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# An Overview of Immigration and the Changing Face of Rural California: The Central San Joaquin Valley

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This paper examines the aggregate performance of California agriculture relative to Florida and U.S. agriculture, 1960-1993, the economics of the California raisin grape industry which uses large quantities of migratory labor for the grape harvest, and schools and schooling of farm workers' children in the Parlier area. The major conclusions are that the labor intensity of California (and Florida) agriculture has fallen much less than for the whole U.S., the raisin grape industry of the Central San Joaquin Valley is struggling due to labor availability and prospects of greater foreign competition, and schooling is one of the most promising routes to a better life for the children of adult farm workers

## **Disciplines**

Agribusiness | Agricultural Economics | Labor Economics | Regional Economics

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Rural California: The Central San Joaquin Valley**

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Key words: agriculture, immigration, raisin grapes, farm workers, schools, schooling, small town, California

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By Wallace E. Huffman  
Iowa State University

Outsiders frequently perceive California as a state with lots of people located in large cities, the location of the motion picture and amusement park industry, and the location of Silicon Valley with the computer industry, but agriculture in California is big business. In 1996, the gross value of farm gate sales were \$24.5 billion which exceeded by almost a factor of two the sales of the second leading state, Texas, with \$13.3 billion. Furthermore, CA produces fifteen or more crops, including raisin grapes, where it accounts for almost all (greater than 90%) of U.S. production (Cook). More broadly, CA accounts for roughly half by value of all U.S. fruit and vegetable production.

Coming from Iowa which has been and continues to be a leading state for agricultural production, I marvel at the dominate role of CA in so many commodities. In Iowa, our primary commodities are corn, soybeans, swine, and cattle, and we do not have a dominate production position in any of them. Although immigrant farm labor is not a major factor in farm level production of major agricultural commodities, significant employment of immigrant labor is occurring in IA meat and poultry packing plants. Two years ago, some of you were able to tour

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\* For Conference on Immigration and the Changing Face of Rural California: Focus on the San Joaquin Valley, U.C. Kearney Agricultural Center, Parlier, CA, Sept. 10-12, 1998.

two IA pork packing plants as part of this series of conferences, "Immigration and Changing Face of the Rural Midwest."

I will focus my comments in three areas: (1) the aggregate performance of CA agriculture relative to Florida and U.S. agriculture, (2) the economics of the CA raisin graph industry, and (3) schools and schooling for children of farm workers.

### **The Aggregate Performance of CA Agriculture**

The Economic Research Service of the USDA has been working over the past decade to construct a state aggregate productivity series for all forty-eight states. This has been a large project led by Eldon Ball, and the data covering 1960-93 have only recently become available (Ball and Nehring; Ahearn, Yee, Ball, and Nehring). Turning to table 1, key indicators of the average performance of agriculture over 1960-93 are reported for CA, FL, and the U.S. For CA agriculture, the average annual (compound) rate of growth of (real) total output has been 2.1 percent, crop output of 2.4 percent, and of livestock output of 1.6 percent. For Florida agriculture, output has been growing at a faster average rate than in California: total output for FL at 3 percent, crop output at 3.2 percent, and livestock output at 2.3 percent. For the U.S. as a whole, output has been growing more slowly than in CA or FL: total U.S. output at 1.6 percent, crop output at 1.9 percent, and livestock output at 1.3 percent. Hence, over the period 1960-93, we see that in CA, FL, and the U.S. as a whole, crop output has been growing faster than livestock output, and crop output has been a growing share of total farm production.

The amazing story for U.S. agriculture during the 20th century and during 1960-93 has been the lack of growth in total inputs (Huffman and Evenson, Ch. 7). Over 1960-93, the average annual rate of growth in CA agriculture of total real inputs has been only 0.4 percent,

materials (or annually purchased inputs) has been 1.4 percent, capital (land, machinery, equipment, buildings, and breeding stock) has been -0.4 percent, and of labor has been -0.6. For FL agriculture the pattern of input growth has been similar to CA: total input growth at the average rate of 0.8 percent, materials at 2.4 percent, capital at -0.4, and labor at -0.6. For U.S. agriculture, the picture is a little different. Total input changed at -0.4 percent, materials at 0.9 percent, capital at -0.2 percent, and labor at -2.6 percent. With CA and FL agriculture being relatively labor intensive and producing a significant quantity of produce for the fresh market, we see a very different trend in labor use in CA and FL than in the U.S. as a whole.

Focusing on the trends in some key ratios, we can draw out additional comparisons.

