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The New Farm Bill: Implications for California Agriculture

Daniel A. Sumner

An alliance of specialty crops producer organizations (including fruits, vegetables, tree nuts, and others) is engaged thoroughly in the Farm Bill process in 2007, in an effort to shape legislation that does more for their industries.

Every five years or so the United States reconsiders its major food, farm, and rural policies in a new "Farm Bill." Many provisions of the currently operative law, the Farm Security and Rural Investment Act of 2002, will expire in late 2007, so Congress, the Administration, and literally hundreds of interest groups are actively considering proposals for changes to the current law. In the late spring of 2007, the proposals range from slight adjustments to the 2002 Farm Bill to a wholesale elimination of farm programs and expansion of nutrition, conservation, and research and extension efforts.

What is a Farm Bill?

The 2002 Act had 10 separate titles: Commodity Programs, Conservation, Agricultural Trade and Aid, Nutrition Programs; Farm Credit, Rural Development; Research; Forestry, Energy, and Miscellaneous Provisions. The 2007 Act is likely to follow a similar plan. All of the titles are of vital interest to some constituency. However, this year the most vigorous discussions have surrounded the commodity title, where most farm subsidy programs are authorized; the conservation title, which is of increasing interest among environmental groups and farmers; the nutrition title, which includes such large programs as food stamps and school lunch subsidies; and the energy title, which has been on everyone's policy agenda this year. Table 1 shows how the total of $124.9 billion in USDA outlays was

"The main farm programs are really only programs for one segment of farming."

Table 1. USDA Program Outlays by Program Area, 2005

USDA Program	Expenditure in 2005 (billions of dollars)	Percent of Total
Food, Nutrition, & Consumer Services	51.0	40.8
Farm Service Agency	36.5	29.2
Rural Development	14.3	11.4
Natural Resources & Environment	8.7	7.0
Foreign Agricultural Service	5.4	4.3
Risk Management	3.0	2.4
Research, Education & Economics	2.7	2.2
Marketing & Regulatory Programs	1.8	1.4
Other	1.5	1.2
Total	124.9	100.0

Source: Economic Research Service, USDA. www.ers.udsa.gov

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Marketing a Mediterranean Diet: Some Issues and Opportunities
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Table 2. Shares of U.S. Cash Receipts and Program Payments for Selected Agricultural Commodities, Crop Year 2002-05 Average[a]

	Percent of Total Value of Production	Percent of Individual Commodity Payments in Total Outlays
Upland cotton	1.9	22.3
Rice	0.6	7.3
Wheat	3.0	9.5
Corn	8.7	43.5
Soybeans	7.2	5.5
Other grains/oilseeds[b]	1.3	4.2
Horticultural crops[c]	21.3	~0.0[e]
Meat animals[d]	37.8	~0.0[e]
Dairy	10.8	5.1[f]
Other commodities[g]	7.4	2.5
Total	100.0	100.0

Notes:

a. Included in the total are production flexibility contract payments, direct payments, countercyclical payments, loan deficiency payments, marketing loan gains, and certificate exchange gains. For the dairy sector, the figure consists of payments under the Milk Income Loss Contract (MILC) Program.

b. Includes barley, oats, sorghum, millet, flaxseed, peanuts, sunflowers, safflower, and miscellaneous oil seeds.

c. Includes fruits, tree nuts, vegetables, melons, and greenhouse/nursery.

d. Includes cattle/calves, hogs, sheep, lambs, and poultry/eggs.

e. Program payments for the meat animal and dairy sector are very small and given here as approximately zero.

f. The data for the Milk Income Loss Contract Payment are available only by fiscal year. The share given is based on the average payment budgeted during fiscal years 2003–06.

g. Includes figures for tobacco, sugar, honey, wool, and mohair.

Source: USDA

U.S. cash receipt data are available from the USDA Economic Research Service, Farm Income Data, accessible at: http://www.ers.usda.gov/Data/FarmIncome/finfidmu.htm.

The commodity payment data are available from the USDA's Farm Service Agency, Budget Division, "Commodity Estimates Book for FY 2007 President's Budget" (for crop year 2002 and 2003 data) and available at http://www.fsa.usda.gov/dam/bud/CCC%20Estimates%20Book/estimatesbook_PresBud.htm), and the "Commodity Estimates Book Material for FY 2007 Mid-Session Review" (for crop years 2004 and 2005) and available at http://www.fsa.usda.gov/dam/bud/CCC%20Estimates%20Book/estimatesbook_MSR.htm.

allocated by program area in 2005. About 41 percent of outlays (about $51 billion) were for food and nutrition programs and about 29 percent for farm programs, including some environmental payments to farmers and landlords.

The Farm Bill is known as authorizing legislation because it creates and modifies government programs that set the framework for government outlays of funds or for regulating producers and consumers. The Farm Bill authorizes budget outlays for two categories of programs. The "mandatory" programs set program rules and triggers and then whatever outlays occur under the program provisions are automatically paid out each year the mandatory programs are authorized. The standard farm subsidy programs are mandatory programs. The cost of the programs depends on the rules set by the Farm Bill and by economic conditions in the relevant commodity markets. For example, the Congress set a loan rate for cotton of 52 cents per pound and whenever the relevant market price (which is the loan repayment rate) falls below 52 cents per pound, the USDA makes payments to cotton producers. The amount of the payments and the cost of the program vary inversely with the market price of cotton. The other major mandatory programs include food stamps and school lunch programs. Once the eligibility rules and subsidy rates are set, the outlays under these nutrition programs will rise or fall with the number of low-income individuals who participate in the programs. Outlays rise when the economy is doing poorly and fall when unemployment is lower and few people enroll.

Traditional farm commodity programs are limited to a handful of crops. Table 2 shows how the distribution of payments diverges from the distribution of the value of commodity production. Livestock products, horticultural crops and others receive almost none of the commodity program payments while major grains, oilseeds, and cotton receive payments far in excess of their share of farm output. The main farm programs are really only programs for one segment of farming.

