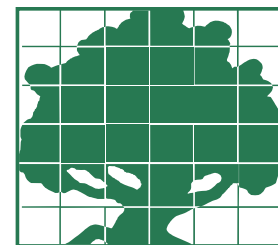


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Labor Trajectories in California's Produce Industry

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If wages increased, California fruit and vegetable growers would have to adapt. Possible adjustments include, mechanization, imports, and labor aids.



Hand-harvesting asparagus increases labor costs. Photo courtesy of CA Asparagus Commission

The value of California's fruit, nut, and vegetable crops was \$20 billion in 2009, almost 60% of the state's farm sales of \$35 billion. California dominates U.S. production of these crops and currently accounts for about half of the U.S. fresh vegetable production and about half of total fruit production. Many of these fruits and vegetables are labor intensive; labor costs for fruit and vegetables average 42% of variable production costs. Over half of the state's hired farm workers are unauthorized, and most move on to nonagricultural employment within a decade of beginning to work in the fields. The California produce industry depends on a constant influx of new, foreign-born labor attracted by wages above those in their countries of origin, primarily Mexico. Enforcement of immigration laws or immigration reform could raise labor costs.

Enforcement of immigration laws has increased recently in two major ways. First, the U.S. government has erected fences and vehicle barriers on a third of the 2,000 mile Mexico-U.S. border to deter unauthorized entries. Second, the Immigration and Enforcement Agency that enforces immigration laws inside the United States has begun to audit more of the I-9 forms completed by newly hired workers and their employers. After these audits, employers are asked to inform workers whose data do not match government records to clear up discrepancies. Most workers instead quit, which has prompted some farm employers to invest in housing in order to hire legal

H-2A guest workers (H-2A workers must be provided with free government-inspected housing). H-2A workers must be paid at least the so-called Adverse Effect Wage Rate (AEWR), which in 2011 is \$10.31 an hour in California, higher than the state and federal minimum wages. AEWRs were established in the 1960s to prevent the presence of legal foreign workers from depressing the wages of U.S. farm workers.

Immigration reform could also raise farm labor costs by legalizing currently unauthorized farm workers and encouraging farm employers to turn to H-2A guest workers if legalized workers find nonfarm jobs, which could raise labor costs. Efforts to enact immigration reform between 2005 and 2007 failed, but in his 2011 State of the Union speech, President Obama urged Congress to try again. He said: "I know that debate will be difficult. I know it will take time. But tonight, let's agree to make that effort." This paper reviews the three most likely adjustments in the fruit and vegetable industry to higher labor costs: mechanization, imports, and labor aids.

The Produce Industry and Trade

U.S. production of fresh-market fruit and vegetables has increased in the last two decades—up 12% for fresh fruit and 41% for fresh vegetables (Table 1 on page 2). Individual commodities, however, have fared very differently. Between 1990–92 and 2008–10, average U.S. fresh-market asparagus production declined 50%, while fresh-market

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Table 1. U.S. Fresh Fruit and Vegetable Statistics

		-----Average-----		
		1990-92	2008-09 for fruit 2008-10 for vegetables	Percent change
Production				
Fresh fruit	Million lbs	19,541	21,822	12
Fresh vegetables	Million lbs	35,335	49,811	41
Per capita consumption				
Fresh fruit	Pounds	68	76	12
Fresh vegetables	Pounds	142	169	19
Imports				
Fresh fruit	Million lbs	2,133	7,273	241
Fresh vegetables	Million lbs	3,874	12,121	213
Exports				
Fresh fruit	Million lbs	4,429	5,802	31
Fresh vegetables	Million lbs	2,949	3,931	33
Import share of consumption				
Fresh fruit	Percent	12	31	152
Fresh vegetables	Percent	11	23	109
Export share of production				
Fresh fruit	Percent	23	27	17
Fresh vegetables	Percent	8	9	13

Note: Bananas are excluded from the fruit group. Vegetables exclude potatoes, sweet potatoes, mushrooms, dry peas, dry beans, and lentils; but include melons.
Source: USDA, Economic Research Service, Fruit and Tree Nuts Yearbook, Vegetable and Melons Yearbook.

strawberry production increased 137%. The U.S. produce industry competes with producers in many other countries with lower farm wages, and imports are increasing as a share of U.S. consumption—up 152% for fresh fruit and 109% for fresh vegetables over the past two decades. Some of these imports arrive when the United States does not produce that product (fresh cherries in December) while others compete with U.S. production, as in the case of some asparagus imports.