First, total factor productivity (TFP) is the ratio of real total output to real total input under the control of farmers, and its average rate change is a measure of productivity or efficiency growth. The annual average growth over the period 1960-93 for CA agriculture is 1.7 percent, for FL agriculture is 2.2 percent, and for U.S. agriculture is 2.0 percent. Hence, real farm output has been growing much faster than real farm inputs under the control of farmers, and although TFP growth has been a little slower in CA than in FL and the U.S. as a whole, the rate in CA is still very good. It is an amazing story that output growth is coming from TFP growth and not from input growth. Over the post-World War II period, the only sector of the private economy that comes close to the record of TFP growth for U.S. agriculture is communications (Jorgenson and Gollop).

Second, the materials-to-labor input ratio and the capital-to-labor ratio would be expected to change if relative input prices were changing significantly in a particular direction or technical change was on average biased in a particular way, e.g., labor saving. During 1960-93, the

materials-to-labor ratio has been increasing at an average annual rate of 2.0 percent in CA agriculture, 3.0 percent in FL agriculture, and 3.5 percent in U.S. agriculture. For the same period, the capital-to-labor ratio has been increasing at only 0.2 percent in CA and FL agriculture, but at 2.8 percent in U.S. agriculture. Thus, we have seen some substitution toward materials and away from labor in agriculture, but we have not seen a significant change in the capital-to-labor ratio in CA and FL agriculture. For U.S. agriculture, labor intensity has been steadily declining. This suggests that in CA and FL (i) the price of capital services relative to the agricultural wage remained unchanged and (ii) new technology has not been labor saving. For the remainder of the country, the price of capital relative to labor seems to have fallen and new technology seems to have been labor saving (Gardner 1992).

Next let's turn to figure 1. It provides a plot of total output, total input, and TFP for CA agriculture over 1960-93. Note that the total inputs are approximately unchanged 1960-72 and then show a little uneven growth after that date, ending in 1993 at 1.16 times its 1960 value. The total output index shows rapid and relatively steady growth ending in 1993 at 2.01 times its 1960 value. Because total input hardly changes over time, TFP follows closely the output index. In 1994, the CA's agricultural TFP index is 1.7 times its 1960 value. In figure 2, we have a graph for U.S. agriculture of total output, total input, and TFP. Note that for U.S. agriculture, the total input decreased significantly over 1980-1993 (by about 17 percent).

Finally, let us turn to figure 3, which traces the path, 1960-93, for CA agriculture of labor, materials, and total input use. Note that agricultural labor in CA declined by about 20 percent from 1975-1986. In 1986 the Immigration Reform and Control Act (IRCA) was passed which gave amnesty to about 1.3 million undocumented individuals who could show

prior work in U.S. agriculture (Martin *et al.*). Since then there is a belief that the newly legalized individuals have brought their families and friends increasingly to the U.S. to settle in rural areas like Parlier and to work in agriculture and other industries. Note that there is no trend in the labor input after 1986. However, since 1986, the material index has been growing rapidly. In what seems to me unusual input aggregation, the USDA includes contract labor with materials rather than the labor input. We know that since 1986 growers have increasingly switched from hiring seasonal workers themselves to dealing with farm labor contractors for their seasonal labor needs (Mason; Martin *et al.*). Thus, it seems that a significant part of the growth in materials use since 1986 is due to the increased use of contract labor. If we were to create one combined agricultural labor index, including contract labor, we would see significant growth in CA agricultural labor use after 1986. Thus, with a relatively elastic supply of low-wage seasonal agricultural workers being available to CA growers from Mexico in recent years and horticultural crops for the fresh market being relatively difficult to mechanize, it seems that labor use in CA (and FL) has followed a very different trend than for the rest of the country. This is likely to continue as long as cheap and productive seasonal agricultural labor are available.

### **The CA Raisin Graph Industry**

There are 4-5 thousand raisin graph growers concentrated in the Fresno area, producing 125-150 thousand acres and roughly 350 thousand tons of dried raisins (Mason). The harvest of raisin graphs is primarily during late August and the first three weeks of September and normally employs 40,000-50,000 temporary workers. Parlier is one of the rural cities that is affected by the inflow of temporary workers to harvest tree and vine crops.

The U.S. domestic supply of raisins is controlled by Federal Marketing Orders. The Federal Raisin Market Order is administered by the Raisin Advisory Committee, and its most important function is to set the "free tonnage," which sells at the U.S. market price currently about double the world raisin price, and the "reserve pool," which goes for export and for domestically subsidized uses like school lunches. In recent years, about two-thirds of the CA raisins have gone to free tonnage and one-third to the reserve pool. Raisin grape growers receive a "blend price" for their raisins depending on the allocation of their raisins to free tonnage and the reserve pool. Assuming this two-thirds versus one-third allocation, raisin grape growers receive a price for their raisins that is about 1.67 times the world price.