Major Issues for 2007

Advocates for change in 2007 have argued for reallocating funds and policy attention away from commodity programs and toward more environmental payments, more attention to nutrition information and assistance, more protection from invasive species, more effort to promote bioenergy, and more research and development, among other subjects. Others, including many economists, argue that the time is ripe for reducing the reliance on traditional commodity support programs. Some suggest simply removing the existing programs, while others have proposed replacing the existing complex array of programs for the grains, oilseeds, and cotton with a new form of revenue insurance that would also replace standard crop insurance programs for these commodities.

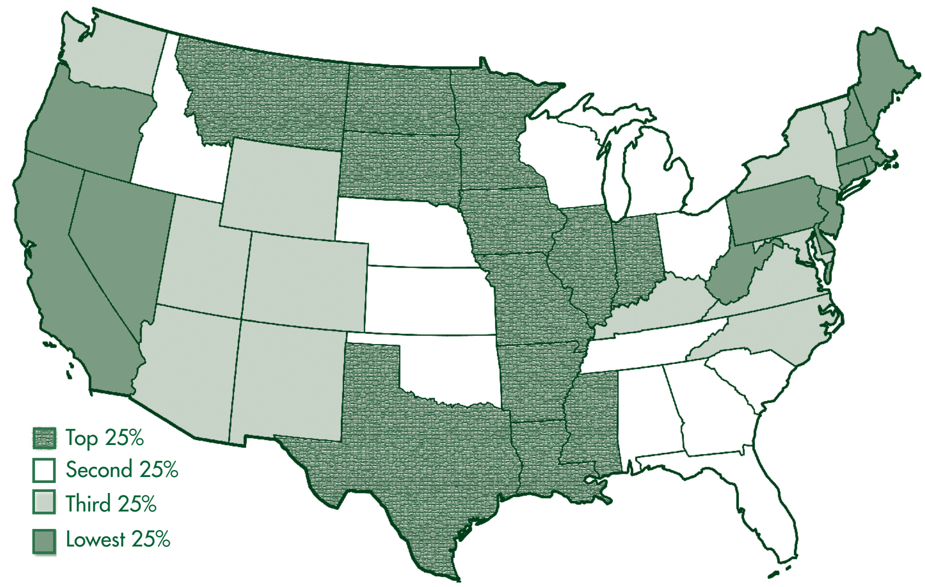
Trade negotiations and litigation add further issues in 2007. If the negotiations of a new World Trade Organization (WTO) agreement move forward, they would provide some limits on farm support in the 2007 Farm Bill. But, even without a new agreement, the existing rules, as interpreted in the recent WTO ruling concerning the U.S. upland cotton program, suggest that U.S. commodity programs may be constrained to limit their impact on international markets.

An alliance of specialty crops producer organizations (including fruits, vegetables, tree nuts, and others) is engaged thoroughly in the Farm Bill process in 2007 in an effort to shape legislation that does more for their industries. This alliance has pointedly not advocated new payment schemes for producers of specialty crops. Instead, they have advocated programs related to demand expansion through promotion and nutrition education and support for consumers, and expansion of government activities that enhance long run productivity, such as research and protection from invasive species.

Figure 1 shows the geographic distribution of farm program payments under the current farm programs. Note that California, the number one farm state in the country, is in the bottom quarter of recipients of commodity payments relative to farm receipts. This map shows graphically why many California interests advocate for a reallocation of funds in 2007.

A major challenge facing those advocating change in 2007 relates to the long-standing Farm Bill tradition of supporting the program crops and the current budget situation.

Figure 1. Commodity Payments as a Percent of Gross Cash Receipts, State Rankings, 2004



Source: USDA, Economic Research Service, www.ers.usda.gov

Budgets and Market Conditions in 2007

Since 1933, every Farm Bill has been shaped in a unique economic and political setting. The Farm Bill of 2007 is no exception. Due to the ethanol boom among other forces, prices of program crops are high in 2007 and are projected to remain high for the next five years. This means that the price contingent payments made to program crops are projected to be very low for the life of the new Farm Bill. The budget allocated to the Farm Bill committees in Congress to cover the projected costs of these mandatory programs for the period of the new Farm Bill is also low relative to the budget in the recent past. For example, the corn program cost about $10 billion for crop year 2005, but is projected to cost no more than $2 billion in crop year 2008, if the program were unchanged in the 2007 Farm Bill. Because market prices are projected to be high, changing traditional farm programs would be credited with saving relatively little over the next Farm Bill. This means that change in farm commodity programs releases relatively few budget dollars to be reallocated to the many competing demands that have been advocated for the 2007 Farm Bill.

The committees of Congress charged with writing the 2007 Farm Bill have tried to find additional budget allocation to supplement their potential spending, but so far their success has been limited by concerns about the overall budget deficit. That means that the Farm Bill will have less money available overall and, even if commodity programs are changed, there is likely to be less money to reallocate among the many competing demands.

Perspective

Over the next few weeks and months, Congress will attempt to craft a new Farm Bill that will govern food, farm, and rural policy in the United States for the next five years or so. The process of writing a Farm Bill is almost as complicated as the final legislation. There are several steps even after the committees draft their initial bills and there is time for California groups to make their views known.

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The Intersection of Energy and Agriculture: Implications of Rising Demand for Biofuels and the Search for the Next Generation

Steven Sexton, Deepak Rajagopal, David Zilberman, and David Roland-Holst

As production of the current generation of biofuels expands, it will impose pressure on food production and environmental preservation, have considerable distributional effects, and cause a restructuring of agriculture. A continued evolution of biofuel technology, driven by the university-industrial complex, promises to mitigate these effects.

World energy demand is expected to increase 70 percent in the next quarter-century amid economic growth in Asia that has led millions in India and China to begin dreaming of owning automobiles. China alone will be responsible for one-fifth of energy demand growth, as its per capita energy consumption moves closer to that of the United States. The growth in energy demand presents a considerable challenge to the world community, which must confront mounting evidence of global warming and the prospect of depleted oil reserves within 70 years. These developments have fueled a scramble for new energy sources from which biofuels have emerged as a promising alternative. Liquid biofuels require only minor adjustments to existing engine technology and fuelling infrastructure, making them relatively more attractive than other technologies like the hydrogen fuel cell and electric vehicles.

