid for wheat flour by the transient farm workers in Gorgan and Dasht was about 30% higher than that paid by the bakers in the city of Gorgan who got subsidized wheat. The difference between the subsidized and market price, however, is substantial only for a few months each year. See Appendix A, p. 250.
the other hand, for whom bread is by far the most important food item and absorbs a major part of their income, could well use a reduction in bread prices.

Despite these problems, the present wheat price policy serves a basic purpose. It allows the urban poor (mainly the unskilled workers and the unemployed) to live on their meager incomes. It is difficult to imagine how the people in the lower income brackets could continue their existence without this subsidy on bread.

We can now begin our analysis of the effects of an increase in the price of wheat upon the distribution of income in this part of the country. In particular, we want to determine the groups which gain from an increase in the price of wheat, and the groups who suffer losses as a result of it. For the sake of clarity, this analysis will be divided into two parts, each relating to a basic assumption.

1. The income-redistributing effects of wheat price increases, assuming that the government discontinues its policy of intervention in the wheat - and bread - markets.

2. The income-redistributing effects of wheat price increases, assuming that the government continues (in basic principle) to support bread prices.

1 The conclusions reached in this section apply to all parts of the country as well.
1. Let us assume that the government decides to abandon its present wheat price policy and allows the price of wheat to seek its own level. Undoubtedly the price of wheat will increase in the absence of government intervention. We can assume for the sake of consistency that it increases to 10 Rls./kg then to 15 and finally to 20 Rls./kg.¹

The immediate result of an increase in the price of wheat from 7 to 10 Rls./kg will be an increase in the price of bread.² Under the present government price control program, which includes a tight control of the shares of the millers and the bakers as well - the value of the wheat accounts for between 50 to 60 percent of the retail price of bread.³ Assuming no change in the "margin" of the millers and the bakers, the assumed 43% increase in the price of wheat will increase bread prices by about 24%. It is more realistic, however, to assume that these margins will also change and the

¹Or alternatively we may assume that the government does not stop its intervention in the market, but merely allows prices to increase to 10, 15 or 20 Rls./kg.

²We have assumed that the current (1352) price of wheat was about 7 Rls. The price was not uniform throughout the country and fluctuated in different months. 7 Rls., however, is a reasonable average for the price of wheat prior to its upward trend in the summer of 1352.

³See Appendix A.
increase in price of bread will be about 30%. When price of wheat is raised to Rls. 15/kg, bread prices will rise by about 60%. Finally, when price of wheat is raised to Rls. 20/kg, price of bread will increase by between 90 to 100%.

Basically, the effects of increases in the price of bread (and wheat) can be separated into two parts. The first being the direct impact upon the "welfare" of the different groups of the population, of the increase in the price of bread, (the direct effects). The second is the effect on the "welfare" of those who have lost (or gained) employment as a result of the change in the price of wheat (indirect effects).

The Direct Effects

The consumers

The direct effect of an increase in the price of wheat is to reduce the real income of the bread consumers. This reduction in the level of real income is small or negligible for

1Strictly speaking, there is no reason for the "margin" to change. These margins have been tightly controlled by the government despite the claims of the millers and bakers -- which are by and large justified -- that their profits are very low and sometimes negative for the millers. Thus just as it has done in the past, the government can continue to control the shares of the millers and the bakers. The situation, however, will not last for long. Any realistic policy must allow for these margins to increase. See Appendix A, p. 250.
some groups and substantial for others.

The group which suffers most as a result of wheat price increases are that composed of urban unemployed, those employed part of the year and a large number of landless rural residents. These are the people listed in the first income group in Table 24.

The urban unemployed, and those workers employed part of the year, are by and large former peasants and farm workers who have migrated to urban centers (mostly Tehran and to a lesser extent other large cities) in search of jobs and have not been able to find them. They depend on their working relatives for their subsistence and supplement this by temporary jobs in the construction industry, performing various odd jobs, begging, etc. Their number can be estimated at slightly less than 4 million.¹

¹According to the government data, in 1968, 19.9% of all urban families in Iran had an annual income of less than Rls. 30,000. Another 10% had an annual income of between Rls. 30,000-40,000 (44, p. 307). Assuming each family on the average to have 5 members (the actual figure is 5.1, (44, p. 305). Then 19.9% of the urban residents have an average per capita income of less than Rls. 6000 (i.e. about $88.2) per year and another 10.7% have an average per capita income of less than Rls. 8000 (about $118) per year. Thus, altogether, 30.6% of all urban residents have annual per capita incomes of less than Rls. 8000, which puts them in the first income group of Table 24. Considering the fact that the total number of urban residents in Iran is about 12.9 million (44, p. 503), this would mean that about 3.9 million urban residents have an annual per capita income of less than Rls. 8000. (These figures were published in 1972. Later figures are not available).
Also included in this income group are a large number of rural residents, whose numbers may be estimated at about 4 million.

The main food for the people in this income group is bread, as they can afford little of anything else. An increase in the price of wheat -- or bread -- endangers their very survival. Table 24 shows, the urban poor spend close to 40% of their total income on bread alone. While Table 24 was

\[1\] While there is no data on the annual per capita income of the rural residents comparable to those presented above for the urban residents, reasonably accurate estimates can be made on the basis of available data. According to the government data, in 1971, 35.3% of all rural families had a total monthly expenditure of less than Rls. 2500, or a yearly expenditure of less than Rls. 30000 (about $441), (44, p. 305). The average number of family members in this group is reported to be 3.52. This means that each person in this group has a yearly expenditure of less than Rls. 8523 (about $125). It is reasonable to assume that people in this group have no saving to speak of, so that their yearly expenditure is more or less the same as their yearly money income. Considering the fact that about 17.429 million Iranians live in rural areas, we can conclude that 6.1 million rural residents have an annual per capita income of less than Rls. 8523. However, it must be noted that some of the rural residents listed in this income group have some land and grow their own wheat. Only landless rural residents, therefore, must be included in this income group. Fortunately, an estimate of the number of landless rural residents is available. According to government data (in 1351), 2.67 million families own farm lands in Iran (74, p. 75). Assuming 5 members per family, about 13.35 million people are included in this land owning group. Even if we assume that all of these people live in rural areas -- which is not the case -- still some 4 million rural residents do not own any land. This is, however, a very conservative estimate as many land owners live in the urban areas. Thus, we can conclude that at least 4 million rural residents have an average annual income of less than Rls. 8523.
constructed on the basis of data gathered in Tehran, it can reasonably be taken to apply to other urban areas as well. It is also reasonable to assume that the rural residents in this income group spend at least 40% -- and perhaps even more -- of their income on bread. An increase in the price of wheat, therefore, reduces the real income of these people significantly.

Should bread prices rise by 30%, as it would if price of wheat were to rise to Rls. 10/kg, people in this income group would have to reduce their consumption of bread and try to survive on less of other things as well. The state of their malnutrition, already quite serious, would become aggravated. With increases in the price of wheat to Rls. 15 or Rls. 20/kg, and a corresponding rise in the price of bread to Rls. 20 or Rls. 24/kg respectively, their very survival would become impossible.

The next group of bread consumers to be considered are urban unskilled and semi-skilled workers. They number at

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1 The overall average annual per capita consumption of wheat in the urban areas is estimated at 113 kg, while the similar figure for the rural residents is 235 kg (43, Annex 14, Tables 3.2 and 3.1).

2 For the rural residents in this income group, only the increase in wheat price is relevant, as they bake their own bread.
about 3.6 million\(^1\) and as Table 24 shows, the members of this group spend about 24% of their total income on bread. This is still a very high ration of bread which is supplemented by tea, sugar and perhaps cheese.

It is not certain what happens to the average consumption of bread among these people as bread prices rise. The lower income member of this group will have to reduce their consumption of bread as there are few other items to be eliminated from their diet. However, an increase in the price of bread may cause an increase in the consumption of bread for the higher income members of this group. This happens because -- due to the overwhelming importance of bread in their expenditure -- the positive "income effect" more than offsets the substitution effect.\(^2\) As price of bread rises,

\(^1\)It is estimated that in 1968 (the latest year for which this type of data is available), 28.5% of all urban families had an average annual income of between Rls. 40,000-75,000 (44, p. 307). Assuming each family on the average, to have 5 members, it can be concluded that 28.5% of all urban residents had an average annual per capita income of between Rls. 8000-15,000 (about $118 to $220). Thus about 3.67 million urban residents are included in this group.

\(^2\)Change in the price of a commodity \(x\) affects the quantity demanded of \(x\). This effect can be separated into two parts; income effect and substitution effect. The Slutsky Equation expresses this idea

\[
\frac{\partial q_x}{\partial p_x} = \frac{\partial q_x}{\partial y} \frac{q_x}{y} - q_x \frac{\partial^2 q_x}{\partial y \partial p_x} \frac{y}{U} = \text{constant} \quad \begin{align*} \text{prices} &= \text{constant} \\ \text{U} &= \text{constant} \end{align*}
\]

is income. The term \(\frac{\partial q_x}{\partial p_x} \frac{y}{U}\) is the substitution effect. This shows the change in (footnote continued on following page)
therefore, they will increase their consumption of bread and reduce that of other food items, if that is possible.

At any rate, an increase in the price of bread reduces the real income of the workers and lowers their standard of living. With a rise in the price of bread of 30%, these people would probably cut down on their consumption of sugar, tea and cheese and increase their bread consumptions. There is no need to emphasize the impact of this upon the life and the work of these people. Although the bargaining power of the workers is -- to say the least -- quite weak, there is no doubt that such an increase in the price of bread will -- in the long run -- lead to an increase in the level of money

(Footnote continued from previous page): the quantity of \( x \) demanded as price of \( x \) changes, while real income remains the same. It follows from the principle of diminishing marginal rate of substitution that substitution effect is always negative, i.e. as price of \( x \) increases (decreases) the substitution effect works such that the quantity of \( x \) demanded decreases (increases).

The term \(-q_x(\partial q_x/\partial y)\) is the income effect. This shows the change in the quantity of \( x \) demanded as consumer's income changes, prices remaining constant. The income effect could be positive or negative or zero. The total effect of a change in the price of \( x \) (the sum of the two effects) may thus be positive or negative.

Since substitution effect is always negative, \( \partial q_x/\partial p_x \) can be positive only if income effect (i.e., \(- q_x(\partial q_x/\partial y)\)) is positive and large enough to more than offset the negative substitution effect. In that case \( x \) is referred to as a Giffen good. Stringent conditions must be met for the total effect to be positive. In particular, for the quantity demanded of good \( x \) to rise as price of \( x \) increases not only must commodity \( x \) be an inferior good, but it must be an important item in the consumer's budget (see 35, pp. 24-29 and 36, Chapter 2).
wages. This is because the present wage rate represents the subsistence level. With higher bread prices the real income of the workers falls below that necessary for subsistence and particularly for being able to work. While it is difficult to estimate this increase in the level of money wage rate with any degree of accuracy, it is reasonable to assume that the change will be about that amount which will just compensate the bread price increase, thus an increase of 30% in the price of bread would have to be followed by an 8% rise in the level of money wages for the unskilled workers. Similarly, increases in the price of bread by 60% or 90%, requires wage increases of 15% and 23% if the real income of the workers is to remain at its present level.

The average income of a family in this income group is estimated at Rls. 56,789 (weighted average of the two income groups listed as having an income of between Rls. 40000 and Rls. 50,000 (9.3% of all urban families) and between Rls. 50,000 and Rls. 75,000 (19.2% of all urban families) in (44, p. 307). Assuming 5 members, per family, the average annual per capita income of the people in this income group amounts to Rls. 11,358 (about $167). An increase in the price of bread by 30%, or 3.75 Rls. per kg, means that each person in this group must have 0.63 x 3.75 = Rls. 2.36 more each day to remain unaffected by the increase in the price of bread (0.63 kg is the average daily consumption of bread for the people in this income group, see Table 24). Thus each family requires Rls. 11.8 each day, or Rls. 4312 each year in additional income to compensate for the bread price increase. The working member of each family, therefore must earn Rls. 4312 each year, which is equivalent — on the average — to a 7.6% increase in his money wage rate.
It is of course, possible for the nominal wage of these workers not to increase by the full amount necessary to offset the increase in the price of wheat. To this extent their standard of living has deteriorated as a result of the wheat price increase. It is also very possible, and indeed quite likely, for the increase in the workers' wages to materialize only after a period of time. The workers will suffer losses as a result of any such lags between the rise in the cost of living and the increase in their wages. It may be concluded that the unskilled workers suffer as a result of an increase in the price of wheat. This loss is especially hard to bear in the short run, before money wages rise sufficiently to offset the bread price increase. But the loss might be appreciable in the long run as well if the workers are unable to raise their money wages sufficiently.