Mason describes the current profitability of raisin grape production as being marginal in the sense that using current prices, allocation between free tonnage and the reserve pool, and labor intensive technology, the value of production on average approximately covers cash costs but does not leave any return to the roughly \$10,000 per acre investment in land and vines or grower labor. There are three major economic issues facing raisin grape growers: (1) available seasonal labor for harvesting their crop using traditional labor intensive methods, (2) adopting new technology--"dried-on-the vine" requiring new trellises (DOV) or replanting the old vines with high density vines, using new trellises and mechanical harvesting methods, called the Simpson's method which requires a much larger investment, and (3) GATT/WTO mandated trade barrier reductions.

This year the raisin grape growers are facing unusual seasonal labor problems because the El Nino weather pattern changed temperatures and rainfall over the past nine months and the normal sequence of dates for fruit ripening. Consequently, seasonal agricultural labor that would

normally be available for raisin grape harvesting seems to have moved to Washington State for harvesting apples. This has slowed the grape harvest and caused the piece-rate wage rate to rise by 10 percent (from 20 to 22 cents per tray) by what is normal mid-harvest with the prospect of further increases as farmers face the September 21<sup>st</sup> date by which raisin grape harvest must be completed in order for growers to qualify for crop insurance payments. Although this year is unusual, raisin grape growers regularly face uncertainty about having enough seasonal labor to harvest their crop.

Harvesting grapes for raisins traditionally proceeds using very old technology. Workers cut the ripe grapes from the vine using a sharp knife, place the grapes in a pan, and when the pan is full with 18-22 pounds of green grapes, they place the green grapes on a 24 inches by 36 inch paper mate, called a tray, on the south side of the harvested vines and facing the sun to dry naturally. The sun-dried method normally takes about three weeks to complete in the Central Valley, and during this period, the drying grapes are vulnerable to heavy or persistent rainfall, although this is unusual in the desert of the San Joaquin Valley. Heavy rainfall, however, will cause a total raisin crop loss. The normal dried raisin yield using traditional technology is about 2 tons per acre.

For the dried-on-the-vine technology, a grower must invest about \$1,500 per acre into new trellises and annually re-train the vines to grow so that grapes can be harvested mechanically. On a local raisin ranch, we saw this technology being used. Relative to traditional raising grape production, this method uses annually additional labor to train the vines and tie the canes to bear the current harvest's grapes to the harvest wire, this labor use can be spread out in the spring when aggregate seasonal labor demand is low, and requires much less labor at harvest

time. At harvest time, a tractor with a sickle-bar mounted on the front of it is used to cut the vines hanging on the south side of the main stock and holding the grapes for the new harvest. Since these vines are attached to the harvest-wire which is roughly 40 inches off the ground, they can dry in the sun off the ground. Although these grapes dry more slowly because of the lower daytime temperature while hanging 40 inches above ground than for grapes drying on the ground, with the DOV method, rainfall causes minimal damage or spoilage. After the grapes are dried into raisins, then a mobile, mechanical raisin harvester is used to separate dried raisins from the leaves and canes. The dried raisin yield from DOV technology is about 25 percent higher than by the traditional method. At current raisin prices, a grower can expect to recover his investment in 3-4 years.

The sickle bar and the raisin harvester were developed by a local machine shop working jointly with some area raisin grape growers. These are mechanical technologies that require mechanical engineering skills and tailoring to local needs, but they are not sophisticated science. The private sector rather than the public sector is the source of almost all of these types of mechanical innovations (Huffman and Evenson 1993).

Under Simpson's intensive raisin grape technology, vines are planted at double the traditional rate, new over-head trellises are used, and each spring new canes are hand tied in a position to make for easy mechanical cutting of ripe raisin grapes. When the raisins are dry, they are mechanically harvested with a machine that shakes them off the canes and separates leaves and canes from the raisins.

Under Simpson's method, labor use is spread out over the season and harvesting is mechanical rather than by hand which greatly reduces seasonal labor demand and harvest time.

With the grape root intensity at two times the traditional rate, the dried raisin yield is 5-6 tons per acre. However, this method requires about a \$5,500 per acre investment in new vines and trellises, and the expected payoff from reduced harvest labor and drying losses makes this method a long term investment, perhaps paying off in 15-20 years.

Under GATT/WTO agricultural provisions, it seems impossible for the U.S. domestic raisin price to remain significantly above the world price in the future. Under WTO, countries must convert nontariff barriers to a tariff equivalent and then over time gradually phase out tariffs on agricultural commodities. Recall that raisins are a relatively durable agricultural commodity; they can be shipped and stored for a significant period of time. In the future, it seems that one of two things must happen. Either imports of raisins will occur and drive down the U.S. price to approximately the world price or the Raisin Advisory Committee will increase the free tonnage so that the U.S. price moves much closer to the world price. In either case, raisin grape farmers face downward price pressure in the future which seems almost certainly to challenge the existence of the CA raisin industry.

