Abstract
Agriculture has one of the highest shares of foreign-born and unauthorized workers among US industries; over three-fourths of hired farm workers were born abroad, usually in Mexico, and over half of all farm workers are unauthorized. Farm employers are among the few to openly acknowledge their dependence on migrant and unauthorized workers and oppose efforts to reduce unauthorized migration unless the government legalizes currently illegal farm workers or provides easy access to legal guest workers. The effects of migrants on competitiveness are mixed. On the one hand, wages held down by migrants keep labor-intensive commodities competitive in the short run, but the fact that most such commodities are shipped long distances means that long-run competitiveness may be eroded because of fewer incentives to develop labor-saving and productivity-improving methods of farming.

Introduction
Agriculture in the western states has long been associated with migrant workers. Unlike the usual process of agricultural development, in which small family farms are consolidated as labor-saving technologies spread, agriculture in California and other western states began with large tracts of land granted by the Spanish and Mexican governments. These large ranchos primarily grazed cattle and grew grain without irrigation.

Transportation and interest costs were lowered by the transcontinental railroad after 1869, which gave farmers an incentive to produce fruits and vegetables that...
could be dried or canned and shipped to distant markets. Most observers expected California’s large farms to be broken into family-sized units to obtain seasonal workers, recreating an Iowa family-farm system in California whose farms produced fruits and vegetables rather than corn and soybeans. However, Chinese workers who were shut out of nonfarm labor markets by discrimination and newcomers from Japan and other countries who could not find nonfarm jobs were available to be seasonal farm workers, and their availability made it unnecessary to break up large farms to obtain a seasonal farm work force (Martin, 1993, Chapter 2). Migrants from the Philippines, the Midwestern Dust Bowl, and Mexico followed, putting labor-intensive agriculture on an immigration treadmill, always looking for new workers abroad to replace those who move up in the US labor market by finding nonfarm jobs.

The fact that labor-intensive US agriculture found usually found new workers willing to accommodate to seasonality meant that there was less need for rather labor-saving innovations or, if certain crops defied mechanization, productivity increasing changes or rising imports. In this way, farming in the US is sometimes just as labor-intensive as in lower-wage countries although, once commodities leave the farm, the US packing and processing system is among the world’s most efficient. However, one argument against immigration reforms that raise labor costs is that US farmers will be less able to compete with imports from lower-wage countries.

**US Agriculture**

Agriculture is the production of food and fiber on farms, which are defined in the US Census of Agriculture (COA) as places that normally sell at least $1,000 worth of farm commodities a year. Most of the 2.2 million US farms enumerated in the 2007 COA are part-time, hobby, and retirement operations that lose money farming but survive because of income from nonfarm jobs, social security, and other sources. Most are family farms, a term that is not defined officially. The US Congress defined a family farm in the Food Security Act of 1985 as one that uses less than 1.5 person-years of hired labor and has no hired manager. Other definitions of a family farm require the farmer and his/her family members to do more than half of the work on the farm.¹

Most US family farms are diversified, producing crops and livestock and providing work for farm operators and their family members most months of the year. Typical tasks on diversified family farms in the midwest and south including planting corn and soybeans in the spring, harvesting these crops in the fall, and tending livestock year-round. The mechanization of many farm tasks

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¹ USDA’s Economic Research Service emphasizes that “there is no hard-and-fast definition of a family farm” and that definitions of family farm have changed over time. Since 2005, ERS defines family farms as those “in which the majority of the business is owned by the operator and individuals related to the operator by blood, marriage, or adoption.” (www.ers.usda.gov/briefing/wellbeing/glossary.htm#familyfarm). According to this ownership-based definition, about 98 percent of US farms are family farms.
has enabled farm families to expand while also allowing one or more family members to be employed in nonfarm jobs. In 2007, over 85 percent of the total income of farm families was from nonfarm sources (Hoppe and Banker, 2010, p39).

Most hired farm workers are employed on relatively large farms that produce fruits and nuts, vegetables and melons, and horticultural specialties such as flowers, nursery plants, and mushrooms (FVH commodities). The production of FVH commodities is much more concentrated on fewer and larger farms than the production of corn and wheat. Instead of thousands of roughly equal-sized farms producing grain, the 10 largest farms that produce lettuce, table grapes, and some other FVH commodities account for half or more of total production. These “factories in the fields” hire hundreds or thousands of seasonal farm workers, and their quest for workers willing to accept seasonal work at relatively low wages lies at the heart of several perennial farm labor issues, including a century of Mexico-US migration.

Most US farm output is from a relative handful of large factories in the fields. The 250,000 farms that each had sales of $250,000 or more in 2007 accounted for almost 85 percent of US farm sales. There were less than 60,000 million-dollar farms, each with annual sales of $1 million or more, but they accounted for over half of US farm sales in 2007. These larger farms receive most government payments to support agriculture because government subsidies are linked to farm output.