Another group of people adversely affected by an increase in the price of bread are a large number of urban residents whose average annual per capita income ranges from Rls. 15,000 to Rls. 30,000 and, as Table 24 shows, spend more than 11% of their total income on bread. The number of the people in this income group may be estimated at about 3.4 Million (44, p. 307). An increase in the price of bread by 30%, reduces the real income of the people in this income
group by about 3.6%. This should not have a significant effect on the bread consumption of these people. Increases in the price of bread by 60% or 90%, reduces the real income of the people in this income group by about 7% and 11% respectively. In both cases, it is very likely that people in this group would reduce their consumption of bread. This is because in this case the income effect is not large enough to offset the negative substitution effect. The substitution effect is also much larger than that for those in the lower income groups, as the people in this (Rls. 15,000 to Rls. 30,000) income category may find it more satisfying to replace bread -- to some extent -- with other food items, such as rice and potatoes. This, however, would require either a reduction in their overall nonfood expenditures, or a decrease in the quantity of food consumed.

Finally, there are those bread consumers whose real income are not significantly affected by a wheat price increase. Though everyone consumes some bread and an increase in the price of bread means smaller amounts of money to be spent on other items; for a large number of people the effect of an increase in the price of bread, even an increase of 100 percent or more, is indeed negligible. Table 24 clearly demonstrates

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1 This is based on the data in (44, p. 307) as well as Table 24.
this point. As per capita income goes up, the significance of the expenditures on bread rapidly diminishes. Obviously one cannot draw a rigid line and divide the people according to whether an increase in the price of bread affects them significantly or not. One can, however, state that the people who spend a smaller part of their income on bread will feel the effect of a bread price increase to a lesser degree than the people whose expenditure on bread absorbs a larger portion of their income. Moreover, beyond a point, when income is quite large and bread consumption only a minute portion of that income, an increase in the price of bread will have no significant effect on the standard of living. The urban middle, and high income groups, approximately two million people (44, p. 307), may be classified as those whose "welfare" are not significantly affected by an increase in the price of bread.

The Wheat Producers

The groups who benefit most from an increase in the price of wheat are, naturally, those who produce wheat. This includes both the present and the potential wheat producers, as higher wheat prices induce some producers of other crops to switch to wheat production. It must be added that not all farmers who grow wheat benefit from an increase in its market price equally. In particular, the benefits accrued to the
smaller producers, especially small village farmers, are very little, while that going to the medium and large farmers are substantial.

The reason for the unequal distribution of gains from wheat price increases are not difficult to see. Not only do the small farmers have less land on which to grow wheat, but they are in a position to market a smaller portion of their produce. Most small farmers produce some wheat for their own consumption, and market only what is above that level. To the extent that wheat is used for family consumption it matters very little what its market price happens to be.
The small farmers, therefore, reap the benefits of an increase in the price of wheat only to the extent that they market their wheat, which is only a part of what they produce.

The medium size and large farmers, on the other hand, are benefited by the wheat price policy to its fullest degree, they market all, or nearly all, of their crops and thus receive the higher price for each kilo of wheat produced.

Another reason for the unproportional distribution of benefits from higher wheat prices to the wheat farmers is the existence of green transactions. The majority of small wheat farmers who market part of their crop, sell their wheat before it is harvested at large discounts. There is no doubt that a higher wheat price leads to a higher price of "green" wheat. But there is no reason to assume that all of the
wheat price increase will be accrued to the small farmer. In all likelihood a portion of the wheat price increase will be absorbed by the green buyers. There is, however, no way to be certain about the exact portion of any price rise which will be accrued by the small farmers and green buyers.

It may thus be concluded that small farmers receive a less than proportional benefit from a wheat price increase than do the large farmers, and that for some small farmers, who produce only for their own consumption, there is no income gain associated with a wheat price increase at all.

While there is no way to determine exactly how many farmers benefit fully from a wheat price increase, some rough estimates can be made from the available data. According to the government data 803,000 parcels of farm land owned by the farmers in Iran have a size of less than one hectare (74, p. 74). Considering the fact that an "average" rural family has 5 members (44, p. 305), it is reasonable to assume that all of the wheat produced on these lands are locally consumed and does not reach the market. Thus about 4 million

1The average size of the land is reported at .4 hectares (74, p. 74). Even if all of the land is sown to wheat, the average family has about 260 kg of wheat (the average yield is assumed to be 0.65 ton/ha). Thus each person has 52 kg of wheat per year. This is less than 1/4 of the average annual per capita consumption of wheat for rural residents.
small farmers are totally excluded from any benefit of a wheat price increase. Indeed, since their wheat crop does not suffice for their own consumption needs, they must purchase additional wheat, by the income they earn by working on other farmers lands as hired hands, from the market. These small farmers, therefore suffer a loss in their real income as a result of any wheat price increases.

346,000 parcels of farm land are of a size of between one to two hectares (74, p. 74). Very little of the wheat produced on these farms reach the market. The average size of farm in this group being 1.47 hectares; each farm, even if all of it is sown to wheat, produces about 958 kg of wheat each year. This means each member of the farm family has about 192 kg of wheat per year, still far short of the average annual per capita wheat consumption of rural residents (see 43, Annex 14, Table 3.3). Thus 1.7 million rural residents, members of the families owning 1 to 2 hectares of land, are also excluded from any benefits of a wheat price increase.

Thus, in all, 5.7 million rural residents, small farmers and their families, do not receive any benefits from wheat price increases.

About 4.9 million rural residents, members of families owning between 2 to 10 hectares of land (74, p. 74), receive part of the benefits of wheat price increases. Although they
do not presently use all of their land for growing wheat, with higher wheat prices most, or all, of their land would be sown to wheat. Higher wheat prices increase the real income of these farmers in varying degree, depending upon the portion of the wheat crop marketed.

Finally, about two million people, members of the families owning more than 10 hectares of land (74, p. 74) receive the full benefits of wheat price increases, as they market nearly all of the wheat they produce. Furthermore, the benefits reaped by this group is quite substantial as they own more than 61% of all farm lands in the country (74, p. 74).

An increase in the price of wheat results in a transfer of income from the consumers of wheat to the producers of wheat. The magnitude of this transfer, of course, depends upon the amount of the price increase. What is important to recognize, however, is that within this general transfer of income, another, less visible redistribution of income takes place. As a result of an increase in the price of wheat a majority of wheat producers will become better off, though large and medium farmers receive a much larger share of this benefit than the smaller farmers. A substantial number of small farmers do not reap any benefit from increases in the price of wheat while a still larger number of very small farmers are adversely affected by it.

Moreover, a substantial part of this transferred income,
is extracted from the urban poor and the rural landless who consume the bulk of the produced wheat. It must be concluded, therefore, that a policy of wheat price increase as described above, will lead to a more unequal distribution of income.

The indirect effects

An increase in the price of wheat leads to an increase in the amount of rural unemployment. The number of people who lose their jobs as a result of such increases in the price of wheat depend upon the magnitude of the price rise. Given the prevailing techniques of production, with wheat being highly capital-intensive and other crops, particularly cotton and rice, extremely labor-intensive, the number of such people will be substantial. While there is no way to estimate the total number of people who lose their jobs as a result of wheat price increases throughout the country, such estimation is possible for Gorgan and the plain area. It was estimated that as price of wheat rises to 10, 15 and 20 Rls., the number of people who become "redundant" in the farm sector of this region amounts to 24,000, 58,000 and 86,000 respectively.⁠¹

Given the present conditions of the economy, in which there is little alternative employment opportunities for these newly unemployed rural workers, the effect of the wheat price

¹See Chapter VIII, p. 7.
increase will be to reduce the conditions of these people to utter poverty, and worse. On the one hand, these people lose their jobs and thus their income is wiped out. At the same time they must pay higher prices for wheat, the only food they can afford to consume.

It may be concluded that the indirect effects of an increase in the price of wheat upon the distribution of income is much more regressive than its direct effect. One can hardly imagine any additional jobs which will be created as a result of an increase in the price, and consequently of the production, of wheat. Any increase in the price of wheat, therefore, will lead to the creation of more unemployment and thus, considering also the direct affects of such a policy, to a more unequal distribution of income.

2. Another possibility is for the government to allow wheat prices to rise, while controlling bread prices at their present level. The government can accomplish this objective by, for instance, standing ready to pay the difference between the costs of bread, including the baker's profit, and the desired price of bread.¹

The main advantage of this scheme is that it does keep the price of bread low, while at the same time encourages the

¹Or alternatively, it could subsidize flour by paying the millers the difference between the costs of production of flour and the desired price of flour.
domestic producers to grow wheat on lands suitable for its production. Unlike the present scheme, this type of policy does not put undue pressure on one group, in this case, the wheat producers.

There is, however, an important problem involved in this proposal. First of all, the government must decide whether to provide subsidized bread for the whole country or only for the urban areas. The former choice is both costly and impractical. But even subsidizing the price of bread in the urban centers is quite expensive. A simple calculation shows this point.

Suppose that price of wheat is raised to 15 Rls./kg. The market price of bread, with no intervention on the part of the government, would rise to about Rls. 20/kg. If the yearly consumption of bread for the urban residents is estimated at about 2210 million kilograms, and if the government

---

1 The impracticality stems from the fact that rural residents, by and large, bake their own bread. The government must therefore subsidize the price of wheat or flour, rather than bread for the rural residents. This will undoubtedly create tremendous problems. For instance, the farmers themselves sell their wheat at a higher price and buy the subsidized flour. Even the subsistence farmers can benefit by selling wheat and buying flour. This scheme is more equitable, but extremely costly. With a wheat price of 15 Rls./kg, the government would incur a loss of about $600 million each year if all of the wheat consumed in the country is to be subsidized (5 million tons x 8000 Rls./ton = 40,000,000,000 Rls.).

2 Assuming that about 13 million people live in urban areas (towns and cities), and that each person consumes about 170 kg of bread in a year.
is determined to keep the price of bread at its present level the cost to the government would amount to 16.5 billion Rls., or roughly about $244 million. If the price of wheat goes up to 20 Rls./kg in the market, the government would have to incur about $373 million to keep the price of bread at its present level.

If only the urban residents receive subsidized bread, however, the condition of the rural poor becomes absolutely untenable. Not only do their employment opportunities dwindle in the rural areas (as a result of wheat price increase) but they must pay higher prices for their needed wheat. The system simply cannot work, unless a solution is found to this problem.

Under this scheme the major beneficiaries would be the wheat farmers who, in effect, receive a direct payment from the government for growing wheat. No other group, except the rural poor, receives any additional loss or benefits (since bread prices remain at their current level). The cost of this subsidy is borne by the people, of course. Whether this program of bread price control will be progressive or not depends to a large extent upon the method by which the government collects the funds to pay for it.

Finally, this scheme also has the disadvantage that it subsidizes bread for all income groups. The government could save a great deal by devising a method by which only the needy
are provided with cheap bread.

In conclusion to this chapter, it must be noted that an increase in the price of bread will lead to a more unequal distribution of income. This takes place both directly and via its employment effect. Whatever other advantages a wheat price increase may have, it scores poorly on the income distribution front.

The Balance of Payments Effects

It was argued before that an increase in the price of wheat alters the share of each crop in the total farm land of this area. In particular, wheat production will increase at the expense of other crops. This means that an increase in the price of wheat changes the level of domestic production of wheat as well as other crops. This in turn affects the level of imports (or exports) of these farm products and the country's balance of trade.

This study being confined to a small area of Iran, there is no way to estimate the impact of an increase in the price of wheat upon the country's balance of trade. At best we can make inferences about the possible effects of such a policy upon the country's balance of payments and make some generalizations.

Table 26 shows the present level of net imports of the "six crops". Except for cotton, Iran is a net importer of all
Table 26. Net imports of six important crops (years 1350 and 1351)\textsuperscript{a}

<table>
<thead>
<tr>
<th>Year</th>
<th>Wheat (Tons)</th>
<th>Cotton</th>
<th>Barley</th>
<th>Rice</th>
<th>Soybean and Sunflower (oil seed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1350</td>
<td>-997,549</td>
<td>+101,000</td>
<td>-191,870</td>
<td>-60,329</td>
<td>-104,445</td>
</tr>
<tr>
<td>1315</td>
<td>-773,344</td>
<td>+112,000</td>
<td>-23,132</td>
<td>-91,659</td>
<td>-131,354</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Source (67).

An increase in the domestic price of wheat reduces the need for wheat imports but at the same time it reduces the domestic production of other crops. The net effect upon the balance of trade, therefore, depends on the world price level for each of these crops as well as the supply elasticities of these crops.

Obviously, there is no way to estimate the change in the level of imports (or exports in case of cotton) which would be forthcoming as a result of an increase in the domestic price of wheat, given our limited information. We can only estimate the change in the production of these crops which would take place in the area of this study. Even if we did have an estimate of the change in domestic production of these crops for the whole country, we would still be unable to predict the net impact of a wheat price increase on the country's balance of payments. The net change in the balance of trade depends
not on the physical quantity of imports and exports, but on their current values. Unless one can predict the future world market prices for these crops, one is unable to predict the effect of a wheat price increase on the balance of trade of the country.