In the near term, California's raisin grape producers face uncertainty about seasonal labor availability and whether to switch to DOV technology. With an almost certain major decline over the long term in the price received by raisin grape producers, the traditional raisin growing technology and DOV do not seem to be economically viable technologies. Long term, Simpson's production method, which roughly doubles raisin yields per acre (or a modification of it), seems to be the only technology that has potential for profitable raisin production. My projection is that the raisin grape industry of CA will struggle for its life over or the next decade,

and the land area currently in raisin grapevines most likely will be converted to other uses, probably to tree crops.

Finally, should raisin grape producers continue to get cheap harvest labor? This is not an easy question to answer. Unfortunately, the answer will be a political one, and one not reached primarily on economic merits. The politics will be determined by relative political power among competing interest groups rather than by socially benevolent governmental policy action.

### **School and Schooling**

Investments in human capital, largely schooling and migration, and collective social capital are the primary methods by which children of seasonal farm workers can expect to get ahead economically over the long term. Furthermore, a large share of the resources invested in school children comes from the community as a whole and not exclusively from the school childrens' parents. Because young children have a lifetime ahead of them to obtain the benefits from additional schooling and the opportunity cost of time of young children is low, these are major factors why the return to lower levels of schooling is high (Polachek and Siebert, Ch 3). Considerable economic evidence exists that the return to schooling is, however, significantly dampened when it is not also combined with occupational and geographical mobility (see Polachek and Siebert, Ch 4, and Ehrenberg and Smith, pp. 328-342).

Hence, rural cities like Parlier face a major challenge as they attempt to provide a good community for families to live and raise their children and for adults to work. To the extent that they are successful, they can expect their best educated young people to leave for better job opportunities someplace else. The relevant labor market for a small rural cities' permanent residents is definitely larger than the city itself. Recent research by Peter Orazem and his

associates shows that the size of the rural labor market is about the area enclosed by a radius equaling the distance of a one-hour commute (Khan, Orazem, and Otto; Kim, Orazem, and Otto). This means that the population growth of any particular rural community is not limited by its own job growth, but rather by the job growth in an area roughly within a sixty mile radius. Furthermore, it means that communities should frequently cooperate in their development and new employment efforts.

Parlier is a rural community having a population that is more three times larger than in 1980, and it experiences about a 50 percent increase in population for the 5-6 summer and early fall months that temporary farm workers are in the area. These temporary workers live in a farm labor camp at the edge of the city and in space rented from the local residents. Parlier is located about 20 miles from Fresno, a city of about 500,000, and one of the fastest growing large U.S. cities during 1980-90. Several other small cities are relatively close by providing some employment prospects in food processing and packaging.

The new principal of the Parlier Consolidated School District, Al Sanchez, described how they are attempting to improve the quality of classroom teaching and to get students to see the potential benefits of additional years of schooling. The low local crime rate, good low cost housing, good school buildings, attempts to get parents involved in their children's school activities, and to get students involved in both athletics and new learning experiences seem excellent community efforts to encourage additional schooling and to attract permanent residents.

For a community where 40 percent of the teenagers have not completed high school, I was disappointed to hear that the school principal was facing adjustments to a newly mandatory state law cutting class sizes and causing the community to face additional financial stress.

Although there may be some communities in CA where the settling-out of the recent Hispanic immigrants or inflow of temporary immigrants has pushed class size into the 30s and 40s where it promises to lower average student performance, there is no definitive evidence nationally that smaller class sizes raise school childrens' performance. Betts (1998) shows that if we take the most optimistic evidence on the effects of class size on children's school performance, the evidence is that the rate of return to resources invested in reduced class size is negative, i.e., the costs are larger than the benefits. He, however, shows for a real discount rate of 3 or less that the return is large from investing resources in an additional year of schooling (also see figure 4). More generally, there is a large literature showing positive returns to additional years of schooling. It is unfortunate, that the new principal cannot focus Parlier School's scarce resources on extending students' tenure in school.

As I have just suggested, new research is showing that schooling quality can be improved by the way that schooling resources are used. High expectations of student in the form of stringent grading standards have a positive effect on the average performance of U.S. school children (Betts 1997a; 1998). Also, extra assigned home work is effective starting in middle school for raising students' performance, especially in mathematics (Betts 1997b). The public cost of added homework is very low, its effects are cumulative as students progress to higher grades and significantly raise the probability of a student continuing on to college. These results suggest that the schooling production function needs to be extended to include incentives that students face, and this seems especially true for children of seasonal farm workers.