Two centuries ago, as much as 20 percent of agricultural land was devoted to producing fuel for transportation. Fossil fuels have since allowed movement away from agriculture as a source of transportation energy, but a return seems imminent. If agriculture is to be relied upon to fuel a growing world population (and a growing driving population), then a serious consideration of the consequences of widespread biofuel adoption is warranted; the technology is not without costs. Rising energy demand is likely to put pressure on food production and the environment, have significant distributional effects, and induce reorganization in agriculture.

The current generation of biofuels, produced primarily from sugar, corn, and soy, addresses many concerns associated with the new energy paradigm. Most countries can grow energy crops, lessening their demands for energy imports. Biofuels support rural development by increasing farm income. They offer hope of economic growth, especially for developing countries near the equator, where energy crop production is expected to be particularly cost-effective. They also offer modest greenhouse gas emissions reductions. These benefits are known and understood. The costs have received much less attention.

While the ability of biofuels to reduce oil imports and increase farm income are significant benefits, the *raison d'etre* of biofuels is their capacity to provide a transportation fuel cleaner than oil. The consensus measure of the efficiency of biofuels is their net energy content and their net life cycle greenhouse gas emissions. These measures account for the energy used in production of energy crop and in processing of crop to fuel, as well as the fact that energy crops sequester carbon that is later emitted when biofuel is combusted. It is thus generally assumed biofuels are carbon-neutral, though the latest environmental analyses suggest differently.

Some analyses have shown biofuels require more energy in production than they yield. Estimates of the carbon-emissions savings have also varied, with the latest study concluding that biofuels are modestly cleaner than gasoline. The latest such accounting for corn-based ethanol in the United States yields an average net greenhouse gas emissions reduction of 18 percent per unit of fuel energy produced and a net energy ratio of 1.2, which implies a gain of 20 percent. It corrects errors in previous studies, particularly adding an energy credit for the animal feed co-product of ethanol that would otherwise be produced from an energy-intensive process. This latest study is the closest to a consensus view that exists today.

Life cycle analyses are not straightforward and have proven controversial. For instance, the animal feed co-product of ethanol saves energy that would be used to produce such products and those savings should rightly accrue as credit to ethanol production. However, as ethanol production expands, it may well yield more co-product than is demanded. The co-product produced beyond market demand should not accrue as a credit and eliminating the credit would substantially worsen the net energy gain from corn ethanol.

Biofuel technology is land intensive. Theoretical estimates for global ethanol production from six potential crops, namely, sugarcane, corn (maize), wheat, sorghum, sugarbeet, and cassava, based on global average yields, is shown in Table 1. These six crops account for over 30 percent of global cropland of 1.4 billion hectares. Utilization of the entire supply of these six crops would account for at most 50 percent of the global gasoline use today. A more realistic scenario of 25 percent utilization of such crops and residues for ethanol implies a mere 12 percent offset in gasoline use.

Current crops and conversion technologies, therefore, are ill-equipped for large-scale displacement of gasoline. Similar calculations based on cropping patterns, crop yields, and conversion technologies suggest that the United States, Canada, and EU-15 would require between 30 percent and 70 percent of their respective current crop areas if they are to replace even 10 percent of their transport fuel consumption by biofuels.

Table 1. Global Biofuel Production by Feedstock

Crop	Avg. Yield	Global Acreage (mil. hec)	Global Production (mil. tons)	Conversion Efficiency liters/ton	Land Intensity (liters/hec)	Max. fuel (billion litres)	Gasoline equivalent (bil. liters)	% Annual Global Gasoline
Sugarcane	65.0	20	1300	70	4550	91	61	4%
Corn	4.9	145	711	402	1971	286	191	12%
Wheat	2.8	215	602	340	952	205	137	9%
Sorghum	1.3	45	59	60	78	4	2	0%
Sugarbeet	46.0	5.4	248	110	5060	27	18	1%
Cassava	11.5	19	219	180	2070	39	26	2%
Wasted Crops	–	–	74	664	–	49	33	2%
Crop residues	–	–	1500	295	–	442	296	19%
Total		**449**				**1143**	**766**	**50%**

Source: FAOStat, Kim and Dale, RIS

Rising Food Prices and Their Geopolitical Consequences

Because the stock of land is fixed, as demand for biofuel rises, there will be pressure on the other primary uses of land: food production and environmental preservation. As land devoted to biofuel production increases, it will necessarily mean a reduction of land for food production or the environment or both. Food prices will rise. While higher commodity prices may benefit some farmers, that effect will not be universal. Some sectors will suffer from rising prices for corn and other commodities that are inputs in production. Specifically, the price of animal feed is increasing in the United States, putting pressure on livestock producers. Any benefits that do accrue to farmers from higher food prices will likely be captured by landowners in the form of higher rents.

Higher food prices will also hurt consumers. Globally, corn prices have doubled since the start of last year and reached a 10-year high early this year. Wheat prices reached a 10-year high, and soybeans touched a two-and-a-half-year high around the same time. Global corn and wheat stockpiles have fallen to 25-year lows. The stockpile system creates a stealth effect for prices, and we have yet to see the full price implications of these depletions. Commodity stockpiles are generally designed to dampen transitory market volatility. Existing agricultural capacity can compensate for cyclical stock depletion, but rising to meet a sustained demand shift is another matter. Historically, this kind of scarcity can only be overcome by recruiting more resources to agriculture, usually in response to higher prices.

While higher food prices may be absorbed in developed countries, they will likely impose hunger in poor regions of the world. Growing ethanol demand is blamed for the doubling of tortilla prices in Mexico toward the end of 2006. Rising food prices in China have prompted the government to close some biofuel plants to reduce demand for energy crops and thereby lessen pressure on food prices. Land economics implies that as we grow more crops for cars in the developed world, we grow fewer crops for food, which will particularly hurt the developing world. These distributional effects of biofuel adoption may have significant geopolitical ramifications.