About 482,000 US farms, less than a quarter of the total, reported that they had expenditures for hired farm labor in 2007. Farmers spent almost $22 billion on workers hired directly in 2007, and that almost half of farm labor expenditures were incurred by the 61,270 farms that hired workers to produce FVH commodities (note that 31,000 dairy farms accounted for 15 percent of farm labor expenditures, more than vegetables and almost as much as fruits). Second, half of the 15,000 US farms that had $250,000 or more in labor expenditures produced FVH commodities. The COA does not report the labor expenditures of these 15,000 FVH farmers, but they likely accounted for over 80 percent of the total.

Some 183,000 farms paid $3.4 billion to contractors and other intermediaries to bring workers to their farms; many of these farms also hired farm workers directly. Two-thirds of contract labor expenses were paid by FVH farms, emphasizing that farms producing fruits and vegetables are most likely to have contractors bring crews of workers to their farms. The 11,000 farms that had contract labor expenses of $50,000 or more likely accounted for over 80 percent of the total.

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2 The 57,000 farms that had sales of at least $1 million in 2007 accounted for $176 billion or 60 percent of total sales; the 5,600 with annual sales of at least $5 million accounted for $83 billion or 28 percent of total farm sales. Very large farms specialize in beef, dairy, and FVH commodities (Hoppe and Banker, 2010, p10).
Seasonal workers are often distinguished from regular or year-round workers by how long they are employed on one particular farm. There were 2.6 million workers hired directly by US farmers in 2007, and two-thirds worked on the responding farm for less than 150 days, suggesting they were seasonal workers (an individual employed on two farms is counted twice in these data). Three-fourths of the workers employed on fruit and nut farms, and half of the workers employed in greenhouse and nursery operations were seasonal, were seasonal.

The US Department of Labor’s Quarterly Census of Employment and Wages (QCEW) provides another window that reinforces the concentration of hired workers on large farms. Between 2001 and 2010, the employment of wage and salary workers in NAICS 11, the industry code for agriculture, forestry, fishing and hunting, averaged 1.2 million and ranged from a low of a million in January to a high of 1.3 million in July. The QCEW reported that average weekly earnings of workers employed in agriculture rose from $400 a week to $500 a week over the decade.

As in the COA, unemployment insurance data show that four major commodities accounted for most farm worker wages: fruits and nuts, vegetables and melons, horticultural specialties such as greenhouse and nursery products, and dairy farms. Average employment in fruits and nuts, NAICS 1113, rose from 162,000 in 2001 to 178,000 in 2008, up 10 percent. Average employment in vegetables and melons, NAICS 1112, fell from 98,000 in 2001 to 92,000 in 2008, down six percent. Average employment in NAICS 1114, greenhouse and nursery production fell from 175,000 in 2001 to 166,000 in 2008, down five percent. Average employment in NAICS 11212, dairy cattle and milk production, rose from 64,000 in 2001 to 88,000 in 2008, up 38 percent.

These data show stable overall employment in agriculture of 1.2 million, a relatively stable number of farm establishments, almost 100,000, and rising average weekly wages, up 20 percent between 2001 and 2008 to $500 a week. For all goods-producing industries, average employment fell from 25 million to 22 million between 2001 and 2008, the number of establishments was stable at 1.3

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3 Federal law requires farm employers who pay cash wages of $20,000 or more for agricultural labor in any calendar quarter in the current or preceding calendar year, or who employed 10 or more workers on at least one day in each of 20 different weeks in the current or immediately preceding calendar year. Four major farm states cover almost all farm workers: California, New York, Texas, and Washington, while Florida and Minnesota cover most farm workers. Since 1995, states have been allowed to exclude H-2A workers from UI coverage.

4 The average employment of workers in NAICS 111, crop production, fell five percent between 2001 and 2008, from 564,000 to 536,000. By contrast, average employment in NAICS 115115, farm labor contractors and crew leaders, rose from 145,000 in 2001 to 159,000 in 2008, up 10 percent. FLCs accounted for over half of the employment in NAICS 1151, support activities for crop production, where employment rose from 175,000 in 2001 to 291,000 in 2008. This means that almost all of the employment increase in support activities for crop production was with FLCs.
million, and average weekly earnings rose about 25 percent, from $800 a week to $1,000 a week.

Table 1. US: Agriculture and Total Employment (000): 2000, 2010, 2020

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Sources: Sommers and Franklin, 2012, 14; Henderson, 2012, 66

**Agriculture 3 S’s: Sales, Labor’s Share, Seasonality**

Three words that begin with S, sales, labor’s share of production expenses, and seasonality, define the essential features of FVH agriculture and hired farm workers. First, sales emphasizes that FVH agriculture involves a relatively small number of US farms and a small share of US farm land, but FVH farm employers pay almost half of all farm wages. Second, labor’s share refers to the fact that labor costs may be a third of the cost of producing many fresh fruits and vegetables, and often the most “controllable” expense for farm employers who have more leverage negotiating with workers and labor contractors than with suppliers of seeds and fertilizer. Third, seasonality is a persisting dilemma because more workers are needed during some months than others. Seasonality raises questions for farmers and workers: will there be a sufficient number of workers available when they are needed, and will seasonal workers earn enough when work is available to support themselves and their families when there is no farm work?