I am not optimistic about significant on-the-job learning of basic education by immigrant farmworkers. For a private firm to voluntarily undertake this investment, it must expect to obtain

a positive return on its investment. If the firm pays the cost of general training, e.g., English, it has no way of insuring that it can obtain a return on its investment. Labor contracts are one-sided; and if workers choose to quit after getting the schooling investment, the investing firm loses its investment. Given that Hispanics with past seasonal farm work experience have a record of high labor turnover, they would not generally be viewed as good places for employers to invest in workers' general training. If the worker pays through reduced wages during the schooling period, he/she may find the investment prospect unattractive (see Polachek and Siebert, pp. 92-93), i.e., the increase in their earning per year may be small and because they are older they have fewer years than their children to obtain benefits.

Firms sometimes find that small investments in general schooling, e.g., English training, can reduce their labor turnover, and this might be an important return on their investing in general schooling. However, schooling is positively correlated with occupational mobility, so large firms with diverse occupations will be more likely to invest in their workers than small firms having an occupationally homogenous workforce. Private firms are an unlikely source of resources for investing in general schooling of farm workers or of their children. Firms, however, regularly find it a good investment to share in firm-specific on-the-job training (Polachek and Siebert, pp. 77-93).

### **Conclusion**

Although CA agriculture has performed well during the past three decades by most standards, it has experienced less reduction in labor intensity than for the remainder of U.S. agriculture. This is due to both the nature of the crops produced and to the availability of low wage, productive, seasonal agricultural labor from Mexico. The CA raisin industry is currently

economically depressed and facing much uncertainty about harvest labor availability, appropriate technology for the future, and future raisin prices. It is my judgement that the raisin grape producers are behaving as rational businessmen, and there is no easy solution to the economic problems that they face in the future.

The farm workers who come from Mexico to CA in their late teens or early twenties with 6-8 years of schooling and eventually settle out into a small rural community like Parlier frequently find themselves scrambling economically to provide for their family's needs. For most of them, making a significant further investment in their own schooling will not be a good economic decision, and they will not generally find private companies willing to make significant investments in their general training either. They, however, can use their own and local community resources to obtain a good education for their children. This does, however, require that they take up a permanent residence in a community providing good schools, good public services, and a safe environment. Hence, it seems to me that the real test of success for first-generation immigrant farm workers is whether their children, the second generation immigrants, can move up from low-wage seasonal work to higher paying full-time jobs. This requires investments in both schooling and occupational mobility. Given that Hispanics are part of a group possessing relatively large collective social capital, they should strive to obtain the economic advantages that come with greater human capital investments without losing the benefits that come with social capital. Rural communities like Parlier seem to have an important role to play in helping new Hispanic immigrants make the transition into an American lifestyle.