If the consensus policy of the North and the South that promotes cheap food were to unravel because of rising demand for agricultural products, it could have implications as dramatic as other great multilateral realignments in modern history, including the Cold War. More ominously, overt conflicts may occur within and between countries that experience dramatic changes in food purchasing power. Although we have been spared this experience for many years, it is not difficult to envision the dynamics of a world with sustained increases in food prices. This would be a world where economic convergence—a welcome historic trend of poorer countries growing faster than developed countries—would be reversed.

Given dramatic initial differences in per capita income, a multinational food auction would doubtless be won by higher-income bidders, with dire consequences for food security in low-income countries. History has definitive lessons for leaders whose populations enter food crises. Political consensus evaporates, leaving an ultimatum between regime change and martial law. The development of technologies that can improve agricultural productivity and that permit the harvest of grain for food and the conversion of other plant parts to biofuel is of paramount importance to mitigate this risk.

Losing Natural Habitat and Biodiversity

The impact of biofuels on the environment will be much the same as for food—demand for land for energy production will impose pressure on land for environmental purposes. The result is that biofuels, which are embraced for their ability to help the environment, will harm the environment. The net environmental effect of biofuel is

Table 2: Potential Biofuel Production from Cellulosic Crops

Crop	Avg. Yield	Global Acreage (mil. hec)	Global Production (mil. tons)	Conversion Efficiency liters/ton	Land Intensity (liter/hec)	Max. fuel (billion liters)	Gasoline equivalent (bil. liters)	% Annual Global Gasoline
Switchgrass	10	100	1000	380	5200	520	348	23%
Miscanthus	22	100	2200	380	11440	1144	766	50%
Total		**719**				**1644**	**1115**	**73%**

Source: FAOStat, Kim and Dale, RIS, Madhu, Voigt and Long

uncertain. The agricultural land base is expected to grow with rising biofuel demand. Agricultural production is already considered a major cause of non-climatic global change, and it is expected to double in the next 50 years (not accounting for biofuel production) as the world population becomes wealthier and grows to nine billion. The agricultural land base is expected to grow 18 percent by 2050 just to meet the demand for food, let alone demand for biofuels. This will necessarily mean a worldwide loss of natural habitat larger than the United States. It likely will result in the loss of one-third of remaining tropical and temperate forests.

As more land is brought into production it will be taken away from fallowed land, grazing land, and natural habitat. In the U.S., this pressure will be felt by the Conservation Reserve Program, which offers payments to farmers in ecologically sensitive areas for voluntarily fallowing their lands. As the gains from farming their lands increase, farmers will opt out of the program or demand greater payments. Lands that were idled will be brought back into production.

The loss of natural lands will reduce biodiversity, exacerbating a problem that is already considered costly to the world community. The costs of biodiversity loss are poorly understood, but it is estimated they presently outweigh the costs of climate change. Considering the ecological services biodiversity provides—from cleaning water, restoring nutrients to soil, sequestering carbon, etc.—and the role of biodiversity in medical breakthroughs, it seems clear the loss of biodiversity warrants attention. Biodiversity loss is also irreversible; there is yet no way to bring an extinct species back to life.

The expansion of biofuel production will also produce greater demand for agricultural inputs like fertilizers, pesticides, and water. Increased use of some inputs, especially pesticides and fertilizers, will have negative impacts on the environment. Because biofuels are water-intensive relative to fossil fuels, substitution toward biofuels will induce greater water demand that will divert water from its de facto environmental uses. Water extraction and conveyance will also become more costly amid rising energy prices, which will impact most greatly those who rely on water conveyance for their livelihoods.

Biofuels can also be expected to produce a restructuring of some agricultural sectors. In particular, rising energy costs will make the transportation of commodities to market increasingly costly and may cause agricultural production to relocate nearer demand. Transportation of ethanol is especially costly because it cannot be sent through pipelines like fossil fuels. Ethanol must instead be shipped on train or truck. Therefore, as demand grows beyond that which is regulation-induced, producers may locate along the coasts, rather than in the Midwest where they are clustered now. Moving corn to refineries will also become increasingly expensive, as will moving biofuel residuals to livestock producers. Therefore, feedstock production, fuel production, and livestock production may co-locate in the future near large markets. The effect of this restructuring will be to raise the price of land near cities and reduce the price of land that is far from markets.

Further, the increasing dependency of energy on agriculture may lead to the integration of energy and agriculture. Energy companies traditionally viewed as oil companies may become major players in agriculture as they move into biofuel production. They may vertically integrate into feedstock and livestock production because of the growing interdependence of these sectors.

The Next Generation

The costs of widespread biofuel adoption are significant. They auger for a commitment to improving the efficiency of biofuels and the productivity of agriculture. As demand for the current generation of biofuels grows, the next generation of biofuels is being developed by scientists to provide a more efficient and cleaner form of transportation fuel that reduces the costs of the biofuels considered here.

Cellulosic ethanol is the most promising biofuel on the horizon, but it is expected to be five to 10 years away from commercialization, at best. Cellulosic ethanol is more efficient, making use of more parts of feedstock plants than corn and sugar ethanol. The next generation will be able to convert non-crop plants like trees and grasses to ethanol and will even be able to convert agricultural residues, like corn husks or wheat stocks, into fuel. In addition to making more efficient use of feedstocks, cellulosic feedstocks are also less costly to produce, can be grown on marginal lands, and are less factor-intensive than traditional crops. This expands the stock of land for energy crop production, improves the net energy content of ethanol, and reduces the need for fertilizer and pesticide inputs. Cellulosic ethanol, however, renders marginal lands, that were previously unproductive, available for biofuel production, potentially worsening pressure on environmental lands.