US farm sales of $300 billion in 2007 were divided almost evenly between crops and livestock. In most states, crop agriculture is dominated by low value-per-acre field crops such as wheat, corn, and soybeans that are planted and harvested by machine. Fruits, vegetables, and horticultural specialties were planted on only six percent of the 417 million acres of US crop land in 2007, but they generated a third of crop sales. In California and other states that produce most FVH commodities, crop sales exceed livestock sales, and high-value FVH commodities dominate crop sales. California has been the leading farm state since 1950 because it produces high-value FVH commodities, and today such commodities are almost 60 percent of California’s farm sales.

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5 There were 922 million acres in farms in 2007, including 416 million acres of farm land. Fruits and nuts were farmed on 12 million acres, vegetables on nine million acres, and greenhouse and nursery crops on four million acres (Statistical Abstract, 2012, Table 823).

6 In California, for example, crop sales were two-thirds of the total $35 billion farm sales (2007), and 85 percent of crop sales were fruit and nuts ($11 billion), vegetables and melons ($5.5 billion), and horticultural specialties such as flowers and mushrooms ($4 billion).
Fruits, vegetables, and horticultural specialties are labor intensive in the sense that labor is often the largest single production expenditure. With labor’s share of the cost of producing fresh fruits such as strawberries or vegetables 20 to 40 percent, farmers often spend $2,000 on labor for a crop that yields $6,000 an acre in revenue. More important, labor is a “controllable” expense in the sense that a farmer may more easily negotiate whether to pay $0.25 or $0.26 cents for picking a 25-pound tray of raisin grapes than negotiate the price of seeds or fertilizer.

Seasonality means that peak employment on a farm can be 5 to 10 times greater than trough employment, as when 100 workers are employed in June and 10 in January. During the peak season, usually the harvest, there must be a mobilization and matching of hundreds of thousands of seasonal workers with a similar number of seasonal jobs. Since many FVH farms specialize in one or a few commodities, thousands of apple or grape harvesters may be employed one week and jobless a few weeks later. There are several sources of seasonal workers, including migrants who arrive to fill seasonal jobs and workers who are otherwise out of the labor market such as students and housewives.

Farmers usually define the seasonal farm labor problem in terms of labor costs, asking how they can ensure that there will be a sufficient number of seasonal workers available at wages they can afford to pay. One answer has been to open border gates to workers in poorer countries, or leave border gates ajar so that foreigners from poorer countries can enter and work illegally. Workers are eager to leave rural Mexico and elsewhere because they can earn more in a season at US wages than they could earn in a year at home. Definitions of socio-economic issues often suggest solutions, and defining the seasonal farm labor problem in terms of the cost and availability of labor points to the preferred farmer solution, viz, admit foreigners who find seasonal US jobs and wages attractive.

In contrast to farm employers who begin from the question of how to get a sufficient number of workers at an affordable cost, worker advocates often begin with labor market outcomes that they find substandard. Seasonal farm workers earn an average $10 an hour for about 1,000 hours of farm work a year, making their earnings $10,000 a year. Since farm workers earn half as much as other US production workers, who average $20 an hour, and work half as many hours as the 2,000 hours of full-time nonfarm workers, seasonal farm workers earn only a fourth of the $40,000 of full-time nonfarm workers.

Most farm employers and worker advocates look to government for solutions to the seasonal farm labor problem as they have defined it. Farmers want the government to open doors to foreign workers who can earn more in the US than at home. Worker advocates, by contrast, have been divided about what they want government to do about farm worker poverty. The third US President, Thomas Jefferson, was an agrarian fundamentalist who believed that farming was both a business and a way of life that would preserve respect for democracy and private property.
Worker advocates who believe in the Jeffersonian ideal of family farms, such as UC Berkeley economist Paul Taylor,7 argued during the 1930s that the government should break up large farms and help farm workers to become small farmers. Lawyer Carey McWilliams, on the other hand, thought that California’s “factories in the fields” were here to stay and urged that factory labor laws be extended to hired farm workers as the US was enacting union, minimum wage, and other labor laws during the 1930s. UC Berkeley economist Varden Fuller showed how farm wages kept low by immigration raised land prices and gave landowners an incentive to find more seasonal workers willing to accept low wages to preserve and enhance the value of their land. Like McWilliams, Fuller urged the government to admit fewer Mexican Bracero workers in order to put upward pressure on farm wages and to give farm workers the right to form unions that could bargain for higher wages with employers.

Government reacted to these very different pressures from farmers and farm worker advocates by yielding to both. On the one hand, federal and state governments sensitive to assertions that labor shortages would leave crops rotting in the fields have generally assured farmers a sufficient supply seasonal workers to get crops harvested. These policies took many forms, from admitting guest workers to tolerating unauthorized migrants, and from adjusting school schedules so students could do farm work to providing prisoners to do farm work. Assured of an ample supply of seasonal workers at “reasonable” costs, farmers had few qualms about planting apple or orange trees in remote places because they assumed seasonal workers would be available when they were needed.