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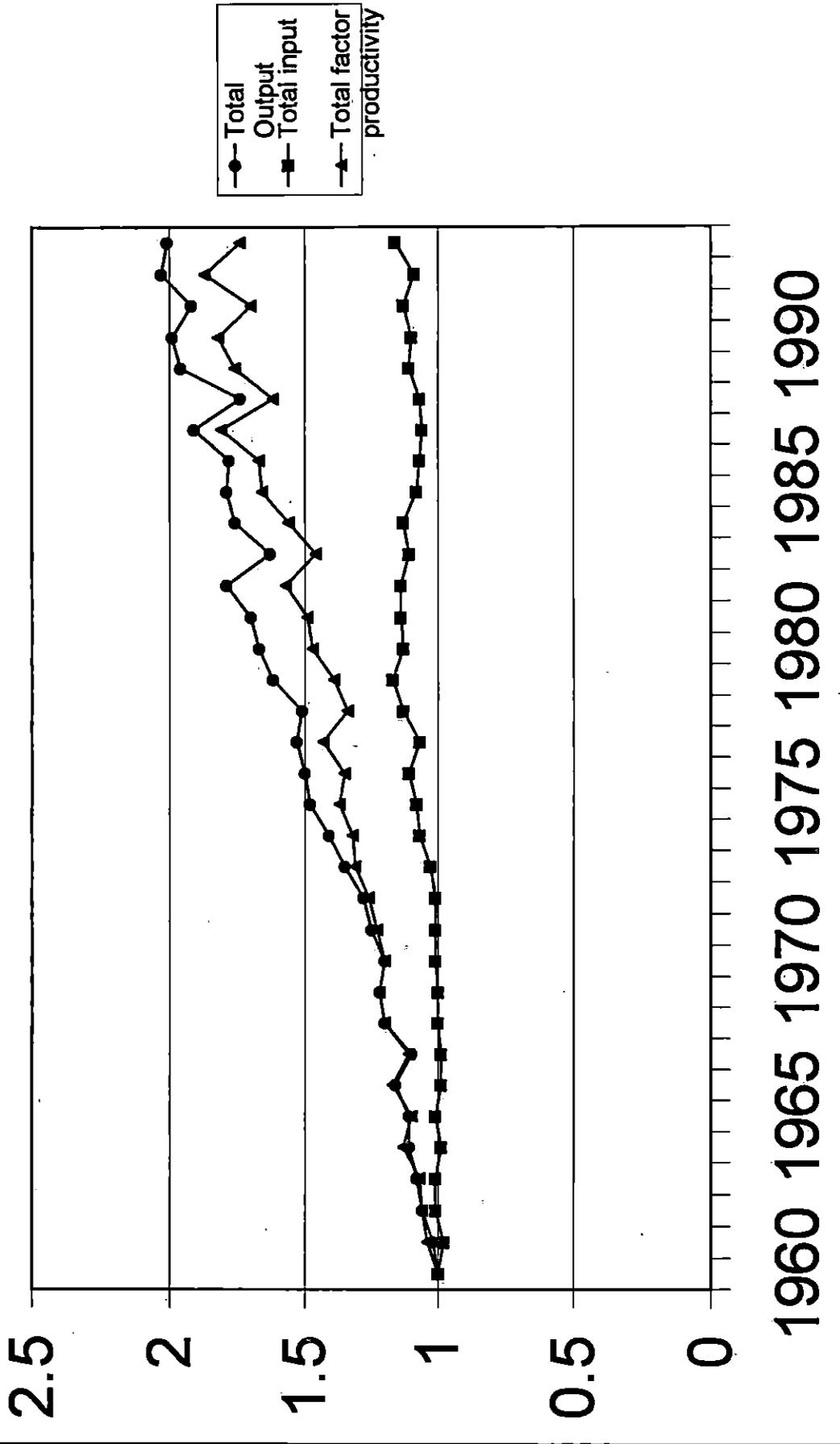
Table 1. Aggregate Performance Indicators: California, Florida, and U.S. Agriculture: 1960-93 (average percent change)

| Real quantities | CA    | FL    | U.S.  |
|-----------------|-------|-------|-------|
| <b>Outputs</b>  |       |       |       |
| Total (TQ)      | 2.1%  | 3.0%  | 1.6%  |
| Crop            | 2.4%  | 3.2%  | 1.9%  |
| Livestock       | 1.6%  | 2.3%  | 1.3%  |
| <b>Inputs</b>   |       |       |       |
| Total (TX)      | 0.4%  | 0.8%  | -0.4% |
| Materials       | 1.4%  | 2.4%  | 0.9%  |
| Capital         | -0.4% | -0.4% | -0.2% |
| Labor           | -0.6% | -0.6% | -2.6% |
| <b>Ratios</b>   |       |       |       |
| TFP=TQ/TX       | 1.7%  | 2.2%  | 2.0%  |
| Mat/Lab         | 2.0%  | 3.0%  | 3.5%  |
| Cap/Lab         | 0.2%  | 0.2%  | 2.8%  |

Source: Ball and Nehring 1998; Ahearn, et al. 1998.

Figure 1.