Hired Farm Workers

Hired workers have long done most of the farm work on California’s fruit and vegetable farms. California has required farm employers to pay unemployment insurance taxes on the wages of workers who earn more than \$100 a quarter since 1978, making unemployment insurance data a “census” of hired workers. In 2009, California’s 17,300

agricultural establishments (usually farms) hired an average of 374,000 workers. Even if each of these establishments had three full-time operators and unpaid family workers, hired workers would have done almost 90% of the work on California farms.

Most hired workers are men born in Mexico. The U.S. Department of Labor’s National Agricultural Worker Survey (NAWS), which surveys workers employed on U.S. and California crop farms, reported that almost three-fourths were born in Mexico and a quarter were born in the United States. Over half of the workers interviewed between 2005 and 2007 were unauthorized.

Most hired workers stay in the seasonal farm workforce a decade or less. The NAWS found that 15% of crop workers were newcomers, in the U.S. farm workforce for less than a year. Those attracted to seasonal jobs on fruit and vegetable

farms are generally workers whose alternative U.S. job options are limited by lack of English-language skills, education, and other factors.

According to the NAWS, hired crop workers earned an average \$8 an hour in 2006, just over half of what U.S. nonfarm production workers earned. The NAWS also found that crop workers were employed on U.S. farms for about two-thirds of the year. Earning half as much and working less means that the annual earnings of crop workers averaged a third of the annual income of nonfarm production workers, who earned almost \$35,000 per a year.

Adjusting to Higher Labor Costs

What would happen to U.S. fruit and vegetable production if farm labor costs rose? Several adjustments are possible. First, farmers could change their production processes to reduce the need for hand labor by mechanizing. They could also use chemicals or precision planters to reduce the need for hand-weeding and hand-thinning of crops. Second, imports could increase if rising U.S. farm labor costs made U.S.-produced commodities less competitive. Third, farm operators could increase the productivity of farm workers by picking fields less often (and accepting lower yields) or providing workers with productivity-increasing harvesting aids, such as conveyor belts that reduce the time required to carry harvested commodities, lightweight ladders for climbing trees, or dwarf trees that reduce the need for ladders. The adjustment an individual commodity group might pursue will vary depending on the characteristics of the crop, status of mechanization or labor aid technology, and the economic conditions of the industry.

Mechanization: Raisins

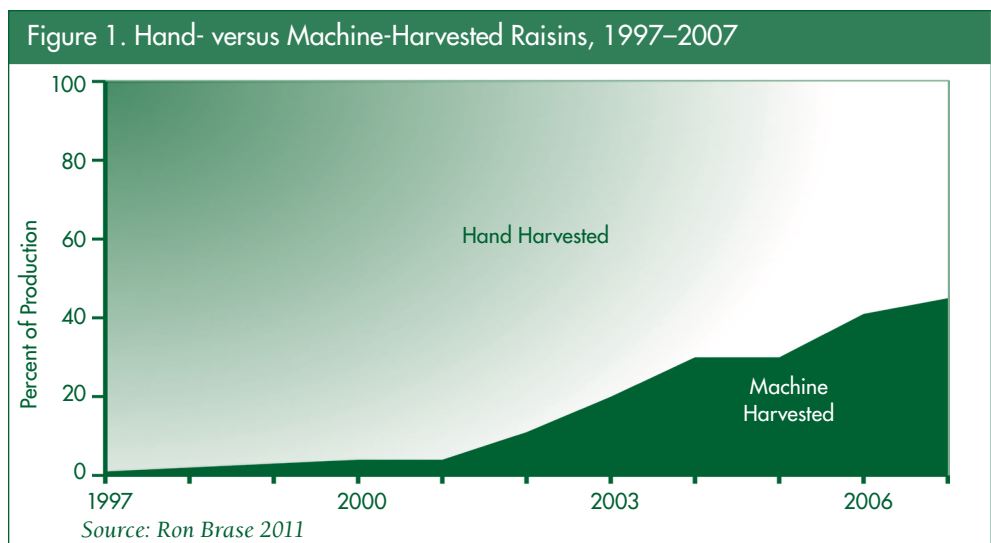
The U.S. raisin industry, centered in Fresno County, California, faces several challenges, including declining U.S. per capita consumption (down 22%

between 1990-92 and 2008-09) and increased competition in a globalizing market. The United States and Turkey are the world's largest raisin producers, accounting for over half of global supply, but Turkey is the world's largest exporter and a lower-cost producer than California. The U.S. raisin industry depends on a complicated set of state and federal marketing programs to remain competitive in export markets.