Governments also responded to pleas to help farm workers. Federal labor laws that initially excluded farm workers were amended to require most farmers to pay their workers at least the federal minimum wage and to provide them with unemployment insurance.8 States such as California went beyond federal laws and offered farm workers more union rights than are available to most nonfarm private-sector workers. The federal government, during the 1960s War on Poverty, established programs to assist poor farm workers and their families with education, housing, training, health and other services.9 Today, a dozen federal programs that cost $1 billion a year assist MSFWs and their children,

7 Taylor, married to photographer Dorthea Lange of the iconic Migrant Mother photograph, advocated the creation of small fruit and vegetable farms in California during the 1930s that would market their crops via coops.
8 Federal labor law coverage of farm workers is incomplete. Farm workers remain excluded from the National Labor Relations Act, and some workers employed on small farms not covered by minimum wage laws. Children are allowed to work in agriculture but not in nonfarm jobs.
9 Many of the federally funded assistance programs were launched during the 1960s war on poverty to help migrant and seasonal farm workers (MSFWs) and their children to "escape" from farm work. At the time, farm wages were rising rapidly, many farm tasks were being mechanized, and it was assumed that there would be far fewer jobs for entry-level hand workers in US agriculture (Martin and Martin, 1993).
including the Migrant Education Program, Migrant Health, Migrant Head Start, and the National Farmworker Jobs Program.¹⁰

Farm labor policy exhibits the contradictions common in government responses to pressure groups that have different definitions of socio-economic problems that suggest different solutions. Government bowed to farm employer pressure to assure an ample supply of farm workers, but also responded to worker advocate pressure to provide funds for programs that aim to reduce farm worker poverty. Contradictions abound even within federal agencies. For example, the US Department of Labor supports employment and training programs that give farm workers the skills needed to raise their earnings by finding nonfarm jobs and also certifies over 95 percent of the requests of farm employers seeking approval to recruit and employ H-2A guest workers.

**Agriculture’s 3 C’s: Concentration, Contractors, and Conflict**

Agriculture, with thousands of producers of commodities such as corn or wheat, is often considered the textbook example of a competitive industry. The production of labor-intensive FVH commodities is more concentrated,¹¹ but the concentration of employment does not rise in lockstep with fewer and larger FVH farms because large producers can hire seasonal workers directly and indirectly via intermediaries. Direct hires are workers that the farm employer recruits, supervises, and pays, while indirect hires are workers brought to farms by contractors, custom harvesters and other intermediaries who usually handle recruitment, training, supervision on the job, and payment.

Contractors and other intermediaries should be a win-win proposition for employers and workers. Specialists who find a series of jobs for seasonal workers can improve labor market efficiency by reducing uncertainty about the availability of labor for farmers and allowing workers to work rather than to search for jobs. However, the differing incentives of farmers and contractors can yield simultaneous labor shortages and surpluses.

Consider a typical interaction between a raisin farmer and a farm labor contractor. Hand-harvesting raisins involves workers cutting bunches of green grapes and laying them on paper trays to dry into raisins in the vineyard. Farmers wait until the grapes have sufficient sugar to begin harvesting, but they also want to have their grapes dried into raisins before fall rains begin. Given both sugar and weather uncertainties, farmers have an incentive to request more workers from contractors sooner because the farmer does not pay workers who wait for work to begin. Contractors, on the other hand, have an incentive to promise more workers than they have to win the farmer’s business. When the


¹¹ COA data do not permit top-10 measures of concentration. The 2007 COA reported that 4,700 fruit, berry and nut farms, each with over $1 million in sales, comprised 4 percent of this type of farm but accounted for 67 percent of the sales. Vegetable and melon sales were even more concentrated; the 4,900 farms with sales of over $1 million in 2007 made up just 7 percent of this type of farm, but accounted for 84 percent of sales.
farmer decides that it is time to begin harvesting, the contractor may bring fewer than the promised number of workers, prompting the farmer to complain of labor shortages. However, other contractors with idle crews may not be aware that a particular farmer is “short” of labor.

A combination of a lack of a centralized information system to post seasonal jobs and worker availability, combined with farmer incentives to request more workers sooner then they are truly needed and contractors to promise more workers sooner than they are available can lead to simultaneous labor shortages and surpluses. An honest centralized labor market information system could help to ensure a sufficient number of seasonal workers to complete seasonal jobs but not so many that the workers suffer spells of unemployment.

Farm labor contractors, who receive a commission of 20 to 40 percent on top of wages paid to workers for their services, have a very mixed reputation. Contractors must cover their costs and earn a profit from the wedge or difference between what a farmer pays to have work done and what the contractor pays to workers. Farmers, who survey themselves to establish “standard” commission rates, are usually in a stronger bargaining position than contractors, many of whom are ex-farm workers with limited capital and business experience. In a bid to win a farmer’s business, contractors may accept money-losing commission rates, such as a 25 percent commission when payroll taxes alone add over 25 percent to wage costs, and try to turn profit by not paying taxes or charging newly arrived migrants for services such as housing, rides to fields and cashing checks.