### California Agriculture: Total Output, Total Input, and Total Factor Productivity, 1960-93 (1960=1.00)



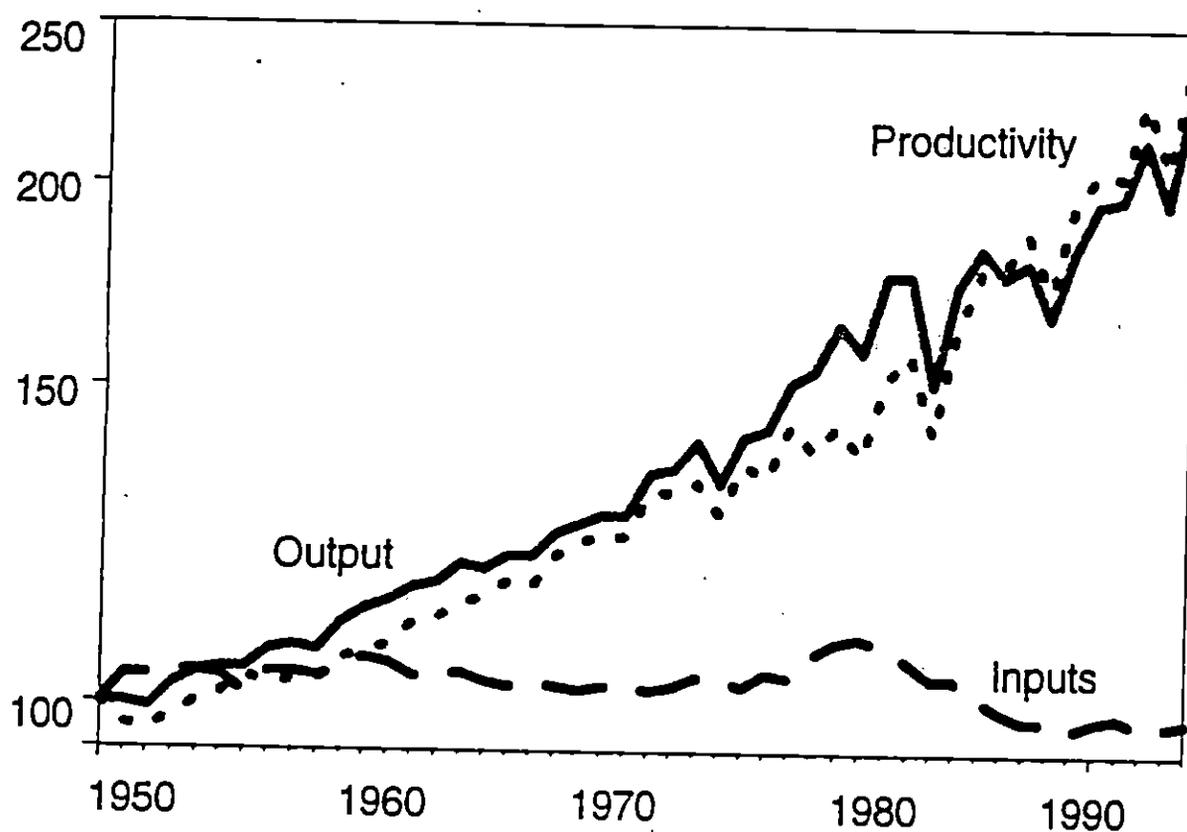
Source: Data from Ball and Nehring 1998.

Figure 2

## Growth in productivity, output, and inputs, U.S. 1948-94

*Productivity is the driving force behind changes in agricultural output.*

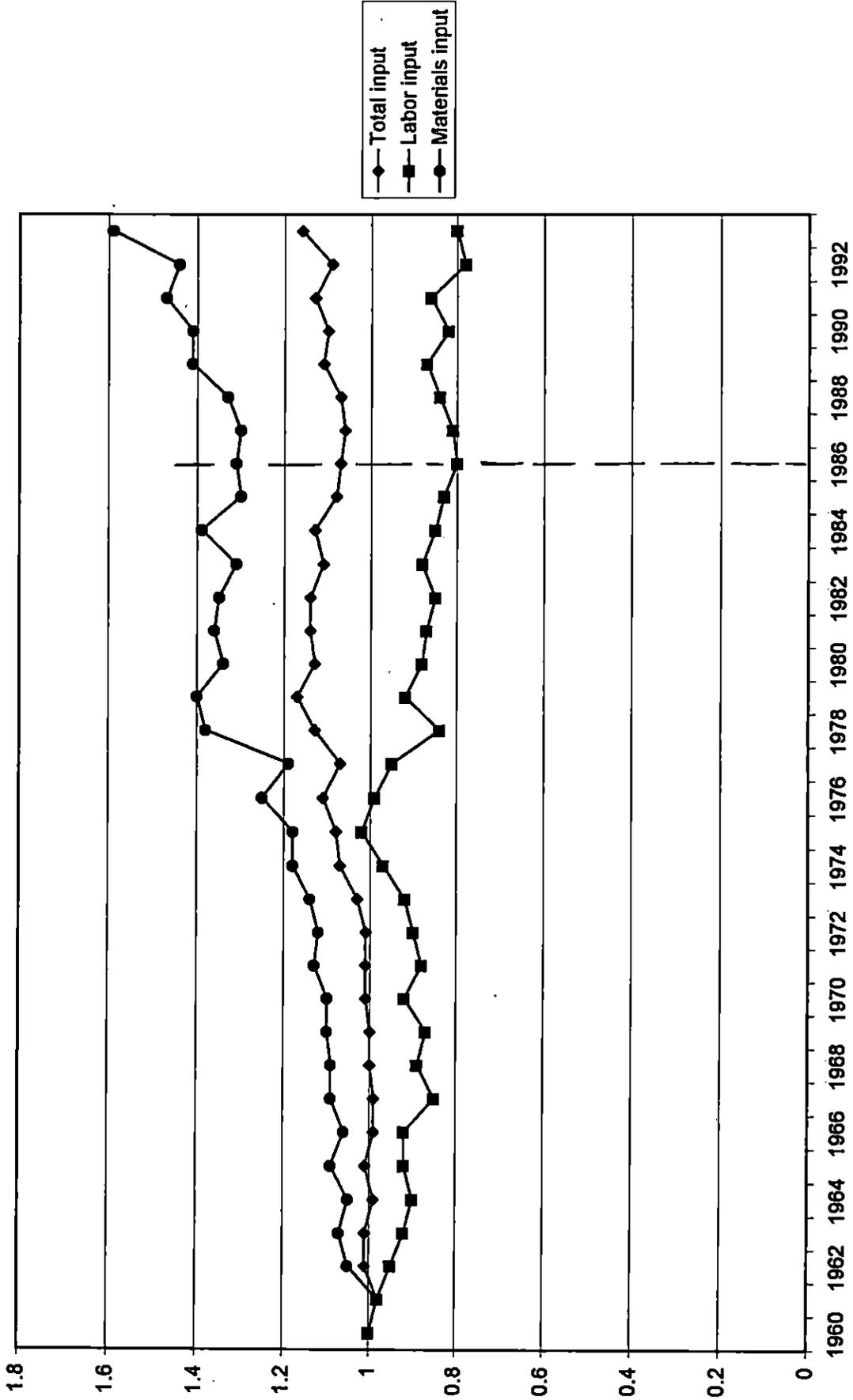
1948 = 100 (Log Scale)