In Table 2, a hypothetical scenario of cellulosic ethanol production is depicted. If current trends in agricultural productivity persist, it will be possible to meet food demand on at least 100 million fewer hectares of cropland. If the freed 100 million hectares of cropland were allocated to growth of Switchgrass and Miscanthus to generate lingo-cellulosic biomass for ethanol production, under the assumptions shown, we could produce 1,115 billion liters of gasoline equivalent ethanol. At today's consumption levels, this level of production could offset 73 percent of the global demand for gasoline without displacing food crops. This scenario hinges on the successful development and commercialization of cellulosic conversion technologies, which seems probable but not certain.

The search for more efficient biofuels should not ignore the role of agricultural biotechnology to improve efficiency, reduce demand for costly inputs, and improve the net carbon emissions of fuels. In particular, agricultural biotechnology has produced crops commonly used in the United States, Argentina, China, and India that reduce the need for pesticides because of pest-resistant genes. These and other technologies have improved the productivity of corn production, in particular, and grains more generally. Future generations of genetically modified crops promise to reduce demand for other inputs, including water. Improvements in the productivity of other biofuel feedstocks (beyond corn) can make all forms of biofuel more viable. Furthermore, continued advances in agricultural productivity generally will reduce the pressure on land and can mitigate the upward pressure on food prices.

The Role of the University-Industry Complex

Within the past few months, several oil companies have announced partnerships with major research universities to develop alternative fuels. They include Chevron and UC Davis, Conoco Phillips and Iowa State University, and a $500 million agreement between BP and UC Berkeley. The Berkeley project in particular will focus on developing cellulosic ethanol. These partnerships are the latest manifestations of the university-industrial complex that was constructed in the 1990s in the biotechnology sector. Since their inception, the agreements have been controversial. Critics worry that corporate money will corrupt research and that research not fueling corporate profits will languish. They also cite an apparent contradiction between public university missions to produce research to the benefit of the public and the licensing of innovations to firms with profit motives.

Supporters of the university-industry complex point out the dearth of research dollars starting in the 1990s and argue that partnerships are efficient in that they permit the university and the firm to perform the tasks at which they have comparative advantages. Universities have the genius and creativity to generate basic research, whereas the private sector is better able to develop basic research and market it. It is argued, therefore, that licensing agreements speed the adoption of new technology relative to university-performed product development.

The performance of the university-industry complex in other sectors indicates the success that may come from its latest iteration. For instance, one in three California biotechnology companies was founded by UC scientists, including faculty, postdocs, and alumni. They include Amgen, Genentech, and Chiron. One in five California high-tech firms was founded by UC scientists and engineers, including Sun Microsystems, Qualcomm, and Broadcom. Research spurred by the corporate-funded biofuel research may produce additional offspring that can power the California economy and produce the next generation of biofuels that may be a true substitute to fossil fuel.

A Role for Policy

The pressures on agriculture will be great in the next half-century as it is relied upon to produce fuel and food for growing populations and growing economies. Agriculture can meet this challenge, but then it will need policies to offer the right incentives to market participants. Intervention may be needed along a number of dimensions. First, policy may be needed to secure a stable food supply. Whereas higher prices for agricultural commodities would auger for a reduction in agricultural policy, reductions in food stockpiles and land devoted to food production may induce greater price variability and impose pressure on low-income consumers. Second, policy may be necessary to protect non-market values of natural resources. Greater demand for land is expected to put pressure on native lands. Third, farmers can be expected to serve a biofuel feedstock market, but incentives may be needed to encourage investment in biofuel processing capacity given up-front costs and uncertainty.

The distributional effects of biofuel may also be significant. It is now recognized that, while biofuel may aid rural development, farm incomes will not universally benefit from higher commodity prices. Land near urban centers may increase in value as firms seek to reduce the costs of transporting production to market. This will hurt some landowners. Higher food prices may endanger poor populations. These and other distributional effects can be mitigated with transfers. Economics must inform and guide these policies.

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Farm Labor Shortages: How Real, What Response?

Philip Martin

California farmers hire an average 380,000 workers to help produce crop and livestock commodities worth $32 billion a year. Farm employment is seasonal; a million workers earn wages sometime during the year on the state's farms. Farm employers have been complaining of labor shortages, arguing for immigration reforms that will make it easier to hire guest workers.

California farmers sold commodities worth $32 billion in 2005, double the farm sales of the number two farm state, Texas. Labor-intensive fruit and nut, vegetable and melon, and horticultural (FVH) specialty crops, such as those produced in nurseries and greenhouses, generated almost 60 percent of California's farm sales.

Expanding farm sales, especially of FVH commodities, may be threatened by farm labor shortages. Farmers and farm groups have been complaining of too few workers to produce and harvest commodities in a timely fashion for the past several years, beginning with the winter vegetable harvest in the Imperial Valley in 2004-05. Labor shortage complaints have spread, and during 2006 included assertions of too few workers to harvest pears in Lake County, raisin grapes in Fresno County, and strawberries in Ventura County.

Farm employers want Congress to enact immigration reforms that will make it easier to hire legal guest workers. Acknowledging that a majority of hired farm workers are unauthorized, they fear that stepped-up border and interior enforcement could lead to crop losses if too few newcomers are available to replace farm workers who are apprehended or move to nonfarm jobs.

This article reviews farm labor shortage definitions, wage and employment data, and likely adjustment scenarios in the event of fewer farm workers. It assesses the likely effects of pending immigration reforms, and concludes that they would institutionalize the current farm labor market, which acts as a revolving door for newcomers from abroad who move on to nonfarm jobs or return to their countries of origin.

Farm Labor Shortages

There is no economic or government definition of persisting shortage. In a market economy, demand curves rank consumers by their willingness to pay particular prices and suppliers by their willingness to sell at particular prices. If demand exceeds supply, prices will rise, reducing demand and increasing supply. Demand and supply adjustments to price changes can occur with considerable lags, as growers of apples or oranges decide if high prices are likely to persist before making investments that lead to additional production. Government intervention, such as putting a ceiling on the price of a commodity, can lead to shortages, as with price controls on apartments in New York City. Guaranteeing high prices to suppliers, on the other hand, can lead to surpluses, as with some farm commodities.