In general, one can state that:

\[
(P_w \cdot \Delta_w) - [(P_c \cdot \Delta_c) + (P_d \cdot \Delta_d) + (P_r \cdot \Delta_r) + (P_s \cdot \Delta_s)]
\]

\[
\frac{A}{B} + (P_{sf} \cdot \Delta_{sf}])
\]

where:

- \(w\) is wheat
- \(s\) is soybeans
- \(c\) is cotton
- \(sf\) is sunflowers
- \(b\) is barley
- \(r\) is rice
- \(\Delta_i\) is change in the volume of production of \(i\)
- \(P_i\) is relevant price level.\(^1\) If \(A > B\), then it can be concluded that the wheat price increase has had a favorable impact upon the country's balance of trade. If \(A < B\), the balance of trade is negatively effected by the change in price of wheat.

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\(^1\)Prices for the imported crops must include transportation charges as well as insurance costs. For the export crop, these costs must be subtracted from the "world market" price.
We have no information about the price elasticity of supply, for the entire country, of any of these farm products. We have no information about the future price levels of these crops either. There is no way, therefore, to reach any conclusions about the impact of an increase in the price of wheat on the balance of trade of the country.

In the light of recent oil price increases and the enormous increase in the foreign exchange receipts of Iran, the balance of payments effect of a wheat price increase becomes of secondary importance. In devising a wheat price policy, therefore, primary emphasis should be placed upon the employment and income distribution effects of the wheat price increase.
In the previous chapters the impact of wheat price variation upon several economic variables were analyzed, using the supply schedules based on the farmers' own estimates of their future production behavior. The conclusions reached in the foregoing discussions provide only the first step toward providing appropriate price policies. What remains to be done is the evaluation of each of these "consequences" according to some priority scale. One may wish to "assign" top priority to the objective of self-sufficiency, even if it means the creation of a large amount of unemployment. Alternatively, balance of trade considerations may not be deemed extremely important. Instead, job creation may be given top priority.

The decisions which are finally made reflect the values of the group -- or the person making the decision. These "values" are in turn determined by the values of the groups in the society whom the decision maker represents. Obviously, one cannot come up with a policy measure which promotes the benefits of all groups within a society to the same extent. What can be done, is to confront the policy maker with the consequences of each particular policy measure he might want to take. In particular, it is possible to confront him with the "trade-offs" between various objectives. What are
the "costs" in terms of objective x when objective y is promoted? This is in essence what will be done in this chapter.

The following discussions consist of two separate parts. In the next section a linear programming framework will be used to arrive at supply schedules for wheat produced in norther Iran. This "normative supply schedule" will then be compared with the supply schedules based on the farmers' own estimates, constructed in Chapter VII. It is hoped that this comparison will shed some additional light on the arguments put forward previously. In the following section, using the same linear programming model, various "objectives" will be included in the model to arrive at a set of schedules, showing the "trade-offs" between these "goals".

Normative Supply Schedules

For the following analysis we shall make use of a simple linear programming model.¹ This model includes 33 restraints (rows) and 49 activities (columns). All of the land in the

¹The model can be specified formally as follows:
Maximize \( z = C'X \)
Subject to the restrictions:
\[ PX < S \]
\[ S > 0 \]
where
\( z \) is the objective function
\( C \) is a \( 1 \times n \) vector of "net prices"
\( X \) is a \( n \times 1 \) vector of crop outputs
\( P \) is a \( m \times n \) matrix of input-output coefficients
\( S \) is a \( m \times 1 \) vector of resource supplies.
area of this study is divided into seven "land types", according to soil properties and water availability. The only other restraint included in the model is labor.\(^1\) Capital restraint is not included in the model and it is assumed that the needed farm equipments are available to the farmers at a constant cost.\(^2\) All of the information used in the model are provided by the farmers themselves. Thus the cost of production of various crops and the expected yields, used in the model reflect the prevailing state of affairs in the farm sector of this region.

The model can be used to derive the "normative" supply schedule for wheat in Gorgan and the plane. This may then be compared with the aggregated supply schedule for wheat derived previously.

Using the prices received by the farmers in 1352, and running a parametric programming on the price of wheat

\(^1\)The restraints, as well as activities are described in Appendix B. Also included is the method by which costs of production of different activities (the C values) are calculated.

\(^2\)The exclusion of capital constraint from the model does not undermine the validity of our conclusions. What our assumption in regard to capital means is that increase in the amount of land sown to wheat, which occurs by and large at the expense of other crops, creates little need for additional farm equipments. Furthermore, to the extent that additional farm equipments are needed, it is assumed that the farmers can obtain them at a cost, equal to the prevailing "rent" of farm machineries.
starting at Rls. 6000/ton, the normative supply schedule for land sown to wheat can be derived. This is shown in Figure 15. The farmers' own estimate of the wheat supply schedule is also graphed in the figure to make comparison easier. Figure 16 shows the two supply schedules in terms of the quantity of wheat produced at various wheat price levels.

As Figures 15 and 16 clearly show, the supply schedules constructed on the basis of farmers' own estimates lies to the right of the "normative" supply schedule. This means that at all levels of wheat prices the farmers believe that they will produce more wheat than what should be produced on the basis of profit maximization behavior.

One can think of many reasons for this observation. The linear programming model used, for instance, could be an unrealistic replica of the real world and thus the conclusions reached on the basis of this model may be irrelevant. Alternatively, the aggregated supply schedule derived may not represent the actual reactions of the farmers to wheat price variations. More importantly, the cause of the observed divergence in the two supply schedules may be due to the simplistic -- and unrealistic -- objective function of the linear programming model used. Construction of the "normative" supply schedule is based on the assumption that the farmers' only objective is maximization of "profit". This is obviously a simplification of the real world objective of the farmers, to say the least.
Table 27. The results of parametric programming, as price of wheat is increased from Rls. 6,000/ton to Rls. 21,000/ton and the farmers estimated supply response (price of cotton Rls. 29,000/ton)

<table>
<thead>
<tr>
<th>Price of cotton Rls./ton</th>
<th>Price of wheat Rls./ton</th>
<th>L. P. Solution</th>
<th>Farmers' Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hectares of land sown to wheat</td>
<td>Quantity of wheat produced (tons)</td>
</tr>
<tr>
<td>29,000</td>
<td>6,000</td>
<td>59,479.62</td>
<td>136,803.13</td>
</tr>
<tr>
<td>29,000</td>
<td>7,000</td>
<td>76,290.34</td>
<td>182,947.14</td>
</tr>
<tr>
<td>29,000</td>
<td>8,000</td>
<td>347,579.62</td>
<td>481,784.75</td>
</tr>
<tr>
<td>29,000</td>
<td>9,000</td>
<td>347,579.62</td>
<td>481,784.75</td>
</tr>
<tr>
<td>29,000</td>
<td>10,000</td>
<td>347,579.62</td>
<td>481,784.75</td>
</tr>
<tr>
<td>29,000</td>
<td>11,000</td>
<td>319,076.50</td>
<td>529,674.70</td>
</tr>
<tr>
<td>29,000</td>
<td>12,000</td>
<td>307,010.57</td>
<td>557,777.49</td>
</tr>
<tr>
<td>29,000</td>
<td>13,000</td>
<td>306,992.57</td>
<td>557,777.49</td>
</tr>
<tr>
<td>29,000</td>
<td>14,000</td>
<td>303,854.35</td>
<td>566,694.75</td>
</tr>
<tr>
<td>29,000</td>
<td>15,000</td>
<td>397,524.24</td>
<td>665,004.19</td>
</tr>
<tr>
<td>29,000</td>
<td>16,000</td>
<td>399,874.00</td>
<td>677,929.19</td>
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<tr>
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<td>677,929.19</td>
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<td>677,929.19</td>
</tr>
<tr>
<td>29,000</td>
<td>19,000</td>
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<td>808,670.09</td>
</tr>
<tr>
<td>29,000</td>
<td>20,000</td>
<td>468,685.00</td>
<td>808,670.09</td>
</tr>
<tr>
<td>29,000</td>
<td>21,000</td>
<td>468,685.00</td>
<td>808,670.09</td>
</tr>
</tbody>
</table>
Price of cotton = Rls. 29,000/ton

$S_F$: supply schedule for wheat based on farmers' estimate

$S_L$: supply schedule for wheat based on L.P. solution

Figure 15. Hectares of land under wheat for various wheat price levels: Data based on Table 24
Price of cotton = Rls. 29,000/ton

$S_F$: supply schedule of wheat based on farmers estimate

$S_L$: supply schedule of wheat based on L.P. solution

Figure 16. Quantity of wheat produced at various wheat price levels. Data in Table 24
It has been mentioned previously that many farmers -- especially the poor, village farmers -- have a tendency to produce more wheat than could be justified on the basis of profit maximization motive alone. This is because the small farmers must produce some wheat -- regardless of its market price -- for their own consumption, or else jeopardize their survival. These farmers, therefore, have a strong tendency to avert the risks which are associated with producing cash crops. Considering these facts, it is not unusual to observe more production of wheat at all price levels than what would be forthcoming if all farmers attempted to maximize their "profit". This is especially true at low levels of prices for wheat. For instance, as Figure 15 shows, at the price of Rls. 6,000/ton, the "optimal" plan requires allocation of about 60,000 hectares of land to wheat production, whereas in actuality, the farmers were growing about 260,000 hectares of wheat.\(^1\) There is no way to reconcile these two observations, except by accepting the fact that many farmers grow wheat primarily for their own consumption even though it is more "profitable" to use the land for other crops.

\(^1\)It must be noted that even this small amount of wheat is included in the optimal plan because the available labor force is insufficient to grow any more cotton. When the same model was run with no labor restraint, the optimal plan included no wheat at all.
Although the exclusion of "other" motives from the objective function of the linear programming model accounts — to a large extent — for the observed divergence of the two supply schedules, there may be yet another reason for this phenomenon. It has been said before that the year 1352 was an unusual year for farm prices everywhere. In Iran, the price of most farm products followed the world wide trend. The price of wheat, being government controlled, however, did not increase appreciably. The most dramatic price increase occurred for cotton in Iran, where its price rose to more than twice of that of the previous year. It was at this time that the interviews were conducted. The farmers were asked to predict their supply responses for various price levels for wheat, assuming that all other costs and prices remained as they were at that time. Although this "ceteris paribus" condition was specified in the interviews, it is not unlikely to assume that most farmers had their doubts about it! It is possible that the farmers did not expect the abnormally high price of cotton to continue for long. It is possible that in answering the questions put to them they considered a more "normal" price for cottons, one which they thought will prevail in the "long run", our specifications notwithstanding! In predicting their supply response in the face of wheat price increases, therefore, they may have based their calculations on — among other things — a lower price for cotton
than the level prevailing in 1352. Considering the fact that our linear programming solution was based on the cotton price prevailing in 1352, the observed divergence between the two supply schedules may -- at least in part -- be explained.

To test this hypothesis, we ran the same model, using the same data, except for substituting a lower price for cotton. In particular, the price of cotton was set at Rls. 23,000/ton.\(^1\) The result of this run are shown in Figures 17 and 18. For the sake of comparison the farmers' estimate of the supply schedule is also drawn in these figures. It is clear that the two supply schedules are much more similar than they were under the assumption of a higher cotton price. Although by no means a proof of the validity of the above-mentioned conjecture, this "test" gives some weight to it.

To summarize what has been said in this section, the observed differences in the supply schedules derived from the farmers' estimates and that given by the linear programming solution, could be explained by one of these two lines of arguments.

a. That farmers in this region are primarily interested in averting risk, and profit maximization is a subordinate goal. They rather have the assurance of a lower level of

\(^1\)The number 23,000 was arrived at by averaging the price of cotton in the three periods of 1350-52. As it has turned out, the price of cotton in 1353 is even lower than this level.
Table 28. The result of parameteric programming, as price of wheat is increased from Rls. 6,000/ton to Rls. 21,000/ton, and the farmers' estimated supply response (price of cotton Rls. 23,000/ton)

<table>
<thead>
<tr>
<th>Price of cotton Rls./ton</th>
<th>Price of wheat Rls./ton</th>
<th>L.P. Solution</th>
<th>Farmers' Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Land sown to wheat (hectares)</td>
<td>Quantity of wheat produced (tons)</td>
</tr>
<tr>
<td>23,000</td>
<td>6,000</td>
<td>57,858.38</td>
<td>133,074.23</td>
</tr>
<tr>
<td>23,000</td>
<td>7,000</td>
<td>77,710.00</td>
<td>187,631.99</td>
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<tr>
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<td>349,968.12</td>
<td>489,666.81</td>
</tr>
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<td>489,666.81</td>
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<tr>
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<td>10,000</td>
<td>325,992.4</td>
<td>536,590.64</td>
</tr>
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</tr>
<tr>
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<td>591,392.12</td>
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<td>380,794.0</td>
<td>591,392.12</td>
</tr>
<tr>
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</tr>
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<td>468,685.0</td>
<td>808,670.09</td>
</tr>
<tr>
<td>23,000</td>
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<td>808,670.09</td>
</tr>
<tr>
<td>23,000</td>
<td>17,000</td>
<td>536,678.0</td>
<td>1,007,308.19</td>
</tr>
<tr>
<td>23,000</td>
<td>18,000</td>
<td>536,678.0</td>
<td>1,007,308.19</td>
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<td>23,000</td>
<td>19,000</td>
<td>536,678.0</td>
<td>1,007,308.19</td>
</tr>
<tr>
<td>Price of cotton Rls./ton</td>
<td>Price of wheat Rls./ton</td>
<td>L.P. Solution</td>
<td>Farmers' Estimates</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------</td>
<td>---------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land sown to wheat (hectares)</td>
<td>Quantity of wheat produced (tons)</td>
</tr>
<tr>
<td>23,000</td>
<td>20,000</td>
<td>536,678.0</td>
<td>1,007,308.19</td>
</tr>
<tr>
<td>23,000</td>
<td>21,000</td>
<td>539,028.0</td>
<td>1,017,883.19</td>
</tr>
</tbody>
</table>
Price of cotton = Rls. 23,000/ton

Figure 17. Hectares of land under wheat at various wheat price levels. Data in Table 27.
Price of cotton = Rls. 23,000/ton

Figure 18. Quantity of wheat produced at various wheat price levels. Data in Table 27.
income which is accrued to them by producing wheat (or at least the assurance of a means of subsistence) than producing the more profitable -- but also more risky -- cotton and expose themselves to -- among other risks -- the vagaries of the market. In their "objective function", therefore, risk aversion and certainty of a means of subsistence have more weight than profits, and alternatively:

b. That the farmers do indeed give substantial weight to profits in making their production decisions. The reason for their behavior may be found in the fact that they in fact considered a "long run" and more realistic price for cotton than that of the year 1352. This would imply that farmers, in deciding what to produce, and how much to produce, envisage for each crop, a price which is based on the price of that good in a number of previous years, rather than considering the price in the previous year alone. Thus supply in each year may be expressed by $S_t = f(P_{t-1}, P_{t-2}, P_{t-n})$ where:

$t$ is time period and $Z$ is "other" factors, rather than the simple case of $S_t = f(P_{t-1}, Z)$.