The usual response to widespread contractor violations of labor, tax, and other laws is more enforcement. However, labor law enforcement typically depends on complaints, and newcomers from abroad are unlikely to know about their rights or how to complain of violations. There have been many proposals and some laws that make farm operators jointly liable with the intermediaries who bring workers to farms for violations of labor and other laws, but even joint liability depends on workers complaining of violations, since there are not enough inspectors to check every farm that employs workers.\textsuperscript{12}

Work is the exchange of effort for reward, and this exchange can generate conflict between employers and workers. Labor market transactions differ from other exchanges because of their continuous nature. Hiring a worker for $10 an hour is the first step in a continuous relationship that involves ongoing negotiations over how much effort a worker must exert to keep the job and how many mistakes are tolerated by the employer. In most workplaces, supervisors regularly evaluate employees, and these evaluations become the basis for promotions, pay raises, and discipline.

\textsuperscript{12} Joint liability is determined case-by-case. Most farm employers who use contractors to get work done on their farms try to ensure that they are not jointly liable for labor law and tax violations committed by the contractor (www.dol.gov/whd/regs/compliance/whdfs35.htm)
Few farm employers have formal systems to recruit and evaluate workers. During the 1970s, when the United Farm Workers was in the headlines, many hoped that collective bargaining would resolve labor market conflicts on farms and encourage the development of more formal personnel systems. However, union agreements play a small role in the farm labor market. Among the 2.4 million workers employed for wages sometime during the year on US farms, fewer than one percent are members of unions.

The best-known farm worker union, the UFW in California, reported fewer than 3,200 year-end members to the US Department of Labor in 2011. Other unions, such as the United Food and Commercial Workers and Teamsters, represent perhaps 5,000 workers employed in dairies and on vegetable farms. There are unions in other states, including the Farm Labor Organizing Committee, which represents vegetable and tobacco workers in Ohio and North Carolina. The Coalition of Immokalee Workers is a pressure group in Florida that negotiated agreements with fast-food chains and other buyers of mature-green tomatoes\textsuperscript{13} that provide an extra penny-a-pound for workers who pick these tomatoes.

\textbf{Agriculture’s 3 R’s: Recruitment, Remuneration, and Retention}

All labor markets match workers and jobs by performing three basic functions: recruitment, remuneration or motivation, and retention. These 3 R’s are handled in unique ways in US agriculture. For example, farmers are more likely to ask current workers to refer friends and relatives to fill vacant jobs than to place ads in newspapers or on the radio seeking workers. Network recruitment, in turn, generally assures that current workers recruit only those who can do the job, and current workers often train the newcomers they bring into the crew, who may be relatives and friends, which minimizes recruitment and training costs for farm employers.

There are alternatives to network recruiting. The most efficient recruitment mechanism in seasonal industries such as agriculture is a central clearinghouse that allows farmers to list job vacancies and workers to seek jobs. Such a clearinghouse could be operated by (groups of) employers, unions via hiring halls, or the public Employment Services. Until the early 1970s, the Employment Service and employer associations acted as clearinghouses for seasonal jobs and workers. However, DOL curtailed ES job matching in agriculture to settle suits charging that it discriminated against farm workers by not telling them about nonfarm jobs (Goldfarb, 1981). Many of the employer associations that served as clearinghouses in California disbanded after their workers voted for union representation in the 1970s.\textsuperscript{14}

\textsuperscript{13} Mature-green tomatoes are picked green and ripened with ethylene to turn them red within five to seven days. Mature-green tomatoes can tolerate rougher handling and have a longer storage life.

\textsuperscript{14} The UFW operated hiring halls in the 1970s, but they proved inefficient in the pre-computer era. Many farmers objected to the UFW ranking workers by union seniority rather than seniority on their farms, and many workers objected to paying union dues before being referred to farm jobs or being separated from family members and workers with whom they wanted to ride and work.
Job-worker matching today is generally decentralized. Contractors and other intermediaries, usually bilingual supervisors, match most seasonal workers and jobs in a system that can lead to simultaneous shortages and surpluses because of conflicting incentives. As we have seen, farmers who do not pay workers while they wait for work to begin have an incentive to request “too many workers too soon,” while contractors seeking jobs for their crews have an incentive to promise “more workers sooner” to win jobs on farms. In this decentralized system, employer shortage complaints are better publicized than worker unemployment complaints.

The second function of labor markets is to remunerate or motivate workers. There are two major remuneration systems in agriculture: hourly and piece rate (salaries are more common for supervisors and some workers employed in dairies). According to the NAWS, about 75 percent of farm jobs paid hourly wages in the 1990s, and 25 percent paid piece rate wages or a combination of hourly and piece rate wages. Piece rates were most common in fruit harvesting jobs, while nursery workers tend to be paid hourly wages.