The labor market operates in the same way. Labor demand curves rank employers by the wages they are willing to pay, and labor supply curves rank workers by their reservation wages, which is the wage needed to induce a person to fill a particular job. As with farmers planting perennial crops, there can be lags between changes in labor demand that affect wages and a supply response, as when an IT-boom increases the wages of computer programmers but time is required to educate additional workers.

Government intervention also affects labor markets. Farm, trade, and other policies can affect the demand for labor by encouraging or discouraging production, and policies ranging from education and training to welfare and minimum wages can affect labor supply. However, the major government intervention that affects the farm labor market is immigration—90 percent of California farm workers were born abroad, and a majority are not authorized to work in the United States.

With no standard government or economic definition of persisting labor shortage, the term can have very different meanings. The labor shortages reported in the press are usually instances of fewer workers employed than desired at current wages, leading to farm work not being done in a timely fashion or crops not being harvested. Many farm employers say there is a labor shortage when they have a crew of 30 workers, but they prefer 40. Other farmers say there is a shortage if they want crews to work today but contractors do not bring crews until tomorrow.

Economists evaluating claims of labor shortages look to what employers do to attract additional workers, such as adjusting wages. The first expected response to a shortage is higher wages, which should increase the supply of workers, perhaps drawing workers from other jobs or areas, and reduce the demand for them, as farmers skip a third or fourth harvest. Farm employers can also take other steps in response to fewer workers, including stepping up recruitment efforts, offering additional benefits such as housing, or making work easier to enlarge the pool of workers available, such as using conveyor belts in the field to eliminate carrying harvested produce, hydraulic lifts to eliminate ladders or, in some cases, mechanize.

The data suggest that the average hourly earnings of California farm workers rose more than usual in Fall 2005, but not in Fall 2006 (Figure 1). The average hourly earnings of non-supervisory production workers employed in agriculture normally rise in the fall months, when seasonal workers are laid off. Between 2002 and 2004, the increase in earnings in the fall months was about two percent, but in Fall 2005, earnings rose five percent, and remained high early in 2006. However, the Fall 2006 rise in earnings reverted to the previous two percent rise, so that average hourly earnings data do exhibit a clear trend.

In contrast to labor shortage, there are government definitions of labor surpluses. The most common indicator is the unemployment rate, the ratio of workers actively seeking jobs to employed and unemployed workers. Labor surplus areas are defined by the U.S. Department of Labor (DOL) as those with unemployment rates that are at least 20 percent above the average for all states during the previous two years, or above 6.5 percent in 2007. One reason for unemployment and labor surpluses is the minimum wage, since a negatively sloped demand for labor curve suggests that more workers would be hired at lower wages.

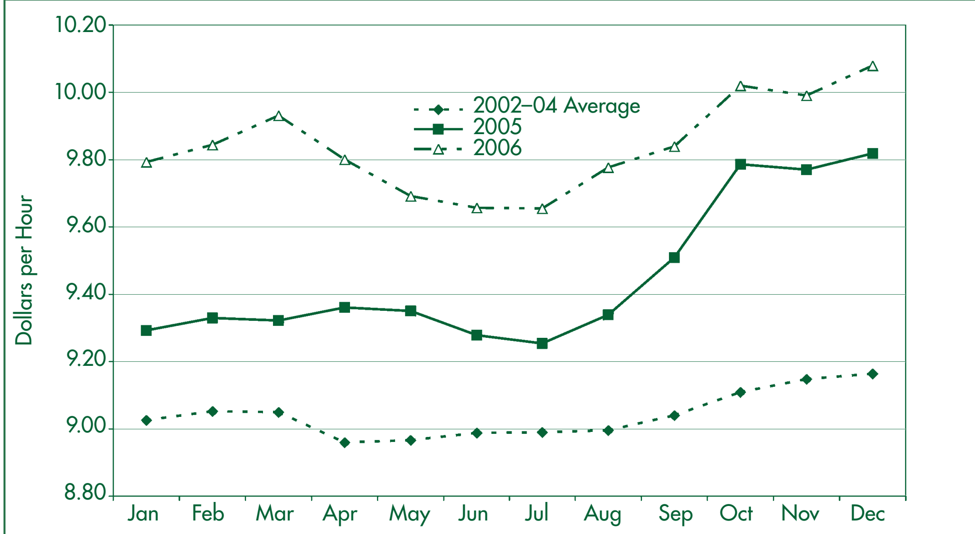
Adjusting to Higher Wages

If fewer farm workers are available, economists expect farm wages to rise. The end of the Bracero program that admitted over 4.5 million Mexican guest workers between 1942 and 1964 contributed to a 40 percent wage increase in the first union contracts for table grape growers in 1966; entry-level wages rose from the federal minimum wage of $1.25 an hour to $1.75 an hour. Farm wages rose faster than nonfarm wages for the next 15 years, as demand for fresh fruits and vegetables rose, unions competed to represent farm workers, and some nonfarm conglomerates vulnerable to consumer boycotts became farmers for tax reasons and as an inflation hedge.

If tighter enforcement of immigration laws leads to fewer new farm workers, and low nonfarm unemployment rates draw workers out of agriculture faster, farm wages would be expected to rise. Rising farm wages could be absorbed smoothly, as the labor supply shrinks along the demand curve, or in a discontinuous way, if the demand for farm workers drops sharply at particular critical wage thresholds.

Today's farm labor market is pictured in Figure 2. At current average hourly earnings of $8 an hour, about 80 percent of farm workers are immigrants. If the influx of newcomers were slowed by enforcement, and exits of farm workers speed up because of the availability of nonfarm jobs, the labor supply curve is expected to shift leftward, resulting in fewer workers employed at higher wages. If all immigrant workers were removed, the new equilibrium would be at b, where there are more American workers employed at higher wages, but far fewer total farm workers.