In actuality, it is more likely that both of these explanations are true. One can guess that for the commercial farmers the latter explanation is more realistic, while the village farmers' behavior is more heavily influenced by the necessity of risk aversion.
Multiple Objectives

While the model used in the previous section is obviously incomplete, it nevertheless is useful as a first approximation for observing the changes in the crop mix which would be forthcoming as a result of wheat price variations. The major limitation of the model used in the previous section, however, lies in the specification of a single objective function. This limitation becomes particularly crucial when the model is to be used as a guide for policy making.

In attempting to devise a particular "price policy", the policy makers may have several objectives in mind. They may want to encourage -- or discourage -- the production of some farm products. Alternatively, the objective may be a transfer of savings from agriculture to the industrial sector. Finally, the objective of the price policy may be controlling the price of food. The problem, however, stems from the fact that regardless of the particular objective of the policy makers, "price policies" affect other variables in the economy as well. These "side effects", which in many cases may be undesirable, must therefore be taken into consideration before a particular policy is implemented. In dealing with such problems, a single objective linear programming model is of little use.

Fortunately, methods have been developed which allow the inclusion of several "goals" in the linear programming frame-
work (22). This allows the policy makers to assign various "weights" to each objective and derive the "optimal" plan associated with each set of "weights" assigned to various goals. The policy makers -- once fully aware of the consequences of placing various degrees of emphasis upon each objective -- can then pursue that policy which entails the situation desired by them.¹

The multiple objective linear programming model may be stated formally as follows: (22, pp. 325-326)

Maximize \( Z = P(g_1(x), g_2(x), \ldots g_n(x)) \)

Subject to \( h_j(x) \leq 0 \quad j = 1, \ldots, m \)

and \( x > 0 \)

where

\( g_i(x) \) represents the \( i^{th} \) "objective" function

\( h_j(x) \) represents the \( j^{th} \) restraint

¹Theoretically, the model can be used to evaluate many types of "goals". However, with objectives which cannot be readily quantified the results obtained becomes, to some extent, arbitrary. In this study, therefore, the goals selected are all quantifiable. It must be emphasized that, so long as the individual goal function \( g_i(x) \) are expressable in an arbitrary linear scale, the inclusion of any goal is permissible. However, to the extent that no method is available for expressing a nonquantifiable goal in a linear scale, the results obtained reflect the judgment of the programmer (or the policy maker if he has helped in finding the appropriate numbers), (see (22)).
and

\[ Z \text{ is some function of the level of individual goal functions.} \]

To avoid the problems associated with representing non-quantifiable phenomena in a linear scale, the goals chosen in this section are all quantifiables. These goals are;

a. Maximization of gross value of the output.\(^1\) This is the same objective used in deriving the wheat supply schedules above. It can be expressed as:

\[
\text{Maximize } Z = C_1X_1 + C_2X_2 + \ldots + C_nX_n
\]

where

- \(C_i\) is the "net price" of activity \(i\)
- \(X_i\) is the amount of activity \(i\) in the plan

b. Maximization of the total number of workers needed in the farm sector. This "goal" requires the production of that crop combination which provides jobs for the most number of people. This may be expressed as:

\[
\text{Maximize } E = e_1X_1 + e_2X_2 + \ldots + e_nX_n
\]

\(^1\)While we refer to this objective as "profit" maximization, the term "profit" may not be strictly accurate. We have not included the fixed cost of farm activities in this model, simply because there is no data upon which an estimate can be based. With this in mind, we shall refer to this objective as "profit" maximization.
c. Minimization of seasonal unemployment. This objective requires the production of that crop mix which minimizes the waste of manpower due to seasonal unemployment. There are a number of ways to specify this goal, none completely satisfactory. The way we have chosen to deal with this problem is to specify the minimum use of labor during three peak months. The rationale behind this is that by reducing the number of workers during peak farming months, the production of those crops with high labor requirements during these periods will be discouraged while production of the crops with high non-peak labor use will be encouraged. This will then help to reduce fluctuation in labor use during various months, and thus decrease seasonal unemployment. This goal may be expressed as:

$$\text{Minimize } s_1x_1 + s_2x_2 + \ldots + s_nx_n$$

where:

$$s_i$$ is the number of man-days of work during the third, fourth and the seventh month of the year, needed to produce a unit of $$x_i$$.

These objectives will not be included in our previous model. A mechanism is used by which different "weights" can
be assigned to these goals. By gradually increasing the weights assigned to each objective -- keeping the weight of other goals constant -- we can deduct the trade-offs between these goals. This can then be used as a guide for policy making.

Let:

- $\lambda_1$ represent the weight assigned to goal #1
- $\lambda_2$ represent the weight assigned to goal #2
- $\lambda_3$ represent the weight assigned to goal #3

The procedure is to start by setting $\lambda_1 = 1$ and $\lambda_2 = \lambda_3 = 0$. The solution to this program is identical with that of the single objective linear programming problem. Then, keeping $\lambda_3 = 0$, the value of $\lambda_2$ is gradually increased. In this case we increase the value of $\lambda$ from zero to 2 by increments of 0.2. This will allow the policy maker to see the effects of placing more and more emphasis on the "employment creation goal", upon the optimal crop combination.

The technical coefficients, costs of production, and the yields of various crops used are all the same as those used before. The set of prices for various crops used in the model are also the same as those used before, except for cotton and wheat. The price of cotton used is Rls. 23,000/ton which represents the average price for the past 3 years. The price of wheat, however, represents a special case. Being government controlled, the price of wheat in Iran does not vary with
the world price level. In this study, we shall select a price of Rls. 17,000/ton, which is assumed to represent the cost of a ton of wheat imported by the government.\(^1\)

First, the model is run with \(\lambda_1 = 1, \lambda_2 = \lambda_3 = 0\). The value of \(\lambda_2\) is then gradually increased while \(\lambda_1\) and \(\lambda_3\) remain constant. The results of this run are listed in Table 29 and are graphed in Figure 19.

As Figure 19 clearly shows, with the "prevailing" set of relative prices, the two objectives of profit maximization and employment creation are conflicting. With no consideration given to employment creation (\(\lambda_2 = 0\)), the optimal plan requires production of more than one million tons of wheat and only a mere 10 thousand tons of cotton. If the set of prices used in the model do indeed reflect world prices, and in the absence of any other considerations, the policy makers should pursue a policy which would result in this crop combination. However, in all likelihood, the policy makers do have other things to worry about. In particular, this "optimal" plan implies a high level of unemployment in the rural sector of

\(^1\)The price of imported wheat paid by Iran in the past two years have not been released by the government thus far. It is believed that in 1974, Iran paid in excess of Rls. 20,000/ton for her imported wheat (including the transportation costs). In 1973, she had paid much less. The price of Rls. 17,000 is selected rather arbitrarily. To the extent that the object of this analysis is the demonstration of the techniques which can be used for planning purposes, inaccuracies in the magnitude of wheat price is unimportant.
Table 29. The quantity of wheat and cotton produced, the number of workers required in peak month, and profit levels associated with $\lambda_1 = 1$, $\lambda_2 = 0, \ldots, 2$

<table>
<thead>
<tr>
<th>$\lambda_1$</th>
<th>$\lambda_2$</th>
<th>Quantity of wheat (tons)</th>
<th>Quantity of cotton (tons)</th>
<th>Number of workers employed during peak month</th>
<th>Gross returns (Rls.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1,007,308</td>
<td>10,340</td>
<td>28,121$^a$</td>
<td>14,381,237,040$^a$</td>
</tr>
<tr>
<td>1</td>
<td>0.2</td>
<td>808,670</td>
<td>188,580</td>
<td>61,308</td>
<td>14,268,947,520</td>
</tr>
<tr>
<td>1</td>
<td>0.4</td>
<td>808,670</td>
<td>188,580</td>
<td>61,308</td>
<td>14,268,947,520</td>
</tr>
<tr>
<td>1</td>
<td>0.6</td>
<td>677,929</td>
<td>291,796</td>
<td>98,171</td>
<td>13,870,316,640</td>
</tr>
<tr>
<td>1</td>
<td>0.8</td>
<td>677,929</td>
<td>291,796</td>
<td>98,171</td>
<td>13,870,316,640</td>
</tr>
<tr>
<td>1</td>
<td>1.0</td>
<td>677,929</td>
<td>291,796</td>
<td>98,171</td>
<td>13,870,316,640</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>585,624</td>
<td>347,179</td>
<td>122,462</td>
<td>13,354,989,600</td>
</tr>
<tr>
<td>1</td>
<td>1.4</td>
<td>572,699</td>
<td>355,639</td>
<td>124,057</td>
<td>13,287,319,680</td>
</tr>
<tr>
<td>1</td>
<td>1.6</td>
<td>566,694</td>
<td>359,324</td>
<td>124,885</td>
<td>13,249,310,880</td>
</tr>
<tr>
<td>1</td>
<td>1.8</td>
<td>566,694</td>
<td>359,324</td>
<td>124,885</td>
<td>13,249,310,880</td>
</tr>
<tr>
<td>1</td>
<td>2.0</td>
<td>557,777</td>
<td>368,887</td>
<td>124,885</td>
<td>13,249,310,880</td>
</tr>
</tbody>
</table>

$^a$To make the comparison of the goals possible, the coefficients of each objective function were standardized. In each case, the coefficients were converted to their respective values in a scale of 1 to 1,000. Once the results were obtained, these numbers were converted to their original scale (number of man-days and dollars).
Figure 19. Trade-off between various "goals". Data in Table 29
northern Iran. The optimal crop production requires a mere 28,000 workers at the peak month of the year. This means that even at the peak farming month, more than 96,000 farm workers are out of a job. These workers can, therefore, be considered absolutely "redundant". Given the inability of the other sectors to absorb additional workers, evidenced by the ever increasing rate of unemployment in the urban areas, these farm workers have nowhere to go. Considering the fact that the number of workers rendered "redundant" by this crop combination is close to 100,000 in this part of the country alone, the nationwide result of this "optimal" plan may be catastrophic.

The policy makers, therefore, may want to consider other possibilities. In particular, they may want to put more emphasis on the "goal" of job creation. Table 29 and Figure 19 show what happens as \( \lambda_2 \) is gradually increased. At \( \lambda = 0.2 \), the optimal plan includes 188,580 tons of cotton, which means the employment of more than 61,000 workers at the peak month. These jobs are created, in effect, as a result of allocating the lands to the production of a crop combination.

---

1 The total available farm labor force is about 125,000.

2 Another undesirable outcome of this situation is what happens to income distribution in the country. This high price of wheat would reduce the real wages received by the workers below that required for subsistence. The policy makers, therefore, have another reason for selecting a lower price for wheat.
which does not represent the "optimal" use of these lands. This is reflected in the drop in the value of the crops produced (Part C, Figure 19). When equal weight is assigned to both objectives \(\lambda_1 = \lambda_2 = 1\), the "optimal" plan includes production of 291,796 tons of cotton and the employment of more than 98,000 workers. Once again, this is done at some cost, reflected by the "profit" drop.

The policy makers must now decide on the proper course of action. If they had, a priori, a preference ordering of these goals, say equal emphasis on the two goals, then they will know, by looking at Figure 19, what crop combination should be produced. A price policy may then be devised which would give rise to that crop combination. The policy makers, however, may not have any clear notion of their preferences in regard to these goals. This is indeed quite likely to be the norm. In that case, the results obtained by this technique may help them to form some sort of preference schedule. By noting the consequences of placing various degrees of emphasis on different goals, they can form a more solid opinion about the importance of these goals.