Employers pay hourly wages when they want slow and careful work, such as to prune trees and vines, and when the employer can control the pace of the work, as when a crop such as broccoli is picked and packed in the field by workers walking behind a machine whose speed is controlled by the driver/employer. Piece rates are common when it is hard to regulate the pace of work, as when workers climb trees to pick fruit (and are thus often out of sight), when quality is less important (as for picking oranges that will be processed into juice), and when an employer wants to keep labor costs constant with a diverse work force. For example, it costs an employer $100 to have 1,000 pounds of table grapes picked if the piece rate is 10 cents a pound whether one fast picker or 3 slow pickers do the work.

If workers are paid piece rate wages, labor law requires employers to record the units of work and hours worked of each worker. If a piece rate worker does not earn at least the minimum wage, the employer must provide “make up” pay so the worker gets at least the minimum wage. The minimum wage is higher than the federal $7.25 an hour level in most major farm labor states, $8 in California and $9.04 in Washington, and workers have become more homogeneous (mostly young Mexican men), so more farm employers pay hourly wages.

Most farm employers pay the minimum wage or $0.50 or $1 an hour more, and many increase their entry-level wage when the minimum wage rises. Most data sources report average hourly earnings, which reflect what workers who are employed under a variety of wage systems, hourly and piece rate, actually earn. The ratio of farm to average nonfarm average hourly earnings has been 50 to 60 percent over the past two decades, meaning that farm workers earn about half as much as nonfarm workers. However, farm workers typically receive fewer

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15 Contractors employ less than 20 percent of workers interviewed in the NAWS, but employ most of the workers employed in labor-intensive seasonal harvests in California.
employer-paid benefits than nonfarm workers, making their total compensation less than half of the average of nonfarm workers.

The third key labor market function is retention, which involves identifying and developing incentives to keep the best year-round workers and encouraging the best seasonal workers to return the following year. Most US employers have formal evaluation systems that involve supervisors evaluating workers periodically and preparing written reports that are used to make retention decisions and to determine wage increases and promotions.

Few farm employers have formal personnel systems. Instead, the two major methods that link recruitment and worker evaluation illustrate agricultural extremes in personnel practices. Some farmers, especially those who work closely with a few year-round workers in dairies and similar operations, ask current employees to refer friends and relatives who would be good workers and depend on current employees to orient and train the newly hired workers they have recommended. The other extreme involves growers who hire crews of what they consider inter-changeable seasonal workers via contractors or foremen. Contractors and foremen also rely on network hiring, but the farmer where the crews are employed rarely knows who is in the crew or the exact worker turnover rate.

Crew-based hiring explains why recruitment and retention are often part of the same labor market function in agriculture. Indeed, an analogy to obtaining irrigation water highlights agricultural recruitment and retention options. The extremes of irrigation systems involve flooding fields with water so that some trickles to each tree or vine, and laying plastic pipes on or under the ground and dripping water and nutrients to each tree or vine. If water is cheap, farmers flood fields with water; if water is expensive, farmers may invest in drip irrigation systems.

The analogy to farm worker recruitment and retention is clear. Do farmers work collectively to flood the labor market with workers, usually by getting border gates opened or left ajar, or recruit and retain the best farm workers for their operation? The best way to ensure plenty of irrigation water is to invest in more dams and canals; the best way to flood the labor market is to invest in politicians willing to ease access to foreign workers.

**Immigrant Farm Workers**
Over half of the hired workers employed on US crop farms have not been authorized to work in the US since the mid-1990s, increasing the risk that immigration law enforcement could reduce the availability and raise the cost of farm labor. Stepped-up enforcement of existing immigration laws, such as audits of the I-9 forms completed by newly hired workers and their employers, and federal and state laws mandating employer participation in the federal government’s E-Verify system, could reduce the supply of farm workers and increase farm labor costs.
More enforcement could be coupled with immigration reforms that legalize unauthorized farm workers and speed the exit of current farm workers from the farm workforce. Grower responses to the higher wages that may result from enforcement or legalization depend on the cost and availability of guest workers and alternatives to hand labor, such as labor-saving machinery and mechanical aids (Calvin and Martin, 2010). US vegetable production is far more mechanized than fruits: about 75 percent of US vegetable and melon tonnage is machine harvested, but less than half of the fruit tonnage.

Imports of labor-intensive commodities may increase if farm labor costs rise, or there may be a mix of rising imports and mechanization. Green onions provide an example of how rising labor costs shifted production from the US to Mexico. In the late 1970s, almost all US green onions were produced in the US; today, almost all are imported from around Mexicali, Mexico. Some processed commodities may be more sensitive to labor costs than fresh commodities. For example, hand-cut frozen broccoli spears are mostly imported, while machine-chopped frozen broccoli is mostly grown in the US.

Until there is mechanization or rising imports, those attracted to seasonal farm work are likely to be workers whose alternative US job options are limited by a lack of English, education, and other factors. The National Agricultural Worker Surveys (NAWS) interviews workers employed on US crop farms, and in recent years found that 70 percent of workers were born abroad, increasingly in southern (20 percent) rather than western Mexico (45 percent).16 Almost half of crop farm workers have less than seven years of (Mexican) schooling and two-thirds speak little or no English.