Harvesting raisin grapes was traditionally the most labor-intensive farm task in North America, with 40,000 to 50,000 workers hired each fall to cut bunches of green grapes and lay them on paper trays to dry into raisins. The key to harvest mechanization was developing grape varieties such as Selma Pete that reach maturity in early rather than late August. The canes of early maturing grape varieties can be cut in August, so that green grapes can dry into raisins on the vine—this is the dried-on-the-vine (DOV) method of harvesting. A modified wine-grape harvester shakes the dried raisin grapes off the vines. Replanting a vineyard and using DOV harvesting requires an investment but increases yields dramatically.

Before 2000, only a few growers used DOV production techniques. The price of raisins fell sharply in 2000 after a very large crop (down 56% from 1999) and in 2001 a modified mechanical wine-grape harvester was introduced to harvest DOV raisins. By 2007, an estimated 45% of California's raisins were harvested using some form of DOV mechanization (Figure 1). Complete harvest mechanization has been delayed, in part, by the large number of small raisin-grape farms, many of which have older owners who are reluctant to mechanize or perhaps replant.

Most of the 80,000 acres of raisin-type grapes removed in the past decade were older vineyards not suitable for machine harvesting. Although acreage of raisin-type grapes has declined, yield has increased, and production of



grapes for raisins in 2010 was about the same as 1990. The spread of DOV has reduced the demand for raisin harvesters to about 25,000 workers. If labor costs rose, the switch to mechanical harvesting would likely accelerate, resulting in fewer and larger raisin producers and less demand for hired labor.

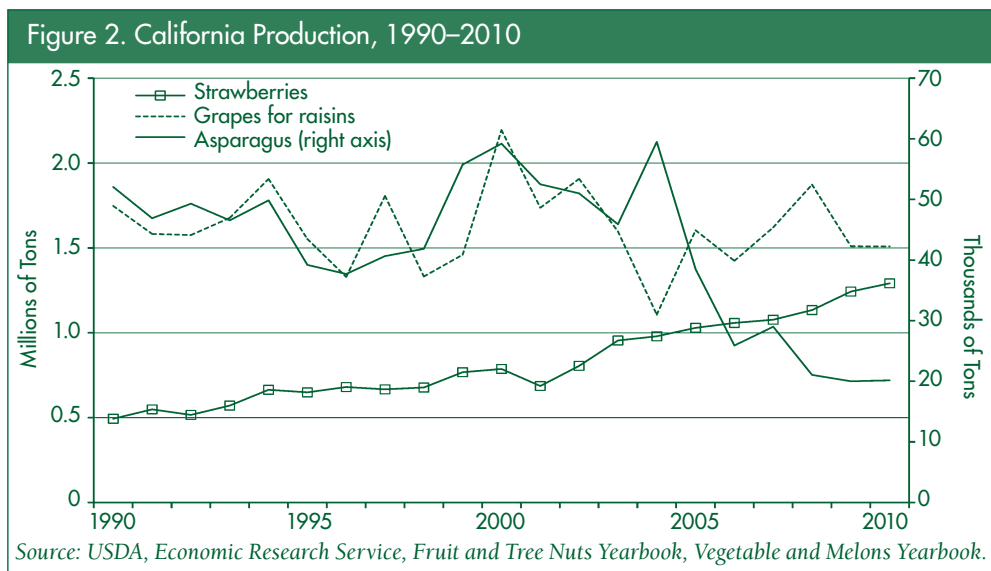
Imports: Asparagus

U.S. per capita consumption of fresh asparagus increased 115% since 1990, but 87% of the fresh asparagus consumed in the United States is now imported, primarily from Peru and Mexico. Some imports come into the United States during seasons when there is no domestic production, but some compete directly with U.S. production. U.S. production of fresh asparagus

fell 50% between 1990-92 and 2008-10; production in California fell 59% (Figure 2). The Food, Conservation, and Energy Act of 2007 provided funds to cushion U.S. asparagus producers from rising imports, and researchers are working on mechanical harvesters.