Next, we consider the objective of minimizing seasonal unemployment. As it was mentioned before, we have chosen to minimize the number of man-days of work needed during the three peak months of the year. In the following calculations
\( \lambda_3 \) is gradually increased from zero to -2.0 by increments of -.2.\(^1\) At the same time, \( \lambda_1 \) is set at 1.0 and \( \lambda_2 \) at 1.2. This means that we are specifying a reduction in the number of workers engaged in farm works during the peak months, while at the same time emphasizing the objectives of "profit" maximization as well as over all employment creation. The results of this run are listed in Table 30 and graphed in Figure 20.

As Figure 20 shows, with the given set of prices and cost levels specified, attempting to reduce the number of workers needed during the peak months of the farming season leads to a reduction in the amount of cotton produced, an increase in the amount of land sown to wheat, a reduction in the number of workers needed in the farm sector, and an increase in the level of farm sector revenues. Oddly enough, by attempting to reduce seasonal unemployment, what we have accomplished is a reduction in the total number of workers in the farm sector. No new crop, one using more labor during the non-peak months, enters the plan, even when \( \lambda_3 \) is set at -2.0. This is of course, due to the nature of the crops produced in this area at the present time.

To see this point more clearly, the number of workers

\(^1\)The negative value of \( \lambda_3 \) indicates that seasonal unemployment is an undesirable thing. By giving \( \lambda_3 \) a negative number, the third "goal" function is in fact minimized.
Table 30. Quantity of wheat and cotton produced, the number of workers needed during peak month, and the levels of profit associated with $\lambda_1 = 1$, $\lambda_2 = 1.2$, and $\lambda_3 = 0, .2, . . . , 2$

<table>
<thead>
<tr>
<th>$\lambda_1$</th>
<th>$\lambda_2$</th>
<th>$\lambda_3$</th>
<th>Wheat (tons)</th>
<th>Cotton (tons)</th>
<th>Number of Workers peak month</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.2</td>
<td>0</td>
<td>585,624</td>
<td>347,179</td>
<td>122,462</td>
<td>13,354,989,520</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-0.2</td>
<td>677,929</td>
<td>291,796</td>
<td>137,179</td>
<td>13,370,317,240</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-0.4</td>
<td>677,929</td>
<td>291,796</td>
<td>137,179</td>
<td>13,370,317,240</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-0.6</td>
<td>808,670</td>
<td>188,580</td>
<td>137,179</td>
<td>13,370,317,240</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-0.8</td>
<td>808,670</td>
<td>188,580</td>
<td>137,179</td>
<td>13,370,317,240</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-1</td>
<td>947,080</td>
<td>61,549</td>
<td>137,179</td>
<td>14,526,897,637</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-1.2</td>
<td>1,007,308</td>
<td>10,340</td>
<td>137,179</td>
<td>14,381,237,042</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-1.4</td>
<td>1,007,308</td>
<td>10,340</td>
<td>137,179</td>
<td>14,381,237,042</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-1.6</td>
<td>1,017,883</td>
<td>-</td>
<td>137,179</td>
<td>14,365,849,994</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-1.8</td>
<td>1,017,883</td>
<td>-</td>
<td>137,179</td>
<td>14,365,849,994</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>-2</td>
<td>1,017,883</td>
<td>-</td>
<td>137,179</td>
<td>14,365,849,994</td>
</tr>
</tbody>
</table>
Figure 20. Trade-off between various goals. Data in Table 30
needed during various months in the farm sector of this region
are drawn in Figure 21. The "solid" schedule shows the number
of workers required when $\lambda_3 = 0$, while $\lambda_1 = 1$ and $\lambda_2 = 1.2$.
This refers to the starting point of Figure 20, when emphasis
is placed upon the total number of workers needed in the farm
sector. When the goal of reducing seasonal unemployment is
simultaneously emphasized, the picture changes drastically, as
shown by the "dotted" schedule. When $\lambda_3$ is set at $-1.0$, the
absolute amount of seasonal unemployment is, of course, re-
duced tremendously. But this occurs only at the "expense" of
total level of employment. When $\lambda_3 = -1.0$, about 90,000
workers are rendered absolutely "redundant". Thus, given
the present techniques of production of various crops, and
the type of crops produced in this area, seasonal unemployment
is reduced only when production of labor intensive crops are
decreased.

For a country which faces labor shortage, the policy
implications of this phenomenon seems obvious. By devising
policies which results in the crop combination associated with
$\lambda_1 = 1$, $\lambda_2 = 1.2$ and $\lambda_3 = 1$, not only can the farm sector re-
lease large numbers of workers, but, given the assumed set of
prices, total value of farm products also increases (Figure
20, Part C).

The choice of appropriate policy is difficult, however,
for a country which has large amounts of unemployment. In
Table 31. Seasonal variation in the number of workers needed in the farm sector for two "weight" combinations

<table>
<thead>
<tr>
<th>Months</th>
<th>Number of workers needed (A)</th>
<th>Number of workers needed (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$A: \lambda_1 = 1.0$</td>
<td>$B: \lambda_1 = 1.0$</td>
</tr>
<tr>
<td></td>
<td>$\lambda_2 = 1.2$</td>
<td>$\lambda_2 = 1.2$</td>
</tr>
<tr>
<td></td>
<td>$\lambda_3 = 0$</td>
<td>$\lambda_3 = 1.0$</td>
</tr>
<tr>
<td>1</td>
<td>3,741</td>
<td>6,800</td>
</tr>
<tr>
<td>2</td>
<td>12,269</td>
<td>2,044</td>
</tr>
<tr>
<td>3</td>
<td>122,463</td>
<td>31,552</td>
</tr>
<tr>
<td>4</td>
<td>102,598</td>
<td>10,221</td>
</tr>
<tr>
<td>5</td>
<td>20,783</td>
<td>4,256</td>
</tr>
<tr>
<td>6</td>
<td>7,482</td>
<td>1,363</td>
</tr>
<tr>
<td>7</td>
<td>117,951</td>
<td>21,030</td>
</tr>
<tr>
<td>8</td>
<td>62,355</td>
<td>14,132</td>
</tr>
<tr>
<td>9</td>
<td>34,495</td>
<td>32,901</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In that case, the above conclusion renders the attempt to reduce seasonal unemployment illogical. For if the objective is to reduce wasting human resources, it does not make any sense to reduce seasonal unemployment at the expense of total unemployment. In such cases, the activities which provide jobs for part of the year are to be produced even though this
Figure 21. Seasonal fluctuation in labor demand when $\lambda_3 = 0$ and $\lambda_3 = 1.0$. Data in Table 31.
implies large, seasonal unemployment.

It must also be mentioned that the conclusions reached above stem largely from the nature of the model. One could have included other farm activities which require labor during the off-season. In that case, seasonal unemployment could be reduced without substantial reduction in the number of workers employed throughout the year. Unfortunately, however, no one has formed a crop-animal combination which solves this problem satisfactorily, and to the extent that improvements have been made in this regard, they are not present in the farm sector of northern Iran.

To conclude this discussion, one must accept the fact that seasonal unemployment is invariably associated with agriculture. The seasonally idle workers, of course, could find socially productive employment during the off seasons. They could improve the rural roads, build irrigation canals, improve their lands, produce handicrafts, etc. Most of these projects, however, require a social cohesion and the creation of communal projects whose benefits are reaped by all of the rural residents. The absence of these preconditions for effective utilization of manpower, however, is what characterizes the "traditional" farm sector in the underdeveloped countries.
Conclusions

In this chapter, the problem of decision making in the presence of conflicting goals were discussed. A linear programming framework incorporating several objective functions was used as the analytical tool.

The policy makers may have a well-defined preference ordering of various objectives before hand. In that case, appropriate "weight" can be assigned to various objectives and the "optimal" plan can be found. In the more usual case, where the policy makers do not have specific "weights" in mind for different objectives, the procedure used here could help them form such a preference ordering. By observing the consequences of placing various degrees of emphasis upon different goals, the policy makers can form a more informed opinion.

In either case, when the appropriate "weights" are decided upon, and the associated "optimal" plan arrived at, the policy makers need only to devise policies which promote the realization of the optimal plan. This could be done by a number of methods, whose effectiveness depend upon the nature of the economy in question. In a planned economy, the implementation of such policies represent no serious problems as economic activities are largely controlled by the state. In a country like Iran, where direct government intervention in the economic activities are limited, implementation of such policies are
more difficult. Still, appropriate price policies could be successful in encouraging production of some crops, while discouraging that of others, so as to induce the production of that crop combination indicated by the optimal plan.

Finally, a few words about the incomplete nature of the model are in order. As it was mentioned previously, in attempting to devise a realistic and successful policy many factors must be taken into account. In regard to this study, the model could have been expanded to include the "goals" of income distribution and balance of payments. Introduction of these goals would make the decision of the policy makers more difficult, but also more realistic. However, introduction of such nonquantifiable objectives is not a simple matter. Judgments must be made as to how to express the impact of each activity upon the distribution of income in a linear scale. These judgments are crucial, because the outcome of the analysis is based on them. What is important, however, is that with enough time and a careful study of the impacts of each activity, a scale, though to some extent arbitrary, can be devised for most types of objectives.
SUMMARY AND CONCLUSIONS

The main objective of this study has been to estimate the impact of wheat price increases upon several economic variables. Aside from the problems faced by the Iranian farm sector in general, the wheat subsector in Iran has had the disadvantage of a tight price control by the government which has kept the price of wheat virtually constant for a decade. In the Northern Iran area, where this study has been conducted, this has resulted in the production of wheat on the low quality lands, as lands of better quality are used for other, more profitable, crops, especially cotton.

Using the data collected by directly questioning the farmers in Gorgan and the plain, a schedule showing farmers' response to wheat price increases was constructed. It was found that although all farmers respond rather quickly to wheat price increases, the small village farmers' response is more pronounced than that of the large, commercial farmers at all levels of wheat prices. It was estimated that as price of wheat rises to Rls. 10/kg, Rls. 15/kg and Rls. 20/kg from its present price of Rls. 6.5/kg, the percentage of land sown to wheat in this area increases to 59%, 76% and 90% respectively.

1Only in 1974 was the official purchase price of wheat raised to Rls. 10/kg.
from the present 46% of all the land in this area used for wheat production. The most drastic reduction takes place in the amount of land presently sown to cotton.

It is not certain at what level of wheat prices Iran becomes self-sufficient in wheat. The quick response to wheat price rises observed in Gorgan and the plain cannot be expected from other regions of the country. To determine the wheat price level at which Iran becomes self-sufficient in wheat, or in general to estimate the balance of trade implications of wheat price increases, requires another study covering all of Iran.

Perhaps the most dramatic result of a wheat price increase, at least in the area of this study, is an increase in the level of unemployment. The wheat price policy assumed in this study increases the acreage of land sown to wheat largely at the expense of other crops, notably cotton. This, given the prevailing techniques of production, reduces the total number of workers needed in the farm sector. A mass of "surplus farm labor" is thus created which must seek employment in the nonfarm sector. Given the present rate of labor absorption by the nonfarm sectors of the Iranian economy, it is safe to conclude that most of the workers released from the farm sector would join the ranks of the unemployed. Table 32 shows the employment effect of wheat price increases in the area of this study.
Table 32. The number and percentage of workers released from the farm sector of Gorgan and the plain at various wheat price levels

<table>
<thead>
<tr>
<th>Price of Wheat</th>
<th>Rls. 10/kg</th>
<th>Rls. 15/kg</th>
<th>Rls. 20/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of workers released from the farm sector</td>
<td>24,000</td>
<td>66,000</td>
<td>86,000</td>
</tr>
<tr>
<td>Percentage of the farm workers released</td>
<td>19%</td>
<td>53%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Even with a much less drastic results in other parts of the country, the employment effect of a substantial wheat price increase could be disastrous.