Figure 1. Average Hourly Earnings, CA Farm Workers, 2002 06



Source: www.labormarketinfo.edd.ca.gov/cgi/databrowsing/?PageID=4&SubID=158

Figure 2. Smooth Adjustment to Higher Farm Wages

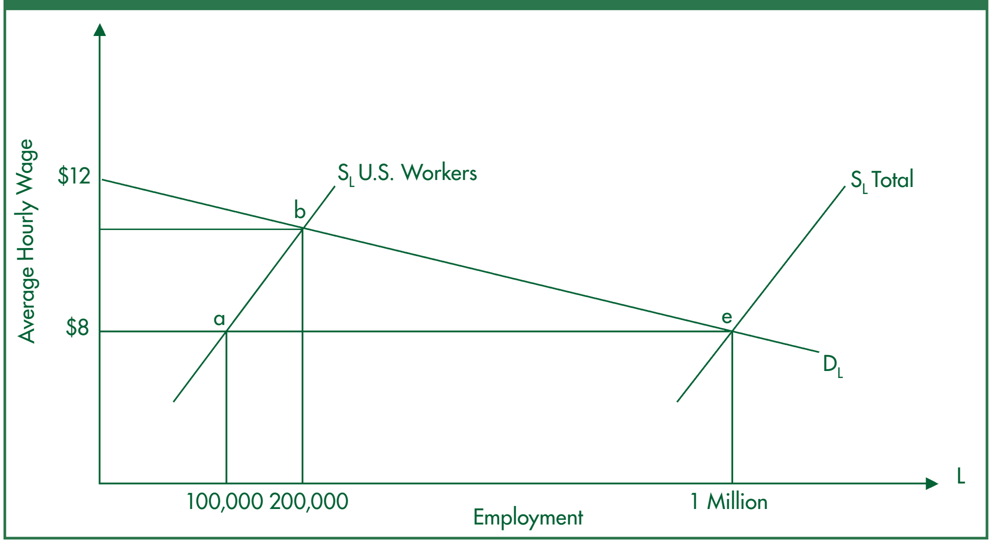
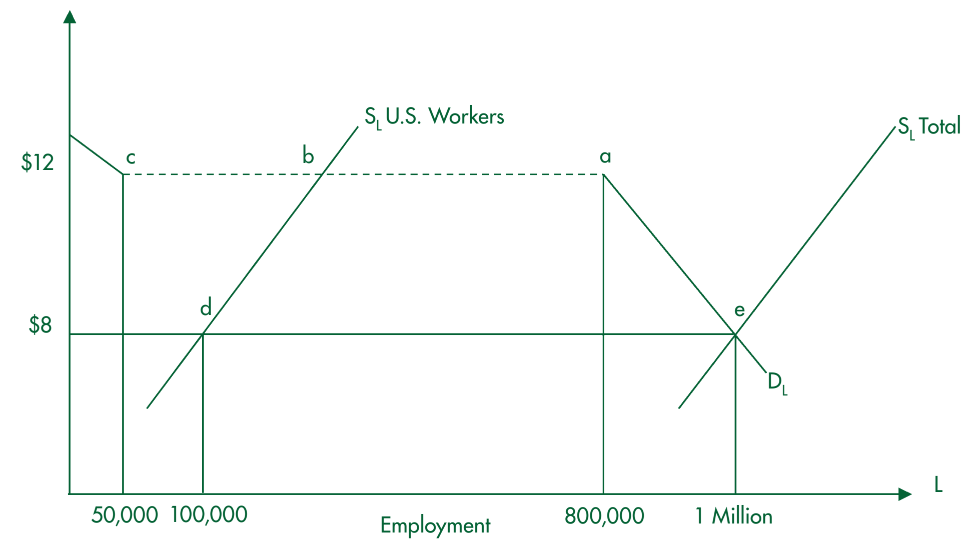


Figure 3. Discontinuous Adjustment to Higher Farm Wages



An alternative adjustment scenario is pictured in Figure 3. It illustrates a kinked demand for labor curve, highlighting the fact that at some critical or threshold wage, the demand for farm labor shrinks sharply, as rising wages lead to crop changes, mechanization, or other employment-reducing responses. Beginning from the same starting point at e, adjustments to fewer workers shift the supply curve leftward, and the demand for labor falls as e.g., farmers skip a third or fourth harvest. However, at the critical wage a, there is a sharp drop in the demand for labor, from 800,000 to 50,000, displacing over 90 percent of the workers who had been employed.

Which picture of farm labor market adjustments to rising wages is most realistic? The key difference in the two scenarios is the shape of the demand for labor curve—the first is smooth, suggesting gradual changes as wages rise, and the second is discontinuous, so that at a critical wage there is a sharp drop in the demand for labor. The mechanization of California's processing tomatoes after the Bracero program illustrates the second or discontinuous adjustment scenario.

In 1960 over 80 percent of the 45,000 peak-harvest workers, employed to pick the state's 2.2 million ton processing tomato crop into 50 to 60 pound lugs, were Mexican Braceros. A decade later, all the state's processing tomatoes were harvested mechanically. Federal and state funding encouraged plant scientists to develop tomatoes that ripened uniformly, and thus could be harvested in one pass through the field. Agricultural engineers developed machines that cut the plant, shook off the tomatoes, and conveyed them past sorters before dumping them in trucks outfitted with 12.5 ton tubs.

Government played a key role in tomato mechanization, as the major funder of labor-saving research and as the inspector of the harvested tomatoes. Processing tomatoes are worth about $50 a ton or 2.5 cents a pound. When hand-harvested tomatoes arrived in 50 pound lugs, rejecting a lug cost the farmer $1.25. With mechanically harvested tomatoes arriving in 12.5 ton loads, rejecting a load cost a farmer $625. To expedite the acceptance of mechanically harvested tomatoes, random sampling stations were established to determine the quality of the tomatoes.

Immigration Reform

About 90 percent of California farm workers are immigrants, and the Senate debated immigration reforms in May-June 2007. The major issue was what to do about the estimated 12 million unauthorized foreigners in the United States. In May 2006, the Senate approved a Comprehensive Immigration Reform Act (CIRA) on a 62-36 vote. It would have divided unauthorized foreigners into three groups based on how long they had been in the United States, and offered those in the United States at least two years, and who paid back taxes and fees as well as underwent background checks and passed English tests, a path to legal status and eventual U.S. citizenship.