Some 1.1 million unauthorized farm workers were legalized in 1987-88 under the Special Agricultural Workers (SAW) program, and there were four SAWs for each unauthorized worker in the first NAWS survey in 1989. By 1993, as the US economy was recovering from recession, the declining share of SAWs was overtaken the rising share of unauthorized workers and, by the mid-1990s, there were almost four unauthorized workers for each legalized SAW worker. The unauthorized share of crop workers continued to rise, peaking at almost 60 percent in 2000. Since then, the unauthorized share of crop workers has been about half, but the share of SAWs has declined to less than 10 percent.

**Figure 1. SAWs and Unauthorized Crop Workers, 1989-2009**

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16 Between 1,500 and 3,000 workers a year are interviewed at work with the permission of their employer, a total of 56,000 workers over the past two decades. Two thirds of employers agree to allow their workers to be interviewed, and over 90 percent of the workers offered $20 agree to answer NAWS questions.
The experience with the SAW program suggests that, if there were to be another legalization of unauthorized farm workers, most would leave farm work within five years. The speed at which newly legalized farm workers leave the farm work force depends on factors ranging from legalization requirements (do newly legalized workers have to continue working in agriculture), worker characteristics (do workers have the English and contacts needed in many nonfarm jobs), and the unemployment rate (are nonfarm jobs readily available).

Between 2007 and 2009, almost 30 percent of crop workers were born in the US and 70 percent were born abroad, almost always in Mexico. Table 3 shows that

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17 An increasing share of Mexican-born farm workers are indigenous, meaning with Amer-Indian roots. The Mexican constitution recognizes 62 indigenous groups, and aims to protect their "customs and traditions." According to the National Commission for the Development of Indigenous Peoples, the indigenous are 15 to 30 percent of the 110 million Mexican residents. About seven percent or eight million speak an indigenous language and one percent or over a million do not speak Spanish. Indigenous peoples are poorer and more likely to live in rural areas than other Mexicans.

The share of indigenous among Mexican-born farm workers in California has been rising. Most estimates suggest that less than 10 percent of Mexican-born farm workers in California in the early 1990s were indigenous, and that today 20 to 30 percent are indigenous. Indigenous Mexican-born farm workers are concentrated in two of the lowest wage but labor-intensive crops, viz, harvesting raisin grapes around Fresno and
foreign-born and US-born workers were similar in many respects. Their average age was 36, and three-fourths were male. About the same share of foreign-born and US-born crop workers had incomes below the poverty line, a third of foreign-born families received some means-tested welfare benefit versus a quarter of US-born families, and very few farm workers were follow-the-crop migrants.

There are also significant differences between foreign-born and US-born crop workers. For example, 55 percent of the foreign-born workers are unauthorized, only 13 percent completed high school, and only three percent speak English well. Foreign-born crop workers are also more likely than US-born crop workers to be married.

Table 2. All, US-Born and Foreign-Born Crop Workers, 2007-2009

All, US-Born, and Foreign-Born Crop Workers, 2007-09
US-born were 29% of all workers between 2007 and 2009

<table>
<thead>
<tr>
<th>Demographics</th>
<th>All</th>
<th>US-born</th>
<th>Foreign-born</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized(%)</td>
<td>52</td>
<td>100</td>
<td>45</td>
</tr>
<tr>
<td>Male(%)</td>
<td>78</td>
<td>77</td>
<td>78</td>
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<tr>
<td>Average age(yrs)</td>
<td>36</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>HS&amp;more education(%)</td>
<td>28</td>
<td>68</td>
<td>13</td>
</tr>
<tr>
<td>Speak English well(%)</td>
<td>30</td>
<td>97</td>
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<tr>
<td>Married(%)</td>
<td>59</td>
<td>44</td>
<td>65</td>
</tr>
<tr>
<td>Families &lt;poverty income(%)</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Families with welfare(%)</td>
<td>30</td>
<td>23</td>
<td>32</td>
</tr>
<tr>
<td>Follow-the-crop migrant(%)</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

Farm work
Age first farm job(yrs)     | 23  | 22      | 23          |
Average years of farm work  | 13  | 14      | 12          |
Directly hired(%)            | 88  | 98      | 83          |
>10 years current employer(%)| 17  | 20      | 15          |
>4 farm employers past year(%)| 1  | 0       | 1           |
FVH Crops(%)                 | 78  | 56      | 88          |
Harvest and post-har jobs(%) | 45  | 27      | 52          |

Wages, Benefits, Plans
Average hourly earnings($)    | 9.13| 9.74    | 8.89        |
Farm days worked, past year  | 194 | 180     | 200         |
Health insurance, current job(%)| 18 | 26      | 14          |
Continue farm work> 5 years(%)| 73 | 66      | 78          |
Find nonfarm job<1 month?     | 44  | 76      | 31          |
Source: NAWS interviews 2007-2009

Foreign-born and US-born crop workers get their first farm jobs in their early 20s, and they had done an average 13 years of farm work when interviewed in the

[harvesting strawberries from Watsonville south to Oxnard](http://www.indigenousfarmworkers.org/final_report.shtml)
NAWS. However, foreign-born workers are more likely to have been hired by contractors and other intermediaries, 17 percent versus two percent; more likely to be working in FVH crops; and more likely to be filling harvest jobs, 52 percent versus 27 percent. Almost 40 percent of US-born workers are employed in field crops such as corn and grains, and over 35 percent are employed in nurseries.