Increases in the price of wheat leads to a more unequal distribution of income. In particular, an increase in the price of wheat, and thus of bread, causes a transfer of income from the wheat consumers, most of whom are low income Iranians whose main food item is bread, to middle and large farmers. Table 33 summarizes this income redistributing effect of wheat price increases in Iran.
Table 33. The effect of wheat price increases upon the real income of various consumer and producer groups; a summary

<table>
<thead>
<tr>
<th>Consumers</th>
<th>Number of people in the group</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban unemployed and partially employed, and rural landless. Annual per capita income less than Rls. 8,000 ($118)</td>
<td>About 8 million</td>
<td>Real income drastically reduced. With price of wheat at Rls. 10/kg their state of malnutrition is aggravated. Higher wheat prices result in starvation and increasing death rate.</td>
</tr>
<tr>
<td>Urban workers. Annual per capita income between Rls. 8,000 and 15,000</td>
<td>About 3.7 million</td>
<td>Real income drastically reduced. Real wages fall below subsistence rate. In the long run, money wages must rise by about 8% (for wheat price of Rls. 10/kg), by 14% (for price of Rls. 15/kg, and 22% for price of Rls. 20/kg) to compensate for the bread price increase.</td>
</tr>
<tr>
<td>Urban lower-middle and middle income groups. Annual per capita income between Rls. 15,000 and Rls. 30,000</td>
<td>About 3.4 million</td>
<td>Real income reduced very little for wheat price of 10/kg but the reduction is significant when the price is Rls. 15 or 20/kg. For ( P_w = \text{Rls. 10/kg} ). No substantial change occurs. With higher wheat prices, rice may replace wheat to some extent. In that case total non-food expenditure must be reduced.</td>
</tr>
<tr>
<td>Higher-middle and high income groups. Annual per capita income above Rls. 30,000</td>
<td>About 1.9 million</td>
<td>No significant change in real income. Little consequence of any kind.</td>
</tr>
</tbody>
</table>

\( ^a \) Classification of various income groups is based on data collected in 1968 and published in 1972 (44, p. 307).
### Table 33 (Continued)

<table>
<thead>
<tr>
<th>Producers b</th>
<th>Number of people in the group</th>
<th>Change in real income</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very small farmers, with less than 1 hectare of land</td>
<td>About 4 million</td>
<td>Real income actually reduced</td>
<td>Their own production of wheat is less than their own yearly consumption of wheat. They must buy wheat from the market. To this extent, therefore, their situation is like that of urban poor.</td>
</tr>
<tr>
<td>Small farmers, with land of between 1 to 2 hectares</td>
<td>About 1.7 million</td>
<td>Little change in real income</td>
<td>What they produce is consumed locally, increase in market price of wheat, therefore, does not affect them much.</td>
</tr>
<tr>
<td>Middle size farmers with land of between 2 to 10 hectares</td>
<td>About 4.9 million</td>
<td>Increase in real income</td>
<td>These farmers receive higher prices for their wheat and thus will become better off. However, since they do not market all of the wheat they produce, they do not receive all of the benefits of a wheat price increase.</td>
</tr>
<tr>
<td>Medium and large farmers, with more than 10 hectares of land</td>
<td>About 2 million</td>
<td>Increase in real income</td>
<td>These farmers market all of their crops and thus receive all of the benefits of a wheat price increase.</td>
</tr>
</tbody>
</table>

b It must be noted that not all farmers are wheat producers. There is no data on the number of farmers who grow wheat. Most small farmers grow some wheat, however; The number of various groups of farmers, and their dependents, given in Table 33 therefore, represent the number of farmers potentially affected by wheat price increases.
Given the significance of bread in the diet of low income Iranians, it can be concluded that increases in the price of bread is not an advisable policy. Any increase in the price of wheat, therefore, should be accompanied by a government subsidy aimed at keeping the price of bread at its present level, lest the very survival of millions of Iranians would be endangered.

Considering the present rate of unemployment in Iran, and the labor absorption capacity of the nonfarm sectors of the economy, large increases in the amount of land sown to wheat, at the expense of more labor intensive crops, must be avoided. This, however, is what would happen if wheat prices were raised to Rls. 15 or Rls. 20/kg.

The problem of large unemployment in the farm sector could be avoided, or at least reduced, if wheat price increases are accompanied by certain steps to bring more land into cultivation. This represents an enormous potential for increased agricultural production in Iran as the amount of land considered suitable for cultivation is more than twice that presently under cultivation and about 5 times the amount of land under cultivation in any one year (41, p. 7).
LITERATURE CITED


27. Foreign Agriculture 12 (Sept. 23, 1974).


73. Plan and Budget Organization. Statistical Center of Iran. Result of Agricultural Census 1350. Tehran: Author, Azar 1352. (In Farsi)


75. Plan and Budget Organization. Statistical Center of Iran. Statistical Year Book of Iran 1351. Tehran: Author, 1352. (In Farsi)


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APPENDIX A: GOVERNMENT'S WHEAT PRICE POLICY

Throughout this study references have been made to the Iranian "wheat price policy". This appendix serves as a description of the nature of that policy, as well as its method of implementation.

In general, the objectives of the wheat price policy of the Iranian government are:

a. Keeping bread prices at a low level
b. Reducing seasonal fluctuations in bread prices
c. Decreasing the excess capacity of the bakeries by reducing their number

The means to achieve these goals are described below.

Each year, before farmers plant their wheat, the government announces an official purchase price for wheat. At this price the government stands ready, in theory, to buy all the wheat offered by the producers. In practice, however, the government buys very little from domestic producers.¹

¹The amount of wheat purchased from domestic producers by the government is indeed small. There are a number of reasons for this:

a. The government's support price has been set too low, compared with the cost of production and the "free" market price, to attract many farmers.

b. The government demands a particular quality of wheat which most farmers do not have. Government specifications are rigid. A typical ad for governments' purchasing policy runs as follows:

(footnote continued on the following page)
In general, if a government announces a policy of purchasing farm products at a fixed price, this implies a program of price support. This is because when a government buys farm products, this will raise prices above what they otherwise would be. The total effect of the Iranian government's "wheat policy", however, tends to reduce the price of

(Footnote continued from previous page)

Clean Wheat  Foreign Solid Objects  at most 1%
Other Cereals  at most 1/2%
Seeds of Wild Grass  at most 10 seeds in 100
Moisture  7%

(45)
The wheat grown by many farmers, particularly the small village farmers, does not meet these requirements and therefore cannot be sold to the government. Mixed grains of much more than 1/2% are common and moisture is often in excess of 7%.

c. The wheat sold to the government must be delivered to "...the government silos or the storage house® in state capitals...". The farmer must deliver it himself or pay for the transportation costs which in many cases is substantial. For the small farmers this is particularly burdening. Moreover, the farmer cannot be certain that his wheat will be bought once he has transported it to the city, for his crop may not meet the specifications. Thus he is most likely to save himself the trouble and sell his crop to the middlemen who would go to his farm and pay the transportation cost, and perhaps even offer him a slightly higher price.

d. A large portion of the wheat farmers, especially the small wheat farmers, have sold their crops "green" to the merchants. Thus at the harvest time they have no crop to sell to the government. The merchant green buyer, is also unlikely to sell to the government, for he can sell it as a higher price to private buyers, as will be explained below.

We can therefore conclude that "the cereal organization virtually always handles overseas imports", and has little to do with buying domestically produced wheat (54, p. 6).
wheat in the country, relative to what it would be in the absence of government's intervention. When the government announces the official purchase price of wheat at Rls. 6,000/ton (which has been the official purchase price for the past decade), it is generally understood that the government is determined to take the necessary actions to keep actual prices received by the producers and paid by the millers close to this "artificial" price. The Iranian government implements its objective mainly by importing wheat and selling it at a subsidized rate.

When the government announces its purchase price of wheat at Rls. 6,000/ton, the market price settles around Rls. 6,500/ton, at harvest time. The reason for this slightly higher market price is that the millers and the merchants offer more to persuade farmers to sell their wheat to them, rather than selling it to the government. This price of Rls. 6,500/ton (about $95/ton), therefore, can be considered "Price received by farmers". This situation has existed in Iran for the past decade.

How does the government control wheat prices and prevent the establishment of a higher price, which would result from

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1 This statement is not strictly accurate. The above price is relevant for harvested wheat. However, many farmers, particularly small village farmers, do not receive this price. They usually sell their crop before it is harvested at much lower price per ton. See Chapter III.
"free" market? If domestic supply of wheat is insufficient to meet the demand at this low price, what is it that keeps the price from rising? The answer is, of course, that the government imports wheat and supplies it to the bakers to insure the "stability" of wheat prices at this low level to consumers. It must be noted that government's policy of bread price control is effective only in the cities. Rural areas are not directly affected by this policy. Furthermore, there are two distinct policy measures, one for Tehran, the capital, and the other for other urban centers.

Activities of the Cereal Organization in Tehran

Each year, the "cereal organization" announces an official wheat quota for different cities (see Table 34). This means that the government stands ready to supply a specified amount of (imported) wheat to the "permitted" bakers at a set price. The price charged by the government is uniform throughout the year, and has been Rls. 7,510/ton during the past nine years. This is approximately the same as the open market price of wheat in Tehran, during the harvest season. But for most of the year, market prices of wheat is well above this price (see Figure 22).

Tehran has about 4,000 bakeries. The bakeries are
Table 34. Share of major Iranian states of the imported wheat (1352)\(^a\)

<table>
<thead>
<tr>
<th>City</th>
<th>Quota (tons)</th>
<th>Quota (% of Total)</th>
<th>Population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tehran</td>
<td>200,000</td>
<td>51%</td>
<td>19%</td>
</tr>
<tr>
<td>The Central State</td>
<td>25,000</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>(Mainly Tehran's suburb)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khorasan</td>
<td>17,000</td>
<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>East Azarbaijan</td>
<td>16,000</td>
<td>4%</td>
<td>10%</td>
</tr>
<tr>
<td>Isfahan</td>
<td>20,000</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>West Azarbaijan</td>
<td>10,000</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Kernanshahan</td>
<td>8,000</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Fars</td>
<td>6,000</td>
<td>1%</td>
<td>6%</td>
</tr>
<tr>
<td>Sisten and Baluchestan</td>
<td>8,000</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Mazandaran</td>
<td>5,000</td>
<td>1%</td>
<td>7%</td>
</tr>
<tr>
<td>Gilan</td>
<td>5,000</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>390,000</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

\(^a\)Source: (57).

small and serve only their immediate vicinity.\(^1\) This is mainly due to the type of bread preferred in Iran, which is best when consumed soon after baking, and cannot be stored for long

\(^1\)Each bakery thus serves about 900 people, or there is one bakery for every 200 to 250 families.
Figure 22. Monthly variation in market price of wheat (Source: 16)
without losing its characteristic flavor. The volume of each baker seems to be much less than its capacity. Although wages are extremely low and the cost of baking bread also low, bread baking in Iran is quite inefficient, as all bakeries operate with considerable excess capacity. The bakeries seem to be operating on the declining portion of their average cost curves.

Partly because of this problem, the government has taken some steps to reduce the number of bakeries. To pursue this goal, about 2,518 bakeries have been given special "permit". The bakers with the permit can buy wheat from the Cereal Organization at the official price of Rls. 7,510/ton, while other bakers must pay the going market price for wheat. The price of bread is also government controlled and applies to all bakers.

At harvest time, as was mentioned before, the market price for wheat is not much different than the government price. At times, the market price might even be lower. In such cases all bakers, permitted ones included, buy their needed supply of wheat from the merchants. But as market price begins to rise, the bakers with "permit" start buying from the government at lower prices.

A baker with "permit", thus has a choice of two markets. Most of the year he takes advantage of the government's lower
offer. To buy the wheat from the Cereal Organization, the baker goes to his union. There he is given a coupon which he can take to the government silo and demand a quantity of wheat.¹ Usually he hands his coupon to a miller and, after a payment to him for his services, receives his flour.

The fee received by the millers is also government controlled. The miller's fee is set at Rls. 560/ton of wheat milled. This is indeed a very small amount, and it has remained unchanged since 1344 (56).

A ton of wheat, on the average, converts to 867 kilograms of flour.² The price of flour, paid by the bakers can be calculated as follows.

\[
\begin{align*}
1000 \text{ kg of wheat} & \quad 7,510 \text{ Rls.} \\
+ \text{Rls. 560 Miller's Fee} & \\
+ \text{Rls. 253 Other Expenses} & \\
867 \text{ kg of flour} & \quad 8,323 \text{ Rls.}
\end{align*}
\]

Thus the bakers with "permit", can buy flour at 9.6 Rls. per kg all year round.³

¹The quota for each baker is determined, among other things, by his sales volume. The coupons given to the bakers by their unions, is at most equivalent to the wheat used by the baker in 10 days.

²A ton of wheat also gives 100 kg of bran.

³There are several types of bread in Iran, each using a particular type of flour. The wheat-flour, as well as the flour-bread conversion rates are different for each type of flour and bread. The above calculations are made for the "star" type of flour, a widely used type.
The bakers, on the average, make 1,375 kg of bread out of a ton of flour. The bread is sold at about 12.5 Rls./kg.\(^1\) The baker's margin, can thus be calculated as follows:

Costs: 1,000 kg of flour (9.6 Rls/kg) 9,600 Rls.

Revenue: 1,375 kg of bread (12.5 Rls./kg) 17,187.5 Rls.

Thus the bakers receive about 7,587 Rls./tons of flour used for all their services. Figure 23 summarizes our findings thus far. The figure shows the "share" of various groups of the retail price of bread.\(^2\)

\(^1\)The price of bread is government controlled and varies (though only slightly) for different kinds of bread. However, it is generally believed that the bakers violate the price guideline in many ways. They could sell bread by number, (that is price it by the piece), instead of weight and thus avoid the whole problem of "weight" per Rls. I have chosen the price of 12.5 Rls./kg of bread, based on my own observation. This is about the "average" price of all kinds of bread.

\(^2\)The figures are calculated as follows:

1,000 kg of flour makes 1,375 kg of bread thus 1 kg of bread requires 1,000/1,375 = .73 kg of flour

The cost of this flour is .73 x 9.6 = 7.01 Rls.