Source: Economic Research Service, U.S. Department of Agriculture, and Ahearn, et al., 1998.

Figure 3.

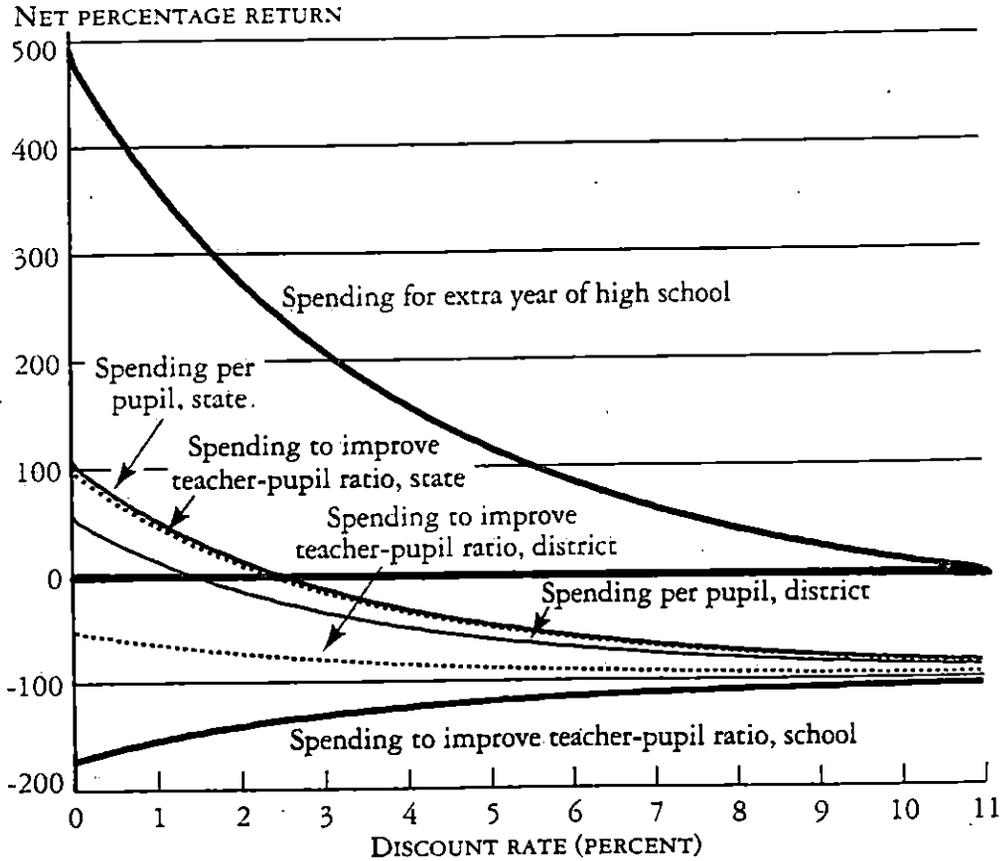
California Agriculture: Total Input, Labor Input, Materials Input, 1960-93 (1960=100)



Source: Data from Ball and Nehring 1998.

Fig. 4

### Net Percentage Return to Given Type of School Spending and Discount Rate



**Note:** The net percentage return to an investment in school expenditure is calculated as the net return (wage gain minus the cost), divided by the costs, and expressed in percentage terms.

Source: Calculations based on March 1993 Current Population Survey data (Betts 1998).