Harvesting fresh asparagus is labor-intensive because each spear is hand-cut individually. When the weather is warm, fields may be harvested daily rather than the more typical two or three times a week. Labor costs rather than labor availability have been the main issue for growers. Asparagus is often the first crop harvested in the spring, minimizing competition for labor from growers of other commodities.

The major issue is how to reduce harvesting costs. Selective mechanical



harvesters could damage asparagus that is not yet mature, limiting their use, and the lack of uniform-ripening varieties restricts the use of once-over harvesters. Without a harvest mechanization break-through, imports are likely to displace more U.S. fresh asparagus production and further reduce labor demand for this crop. Asparagus may follow the path of green onions, a labor-intensive commodity only rarely grown in the United States now. Almost all green onions consumed in the United States are imported from Mexico.

Labor Aids: Strawberries

Almost 90% of U.S. fresh-market strawberries are produced in California and all are picked by hand. Total U.S. strawberry production increased 107% between 1990-92 and 2008-10 and California production rose 135%; yields increased 73% and U.S. consumption of fresh-market strawberries doubled over this period.

Imports of *fresh* strawberries, 8% of U.S. consumption, are held down by year-round U.S. production and the difficulty of transporting fragile and perishable strawberries long distances. However, imports of *processed* strawberries, usually frozen, account for almost a third of U.S. consumption. While California strawberry growers aim for the fresh market, processing is an important residual market that is becoming less profitable with increased imports.

Strawberries are among the most labor-intensive commodities. Up to 1,000 hours of labor are required to harvest an acre, as fields are often picked several times a week over four-to-six months. Workers place strawberries into the plastic clamshells in which they are sold; the clamshells are in a cardboard flat mounted on a small wheelbarrow. In most fields, workers stop harvesting when a flat is filled, take the full flat to a truck at the end of the row to unload and receive credit for picking it, and return with an empty flat and resume picking.

A labor aid can increase worker productivity by reducing the time spent carrying full flats of berries. In the large and flat fields of Ventura County in Southern California, many growers are now using a slow-moving conveyor belt that moves down the field in front of the harvest crew. Harvesters still fill flats mounted on wheelbarrow devices, but walk fewer steps to put full trays on the belt, get an empty flat, and resume harvesting, which can reduce harvesting hours by a third or more in large fields. Adoption of the conveyor belts, which cost over \$100,000 each, has been slowed by disputes over how much harvest piece-rate wages can be reduced to reflect increased worker productivity. Growers outside Ventura County have been less likely to adopt the conveyor belt.

If labor costs rose, more growers would likely adopt conveyor belts, including versions that are more appropriate for smaller and more hilly fields. A number of research efforts aim to mechanize the harvest, including a scout and harvesting system that uses one machine to identify ripe fruit and another to harvest it; this research is, however, still in an early stage. If higher labor costs were passed on to consumers, the rapid growth in strawberry consumption might slow.

Conclusions

The production of many major fruit and vegetable commodities is labor-intensive. Producers who hire mostly unauthorized workers face several challenges, including immigration enforcement or reforms that could raise labor costs at a time of increased trade. This paper examined the potential responses of three major California commodity groups to higher labor costs: harvest mechanization, increased imports, and more labor aids.

Early maturing raisin-grapes can be harvested mechanically, which requires replanting vineyards to achieve the maximum yield increases of the less labor-intensive system.

About half of the industry has mechanized in the last decade, reducing labor demand, but the large number of small and older producers slows adoption of the DOV technology.

Rising labor costs would likely increase fresh asparagus imports and decrease domestic production unless an economical harvester is developed, which is less likely as production declines and reduces private incentives to develop such machines. With lower production, asparagus labor demand may have already peaked.

Fresh strawberry producers are likely to use more aids to increase worker productivity or find that higher labor costs passed on to consumers would slow rapidly increasing consumption. The adjustments of fruit and vegetable producers to higher labor costs depend on factors that include the availability of mechanical alternatives, the degree of import competition, and the feasibility of aids that increase worker productivity.

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For additional information, the authors recommend:

Calvin, L. and P. Martin. 2010. "Labor-Intensive U.S. Fruit and Vegetable Industry Competes in a Global Market." *Amber Waves*. USDA. Economic Research Service. December. www.ers.usda.gov/AmberWaves/December10/PDF/LaborIntensive.pdf

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