The Comprehensive Immigration Reform Act of 2007 (S1348) is a four-pronged effort to deal with illegal migration that would: (1) increase border and interior enforcement to slow illegal migration; (2) provide a path to legalization for most of the 12 million unauthorized foreigners in the United States; (3) establish a new guest worker program; and (4) create a point system to select U.S. immigrants.

CIRA 2007 aims to reduce illegal immigration with new border and interior enforcement measures. It calls for an increase in the number of Border Patrol agents from the current 14,500 to 20,000 within 18 months (and eventually to 28,000), an additional 370 miles of fencing on the border, and enough detention space for 27,500 foreigners. After enactment, anyone apprehended after entry without inspection will be barred from receiving work or tourist visas to enter the United States.

A mandatory Employment Eligibility Verification System (EEVS) would check the legal status of all new hires within 18 months of enactment and re-verify employees hired before BSIR's enactment within three years. Employers would submit employee-provided data to the Department of Homeland Security (DHS) via the Internet, and DHS would have access to Social Security data; the Social Security Administration would develop fraud-resistant cards. Penalties for violating employer sanctions laws would rise to $5,000 for a first offense and up to $75,000 for repeat offenders.

Under CIRA 2007, the estimated 12 million illegal foreigners in the United

States before January 1, 2007 could register with DHS six months after enactment and pay $1,000 to obtain four-year renewable Z-1 visas. Z-1 visa holders could become immigrants if they pass an English test and undergo a background check, pay a $4,000 fine, and apply at a U.S. consulate in their home country (the touchback rule, which applies only to the head of an unauthorized family). However, Z-1 visa holders would have to wait until the current backlog of foreigners awaiting immigrant visas is cleared, a process that DHS estimates will take eight years.

There would be a second legalization program for up to 1.5 million unauthorized farm workers who did at least 150 days of farm work in the two years ending December 31, 2006. Farm workers would have a slightly easier route to immigrant visas if they worked at least 150 days a year in U.S. agriculture for three years, or at least 100 days a year for five years. Like Z-1 visa holders, they would have to return to their countries of origin to apply for immigrant visas but would be first in line for immigration visas when current backlogs are cleared. Farm workers would pay a $400 fine to become immigrants.

The third element of CIRA 2007 is a new program to admit up to 200,000 Y-1 guest workers a year. The current H-1B program would double in size, and the current H-2A (agriculture) and H-2B (nonfarm) seasonal programs would become the Y-2A and Y-2B programs.

U.S. employers could recruit Y-1 workers after advertising vacant jobs for at least 90 days and making certifications, including promising not to lay off U.S. workers in order to hire guest workers. Employers would pay a processing fee and a guest worker impact fee of $500 to $1,250, depending on the firm's size. Employers would have to provide Y-1 workers with the same wages and benefits as similar U.S. workers, and pay at least the local prevailing wage. Employers in counties with unemployment rates of seven percent or more would have to obtain waivers from DOL to employ Y-1 workers.

To obtain Y-1 visas, foreigners would pay a processing fee and an impact fee of $500 and report to their U.S. employers within seven days. Y-visas are valid for two years and can be renewed twice, for a total of six years of U.S. work. However, there must be at least one year in the worker's country of origin between U.S. work stints. Y-1 guest workers must not be unemployed more than 60 days at any one time, nor more than 120 days during the life of each two-year work visa.

The Y-2A program would change the H-2A program in three important ways: attestation would replace certification, housing allowances could be provided instead of free housing, and the AEWR would be frozen at 2002 levels and studied. The Y-2B program would operate like the current H-2B program, with a ceiling of 100,000 visas, up from the current 66,000, plus an additional 20,000 for workers who have previously held H-2B visas.

CIRA 2007 would change the legal immigration system. There were about four million foreigners waiting for immigrant visas in May 2005, including 1.5 million spouses and minor children of legal immigrants. This backlog would be cleared by adding 440,000 visas a year to expedite family unification.

After the backlog is cleared, a new point system would select up to 380,000 legal immigrants a year. Foreigners seeking to immigrate would have to achieve at least 55 of the maximum 100 points, with up to 47 points available for employment (including type of job, worker's age and experience, and employer recommendation), up to 28 for education, up to 15 for English and civics and, once they have the minimum 55 points, up to 10 additional points for having U.S. relatives. Foreigners seeking visas to fill high-demand jobs, whether for janitors or engineers, would get up to 16 of the 47 employment points.

Farm workers with Z-visas would have a different point system, earning up to 25 points for doing farm work in the first five years of Z-visa status, up to 15 points for lawful U.S. employment (one point per year), up to five points for home ownership, and up to five points for family health insurance.

Conclusions

The California Farm Bureau Federation and other farm organizations are conducting farm labor shortage surveys in Summer 2007, asking their members to report instances of too few workers to complete farm tasks in a timely way. There will undoubtedly be many complaints of labor shortages, as tougher border enforcement leads to higher smuggling fees and more dangerous entry routes into the United States. Those who elude enforcement may have more debts and stay in the United States longer because of higher re-entry costs, encouraging them to get out of seasonal farm jobs sooner.

If farm wages rise, the most noticeable changes are likely to be on the demand side of the labor market, as farmers mechanize tasks, switch crops, or take other steps to reduce employment. These adjustments in the past have been abrupt, accelerating the trend toward fewer and larger farms.

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For more information, the author recommends the following:

Martin, Philip L. 2007. Immigration Reform, Agriculture, and Rural Communities. *Choices.* Vol 22. No 1. www.choicesmagazine.org.

Martin, Philip. 2005. AgJOBS. New Solution or New Problem. *UC Davis Law Review.* Vol 38, No 3. pp. 973-991. http://lawreview.law.ucdavis.edu/issues.html.

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