1,000 kg of wheat makes 867 kg of flour. Thus .73 kg of flour requires

\[
\frac{.73 \times 1,000}{867} = .84 \text{ kg of wheat.}
\]

The cost of this wheat is .84 x 7.51 = 6.31 Rls.

This is how the consumer price of 12.5 Rls. is distributed.
Figure 23. Bread price spread in Tehran for "member" bakers (imported wheat)
Before continuing our discussion, several points must be emphasized.

a. The "wheat price" component of the retail price of bread is in reality more than what the figure indicates. The official selling price of 7.51 Rls./kg may be far below the price paid by the "society" for that wheat. The government sells wheat at that price, regardless of the price she paid to foreign producers. For instance, the real cost of wheat sold by the government in 1973 at the subsidized price of 7.5 Rls./kg was, in fact, more than 20 Rls./kg. This was the price of wheat purchased from the United States plus transportation costs.

b. The millers' margin, which is 6% in this case is indeed low. The millers' fee of 560 Rls./ton of wheat milled, was agreed to by the Cereal Organization and the Bakers and the Millers Union in 1966. At that time, this amount represented a "break even" price for the millers, without any pure economic profit. Inflation has changed all that now. A government sponsored study\(^1\) concludes that the "break even" price now would be around 860 Rls./ton of wheat milled.

\(^1\)This study is done by the Research Division of the Department of rural cooperatives. It is unpublished, and in Farsi. As of yet, it has no title!
There are, however, other factors involved in this pricing policy. All parties involved are aware, though no one admits it publicly, that the millers mix their "government" wheat with lower quality, and cheaper, domestic brands, and thereby increase their effective fee. The millers claim this mixing to be essential to their operation, as flour made exclusively of imported wheat lacks the specific quality needed for baking Iranian type bread.

Nevertheless, one thing is for certain. The millers' margin is small. Any realistic plan for the future must include a revision of the old agreement and raise the millers' fee. This is, of course, not the same thing as saying that variation in price of wheat necessitates, or ensues, a change in the millers' fee. One has nothing to do with the other. Millers' fee in Tehran, and for the "permitted" bakers is government controlled, and only the government can increase it. But left to itself, this fee would undoubtedly rise to a much higher level.

c. The bakers with no "permit" have a much more difficult time. They must buy flour in the open market and make the best of their situation. The "free" market price of flour varies from day to day and at times reaches quite high levels. As Figure 22 indicates, price index for 1352 varied from 105 in (Mordad) to 126 in (FarVardin). Since bread prices are government controlled, this variation in flour
prices represents a corresponding reduction in the already too low margin of the bakers without permit.

d. Figure 23 does not show the share of the farmer in the price of bread because it is assumed that the wheat supplied by the government is bought from other countries. This has been the case in recent years. When part of the wheat supplied to the "permitted" bakers by the government comes from government purchase of domestic wheat, the share of Iranian farmers in the price of bread is that shown by Figure 24. This share ranges from 43% for those farmers who sell their crop at harvest time (usually large farmers) to about 34% for the small farmers who sell their crop "green".

Government Policy in Other Urban Centers

The Cereal Organization's policy of intervention in the wheat and flour market extends to urban centers outside of Tehran as well. Bread prices are controlled in all cities, and to a lesser extent, so are flour prices. But the extent of government's intervention and its degree of control is much less for cities other than Tehran. For one thing most of these cities are nearly self-sufficient in wheat from the farms in the neighboring villages. There is, therefore, less need for imported wheat. Nevertheless, every state has a share of imported wheat (see Table 34).

The shares of imported wheat apportioned to each state
Figure 24. The bread price spread in Tehran for domestic wheat
is sent to be stored at the local silos, and are placed under the control of the governor of that state. This wheat does not enter the market for some time. The market forces are allowed to determine the market prices for wheat and flour. These prices are at their lowest during the harvest time and thereafter increase gradually. When the market price of wheat or flour reach a specific level, the government steps in and "dumps" the imported wheat into the market. Once again, this wheat is put at the disposal of the bakers' union, who in turn make it available to the "permitted" bakers.

The basic difference between the government policy in Tehran and other urban centers is the fact that the "permitted" bakers in the latter areas receive imported wheat only about 3 or 4 months of the year, during which time market price of flour has peaked, whereas in Tehran, the bakers with the "permit" can use the imported wheat at the uniform price all year round.

Another point to be observed is that in many of these urban centers, bread prices are in fact lower than it is in Tehran. As it was mentioned before, bread prices are controlled in all cities, but what is important is what we called "de facto" bread prices. This price was 12.5 Rls./kg in Tehran, but 11 Rls./kg in Gorgan (a net exporter of wheat). The following description may be helpful in an understanding of the situation in another urban center (Gorgan).
The millers in this area buy a large quantity of wheat from the farmers at harvest time. Those with more capital buy enough wheat to last them all year. Most millers, however, can afford to purchase only a few months supply of wheat. These millers then, gradually convert the wheat into flour and sell it in the "free market", reaping a modest profit.

As we said previously, a ton of wheat, on the average, converts to about 867 kg of flour and 100 kg of bran. At the harvest time, flour is sold at 9,400 Rls./ton and the bran at 2,500 Rls./ton. The millers' fee, then, can be calculated as follows:

Costs of wheat, 1 ton = 6,500 Rls. Rls. 6,500

Gross Revenue: (9,400 Rls./ton)

Flour: 867 kg Rls. 8,149.8
Bran: 100 kg (2,500 Rls./ton) Rls. 250

Total Revenue Rls. 8,399.8

Thus the millers' margin is Rls. 1,899.8, for every ton of wheat milled at harvest time. This is of course, over three times the millers' margin in Tehran.

The bakers in Gorgan buy their needed flour from these millers, or from middlemen whose job it is to buy and sell flour. During the harvest season flour is priced around Rls. 9,400/ton. The bread is sold at 11 Rls./kg. The baker's
situation can be summarized as follows.

Cost: 1,000 kg of flour (9.400 Rls./ton) 9,400 Rls.

Revenue: 1,375 kg of bread (11 Rls./kg) 15,125 Rls.

Thus the bakers receive about 5,725 Rls. for each ton of flour used. This margin is quite small. The bakeries, as was mentioned before, are small. The average bakery bakes about 1/2 ton of flour in a day. For this, the bakery must have four to five full time employees. Adding other costs of the bakeries (fuel, rent, etc.) to the labor cost, there is virtually no room for profit.

Figure 25 summarizes the farmer-retailer spread for wheat in Gorgan at harvest time. This graph is essentially similar to the previous graph pertaining to Tehran. The only difference being a contraction in the bakers' share and an expansion in the millers' share.

Thus far, we have not seen the government's policy in action. This is because our discussions have been limited to the situation at harvest season, where the market price of wheat is at its lowest, and there is no need for government

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Once again, the necessary calculations are made to determine the share of each group of the price of bread.

1 kg of bread requires .73 kg of flour. Cost of this flour is .73 x 9.4 = 6.86 Rls.

0.73 kg of flour requires .84 kg of wheat. Cost of this wheat is .84 x 6.5 = 5.46 Rls.
Figure 25. Wheat-bread spread in Gorgan at harvest time
intervention in the market.

Gradually, the market prices of wheat and flour begin to increase. The main reasons for this price rise are storage costs, and the interest charge on the capital invested in buying wheat at harvest time. The price of wheat increases to about Rls. 8,000/ton around October.¹ Flour prices rise accordingly. The bakers are now caught in a squeeze between rising costs and constant bread prices. Their profit begins to shrink. By December flour sells at about Rls. 1,300/ton, a 40% increase since the harvest time.² Obviously, the bakers are in a perilous situation. Their position can be summarized as follows:

Cost: 1 ton of flour (13,000 Rls./ton) 13,000 Rls.
Revenue: 1,375 kg of bread (11 Rls./kg) 15,125 Rls.

Their "margin" shrinks to 2,125 Rls. per ton of flour used.

The farmer-retailer spread now changes to that represented by Figure 26. The bakers now receive a mere 14% of the retail

¹We are discussing the situation in Gorgan, a wheat producing area. The prices are higher in the cities which import wheat from other parts of the country, simply because there is a transportation cost. For example, during this October, wheat prices in Tehran was around 9,000 Rls./ton.

²The price of flour increases more than that of wheat. This is because the high quality wheat is purchased at harvest time by the millers and/or the merchants, who sell it as flour. Most of the wheat available in December is of the poorest quality, and thus fetches lower prices.
Figure 26. Bread price spread in Gorgan during Dec.-Jan. Prior to government intervention.
price of bread for their services. Of what they were receiving previously, a large part is accrued to the "middle-men" as their fee for having purchased the wheat and storing it. Clearly the bakers' position is untenable. Something must be done.

To prevent the bakers from going bankrupt, the government steps in. The governor issues an order by which the imported wheat is put at the disposal of the bakers' union in the large cities of his state. The union, in turn, mills all this wheat and makes the flour available to the bakers at a low price of 10,250 Rls./ton. The union pays a fee to the millers, amounting to 800 Rls./ton of wheat milled. This is higher than the fee paid to Tehran's millers, but still lower than the fee charged by the millers for milling "private" wheat. The bakers in Gorgan, now buying the subsidized flour, reap a modest profit. Their situation now is summarized below:

Costs: 1,000 kg of flour (10,250 Rls./ton) 10,250 Rls.
Revenue: 1,375 kg of bread (11 Rls./ton) 15,125 Rls.

Their margin now is 4,875 Rls. Figure 27 shows the share of each group in the retail price of bread.¹

¹1 kg of bread requires .73 kg of flour. Cost of this flour is .73 x 10.25 = 7.48 Rls. 1 kg of flour requires .84 kg of wheat. Cost of this wheat is 6.8 Rls.
Figure 27. Bread price spread in Gorgan, when government intervenes (imported wheat)
Before ending this chapter, a few comments may be in order:

1. Although the wheat "share" of the retail price of bread is very high in Iran, compared with that in other countries, still the price received by the wheat farmer is quite low. Wheat prices, as we saw before, was at the neighborhood of 6,500 Rls./ton at harvest time. Considering the costs of production, this is a low price as it is. But in most cases, this is not the price received by farmers. We have seen before that the majority of small farmers, most of whom grow some wheat, sell their crops green, at a discounted price. The "price received by farmers" for this group of farmers is much lower than the one mentioned above, perhaps around 400 Rls./ton.

But no matter when and how the wheat is sold, its price seems to be quite low, relative to other crops. The government's purchase price of wheat has remained virtually constant during the past 10 years, while prices of other crops have increased nearly every year, in some cases tripling since a decade ago. This explains the observation that growing wheat is the last choice of the commercial farmers in Iran.

Even government officials admit that the present wheat price policy is untenable. They note that this year's imported wheat cost the government more than 20,000 Rls./ton, more than three times the price paid for domestic wheat.
While this was an exceptional year for farm prices, future price trends are by no means certain. The prospect of a few more years of high wheat prices may force the government to revise its wheat pricing policy and adopt a more realistic approach. Already the government has announced a purchase price of 1,000 Rls./ton. Time will tell how effective this new incentive will be.

2. The millers' fee, set by the government in 1966 and unchanged since then, is also quite low. The millers are presently avoiding substantial losses by a variety of schemes, as was referred to above. The study I referred to previously leaves no doubt that the present plight of the millers, those in Tehran, cannot continue for long. Not only is their fee small, they are operating at less than 60% capacity which aggravates the problem even more.

But no matter how urgent the need for an increase in the millers' margin may be, it is safe to assume that an increase in the price of wheat will not have a significant effect on it. Had this been a "free" market, the millers' fee would surely have risen long ago. But whether or not this fee will rise or not has much less to do with the price of wheat, than with the government's policy at each particular time.

If the government were to lift its control from the wheat-bread market completely, then of course, millers' fee would increase along with, but not because of, wheat prices.
But should the government raise the price of wheat with no change in its other policies, then there is no reason to assume any change in the millers' margin.

It should be added, however, that if the government has no plans for easing its controls on the market, as there is no indication that it has, then the millers margin must surely increase for the system to continue its operation even as it is today. The study referred to above maintains that many millers in Tehran are losing money each day, and are in operation only because they have invested millions of Rials in their mills and have no way to recover their investment except by staying in and hoping for a more favorable situation. This hope, however, will not last for long.

3. Though no uniform in all cities and at all times, the bakers' margin, by and large, is small also. During the harvest time when wheat prices are low, or in Tehran for the "permitted" bakers, the margin is not too small. Relatively speaking, a margin of 35% of the price of bread, is reasonable. But at times, as we saw before, this margin gets as low as 14% of the bread price. The bakers I talked to insisted that they lost money during such times. Though I was told that the bakers raise their "effective" price by
various means on these occasions, it can hardly be imagined how a bakery with 4 or 5 workers, could be profitable on a margin of 1,132 Rls. per day (about $17).  

The point that needs to be emphasized is, however, that the present method of baking bread in Iran has little room for improvement. Most types of bread cannot be stored for long and must therefore be baked only for the day's consumption. Each neighborhood has its own bakery and thus the sales volume is low. Nearly all bakers I talked to, believed that they could handle twice as many customers as they were getting now. But that would surely create new problems. Iranians like to have their bread hot, and buy it at meal time. Even now there is a huge crowd around the bakeries at meal time.

But the low sales volume means excess capacity and high average costs. Efficiency could be increased, and the bakers' margin reduced, only with a new method of bread baking. Another possible solution would be a system of distribution which would enable a bakery to serve several neighborhoods.

In recent years there have been talks of "mechanizing" the

1 They could sell by number, rather than by weight and thus sell 1 kg of bread for a higher price. They could also sell bread which is less than perfectly cooked, thus passing on a bit of water to the customer. I cannot say whether this is indeed done or not. I can testify, however, to the appearances of the bakeries, as well as those who worked in it, which gave no indication of a prospering enterprise.

2 Based on a sale of 750 kg of bread a day.
system of bread baking in Iran. This will reduce the average cost of baking bread but introduces other problems. Not only the bread baked in "factories" does not appeal to the Iranians' taste, but also this system aggravates the unemployment problem in Iran. The workers presently engaged in bakeries will be unemployed as job opportunities are scarce.

To summarize, there is little room for a reduction in the bakers' margin under the present system of bakery. Furthermore, variation in the price of wheat should have no effect on this margin.

4. There are many who question the equity of the present form of government subsidy. Under the present policy, rich and poor are subsidized alike. As Table 24, p. 172, clearly indicates, however, the poor spend a large portion of their income on bread, while the middle and high income group's expenditure on bread is negligible. The rich can afford to pay a higher price for their bread, and the poor could well use a price reduction.

Given the present conditions, subsidizing bread seems unavoidable. But the present policy of bread price support is very costly to the government, as well as being adverse to wheat farmers. To the extent that this helps the poorer section of the population, it is surely a praise-worthy effort. But as it is, this policy is also subsidizing a large
section of the population which could well do without it. The solution, then, seems to be a new scheme whereby bread could be cheaper for some, and more expensive for others. Obviously, such a policy measure will be much more difficult to implement, than the present one. The benefits of a more equitable subsidy, however, is so substantial as to merit further analysis on this subject.
APPENDIX B: ACTIVITIES, RESTRAINTS AND INPUT-OUTPUT COEFFICIENTS OF THE LINEAR PROGRAMMING MODEL

The Activities

PO\textsubscript{1} Continuous cotton production and harvesting on Class 1 land. The unit of activity is one hectare. (unmechanized)

\begin{align*}
\text{Yield} & \quad 4 \text{ tons} \\
\text{Variable costs Rls.} & \quad 10,970^{1}
\end{align*}

PO\textsubscript{2} Continuous cotton production and harvesting on Class 2 land. Unit is one hectare. (unmechanized)

\begin{align*}
\text{Yield} & \quad 3 \text{ tons} \\
\text{Variable costs Rls.} & \quad 9,440
\end{align*}

PO\textsubscript{3} Continuous cotton production and harvesting on Class 3 land. The unit of activity is one hectare (unmechanized)

\begin{align*}
\text{Yield} & \quad 2.2 \text{ tons} \\
\text{Variable costs Rls.} & \quad 8,070
\end{align*}

PO\textsubscript{4} Continuous cotton production and harvesting on Class 4 land. The unit of activity is one hectare. (unmechanized)

\begin{align*}
\text{Yield} & \quad 1.4 \text{ tons} \\
\text{Variable costs Rls.} & \quad 6,070
\end{align*}

PO\textsubscript{5} Continuous cotton production and harvesting on Class 3 land. The unit of activity is one hectare. (unmechanized)

\begin{align*}
\text{Yield} & \quad 0.5 \text{ tons} \\
\text{Variable costs Rls.} & \quad 1,710
\end{align*}

P\textsubscript{10} Continuous wheat production and harvesting on land 6. The unit of activity is one hectare.

\begin{align*}
\text{Yield} & \quad 0.8 \text{ tons} \\
\text{Variable costs Rls.} & \quad 3,000
\end{align*}

P\textsubscript{11} Continuous wheat production and harvesting on Class 1 land. The unit of activity is one hectare.

\begin{align*}
\text{Yield} & \quad 5 \text{ tons} \\
\text{Variable costs Rls.} & \quad 9,860
\end{align*}

\begin{footnotesize}
\textsuperscript{1}This is variable cost, not otherwise accounted for in the model.
\end{footnotesize}
P12 Continuous wheat production and harvesting on Class 2 land. The unit of activity is one hectare.  
Yield 4 tons  
Variable costs Rls. 8,560

P13 Continuous wheat production and harvesting on Class 3 land. The unit of activity is one hectare.  
Yield 3 tons  
Variable costs Rls. 7,560

P14 Continuous wheat production and harvesting on Class 4 land. The unit of activity is one hectare.  
Yield 21. tons  
Variable cost Rls. 5,990

P15 Continuous wheat production and harvesting on Class 3 land. The unit of activity is one hectare.  
Yield 1.1 ton  
Variable costs Rls. 3,100

P16 Cotton-wheat rotation, production and harvesting on Class 1 land. The unit of activity is two hectares.  
Yield cotton 4.4, wheat 5.5  
Variable costs Rls. 20,830

P17 Cotton-wheat rotation, production and harvesting on Class 2 land. The unit of activity is two hectares.  
Yield cotton 3.3, wheat 4.4  
Variable costs. Rls. 18,000

P18 Cotton-wheat rotation, production and harvesting on Class 3 land. The unit of activity is two hectares.  
Yield cotton 2.4, wheat 3.3  
Variable cost Rls. 15,630

P19 Cotton-wheat rotation, production and harvesting on Class 4 land. The unit of activity is two hectares.  
Yield cotton 1.5, wheat 2.3  
Variable costs Rls. 12,050

P20 Cotton-wheat rotation, production and harvesting on Class 5 land. The unit of activity is two hectares.  
Yield cotton 0.6, wheat 1.2  
Variable costs Rls. 4,870
<table>
<thead>
<tr>
<th>Plant</th>
<th>Continuous production and harvesting</th>
<th>Unit of activity</th>
<th>Yield</th>
<th>Variable costs</th>
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<td><strong>P21</strong></td>
<td>Continuous rice production and harvesting on Class 1 land. The unit of activity is one hectare.</td>
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<td>Rls. 19,100</td>
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<td>Continuous rice production and harvesting on Class 2 land. The unit of activity is one hectare.</td>
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<td><strong>P23</strong></td>
<td>Continuous rice production and harvesting on Class 3 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>2.9 tons</td>
<td>Rls. 15,100</td>
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<tr>
<td><strong>P24</strong></td>
<td>Continuous soybean production and harvesting on Class 2 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>2.5 tons</td>
<td>Rls. 6,550</td>
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<tr>
<td><strong>P25</strong></td>
<td>Continuous soybean production and harvesting on Class 3 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>1.8 tons</td>
<td>Rls. 6,550</td>
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<tr>
<td><strong>P26</strong></td>
<td>Continuous soybean production and harvesting on Class 4 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>1.1 tons</td>
<td>Rls. 5,550</td>
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<td><strong>P27</strong></td>
<td>Continuous sunflower production and harvesting on Class 3 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
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<td>Rls. 1,900</td>
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<td><strong>P28</strong></td>
<td>Continuous sunflower production and harvesting on Class 4 land. The unit of activity is one hectare.</td>
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<td><strong>P29</strong></td>
<td>Continuous sunflower production and harvesting on Class 3 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>0.8 tons</td>
<td>Rls. 3,900</td>
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<td><strong>P30</strong></td>
<td>Continuous barley production and harvesting on Class 4 land. The unit of activity is one hectare.</td>
<td>one hectare</td>
<td>2.2 tons</td>
<td>Rls. 4,000</td>
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</table>
Continuous barley production and harvesting on Class 5 land. The unit of activity is one hectare.
Yield 1.3 tons
Variable costs Rls. 2,470

Continuous barley production and harvesting on Class 6 land. The unit of activity is one hectare.
Yield 1.0 ton
Variable cost Rls. 2,370

Continuous barley production and harvesting on Class 7 land. The unit of activity is one hectare.
Yield 0.7 ton
Variable costs Rls. 1.870

Cotton selling activity. The unit of activity is one ton.

Wheat selling activity. The unit of activity is one ton.

Rice selling activity. The unit of activity is one ton.

Soybean selling activity. The unit of activity is one ton.

Sunflower selling activity. The unit of activity is one ton.

Barley selling activity. The unit of activity is one ton.

Labor hiring activity in period one. The unit of activity is one day.

Labor hiring activity in period two. The unit of activity is one day.

Labor hiring activity in period three. The unit of activity is one day.

Labor hiring activity in period four. The unit of activity is one day.

Labor hiring activity in period five. The unit of activity is one day.

Labor hiring activity in period six. The unit of activity is one day.

Labor hiring activity in period seven. The unit of activity is one day.
P47 Labor hiring activity in period eight. The unit of activity is one day.

P48 Labor hiring activity in period nine. The unit of activity is one day.

P49 Labor hiring activity in period ten. The unit of activity is one day.

Restraints

RO Land type 1. The B column entry represents hectares.\(^1\)

This is the highest quality land. Practically all crops included in this program can be grown on this type of land. However, this land is most suitable for cotton, rice, and wheat. 4,700 hectares of this type land is available in this area.

RO\(_2\) Land type 2. 33,460 hectares. This land is of lower quality than type 1.\(^2\) The yield of various crops grown on this land were given previously.

RO\(_3\) Land type 3. 102,526 hectares. Again, the quality of this land is lower than that of the previous two types. The type of crops grown on this land are cotton, wheat, soybeans, sunflower, barley.

RO\(_4\) Land type 4. 137,622 hectares. Again, the quality of this land is lower than that of the previous three types. The crops grown are: cotton, wheat, soybeans, sunflowers, barley.

RO\(_5\) Land type 5. 184,610 hectares. Again, the quality of this land is lower than that of the previous four types. The crops grown are: cotton, wheat, sunflower, barley.

RO\(_6\) Land type 6. 76,130 hectares. Again, the quality of this land is lower than that of the previous five types. The crops grown are wheat and barley.

\(^1\)One hectare is approximately 2.3 acres.

\(^2\)The term "quality" is used in a general sense. In particular, the amount of water available is assumed to affect the "quality" of farm land.
**R23** Land type 7. 15,375 hectares. Again, the quality of this land is lower than that of the previous six types. The only crop grown on this land is barley.

**R07 through R16.** These are labor restraints. The unit is one man-day. It is assumed that all required workers must be hired by the farm managers, so that no set number is put in the B column for these restraints. It is thus assumed that while no labor is available on the farms now, they can be hired, at given wage rates, up to some limit.

**R17 to R22** Transfer rows

**R24 to R33** Restriction on labor hiring. It has been estimated that the number of workers available in the farm sector of this region is 124,885. Assuming that each worker works on the average of 28 days a month, it means that each month, about 3,496,807 man-days of work are available for hire. **R24 to R33** limits labor hiring to no more than this amount.

Finally, it must be mentioned that no fixed cost paying activity is included in the model. The main reason for this exclusion is the fact that no data is available on the amount of fixed cost involved. It would have been a very difficult and time-consuming task, to say the least, to try and calculate this figure. This, however, may not be necessary for our purposes. In the short run, the only affect of excluding fixed cost is reflected in the value of the program. Calculation of the value of the program, however, is not our main objective in this study. For this reason, exclusion of a fixed cost paying activity should not present a serious problem.
Table 35. Costs of production

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(Nonlabor)

*P06-P10 were mechanized cotton production. They were deleted in later runs, as they seemed to have no effect upon the outcome of the runs.
Table 35 (Continued)

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<td>-4,000</td>
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<td>17,000^b</td>
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^b These figures were changed for some runs (see the text).
Table 36. Conversion of coefficients of the "goal" functions to "standard" forms

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<td>18</td>
<td>14</td>
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<td>0.33</td>
<td>0.33</td>
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<td>1000</td>
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aStandardization: A scale of 1 to 1,000 has been selected. For each goal, (row) the largest number (positive or negative) is set equal to 1,000. All other numbers in that row are accordingly standardized, e.g. in (value row: 24,000 = 1,000. All other numbers are then divided by 24).
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<td>16,600</td>
<td>24,000</td>
<td>13,000</td>
<td>5,600</td>
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<tr>
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<tr>
<td>Seasonal empl. man-days</td>
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<td>0.33</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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</tr>
<tr>
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APPENDIX C: NOTE ON COMMERCIAL AND VILLAGE FARMERS

Throughout this study distinction is made between two types of farmers:

Commercial farmers: Those farmers who own more than 30 hectares of land and usually live in the towns and cities close to their farms. They produce solely for the market. They hire farm workers and occasionally even managers. Many of these commercial farmers are engaged in nonfarm activities as well.

Village farmers: Those farmers who own less than 10 hectares of land (per family) and live in the villages where their farm is located. The village farmers with more than 4 or 5 hectares of land also hire transient farm workers (or land less villagers) during the peak months. Those village farmers with 1 or 2 hectares of land, on the other hand, may work on other villagers' farms to supplement their income. Nearly all village farmers in this area produce some wheat for their family's consumption and market only what is in excess of this level.