US-born workers had average hourly earnings of $9.74 in 2007-09, almost a $1 an hour more than the average $8.89 of foreign-born workers. Foreign-born workers had more days of farm work in the past 12 months, 200 versus 180, and were less likely to have health insurance provided by their current farm employer. A seventh of foreign-born workers, versus a quarter of US-born workers, had employer-provided health insurance in their current job.

Over three-fourths of foreign-born workers, and two-thirds of US-born workers, plan to continue working in agriculture at least five more years. A third of the foreign-born farm workers, versus two-thirds of the US-born, said they think could find a nonfarm job within a month, although these shares may be lower in 2012 because of persisting high unemployment rates in states with large numbers of crop workers such as California.

Table 4 examines two groups of farm workers. SAW-legalized farm workers, including a few workers legalized under the general legalization and Central American programs, fell from 32 percent to 15 percent of workers between 1989-91 and 1998-00 before stabilizing at just over 10 percent of crop workers. Foreign-born newcomers, defined as workers in the US less than a year before they were interviewed, rose sharply during the 1990s. They were almost a quarter of all crop workers in the late 1990s but less than 10 percent of workers interviewed between 2007 and 2009.

Table 3. Foreign-born Farm Workers, 1989-2009

<table>
<thead>
<tr>
<th></th>
<th>SAW-Legalized</th>
<th>Foreign-Born Newcomers</th>
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<tbody>
<tr>
<td></td>
<td>1989-91</td>
<td>1998-00</td>
</tr>
<tr>
<td>Share of workers(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authorized(%)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Male(%)</td>
<td>86</td>
<td>88</td>
</tr>
<tr>
<td>Average age(yrs)</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>HS&amp;more education(%)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Speak English well(%)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Married(%)</td>
<td>63</td>
<td>77</td>
</tr>
<tr>
<td>Families &lt;poverty income(%)</td>
<td>&lt;36</td>
<td>12</td>
</tr>
<tr>
<td>Families with welfare(%)</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>Follow-the-crop migrant(%)</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>Average years of farm work</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Directly hired(%)</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>FVH Crops(%)</td>
<td>86</td>
<td>87</td>
</tr>
<tr>
<td>Harvest and post-har jobs(%)</td>
<td>59</td>
<td>39</td>
</tr>
<tr>
<td>Wages, Benefits, Plans</td>
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<td></td>
</tr>
</tbody>
</table>
SAW-legalized workers are today much older than newcomers; their average age was 49 in 2007-09, versus 25 for newcomers. Three-fourths of the SAW-legalized workers did not migrate, but a quarter returned to Mexico in the past year, usually over the Christmas holidays (almost none followed the crops in the US). Over 90 percent of newcomer farm workers moved from Mexico to the US in the year before they were interviewed.

Educational levels have been rising in Mexico, which explains why SAW-legalized workers have less education than newcomers, an average five versus six years (seven percent of both groups graduated from high school in 2007-09). However, SAWs in the US since the mid-1980s are much more likely to speak some English and to have incomes above the poverty line. By contrast, almost 95 percent of newcomers had below-poverty level incomes. A third of newcomers work for labor contractors, versus less than a fourth of SAW-legalized workers, including only an eighth during 2007-09. Newcomers had fewer days of farm work in the past year than SAW-legalized workers.

About 90 percent of both SAW-legalized and newcomer workers are concentrated in FVH commodities, a pattern that has not changed over the past two decades. The share of both SAW-legalized and newcomer workers filling harvest and post-harvest jobs has been falling, and was half or less in 2007-09.

SAW-legalized workers earned an average 1.5 times the federal minimum wage in 1989-1991, but the SAW premium over the minimum wage fell in subsequent periods. Newcomers earned 30 percent more than the federal minimum wage during 1989-91, and the newcomer premium fell to 10 percent above the federal minimum wage during 2007-09. A third of SAW-legalized workers, but only an eighth of newcomers, believe they could find a nonfarm job in a month.

In a hired farm work force that includes perhaps 2.4 million individuals, equivalent to average US employment of janitors and cleaners, farm worker averages can be misleading. For example, almost all foreign-born farm workers were born in Mexico, but Mexican-born US farm workers are increasingly from southern Mexico rather than west-central Mexico where Braceros were recruited.

Some Spanish-speaking west-central Mexicans have become supervisors of newly arrived indigenous workers from southern Mexico who may not speak Spanish well, reflecting the growing complexity of the hired farm work force. Some legal west-central Mexicans continue to circulate between US jobs and homes and Mexican villages of origin, while many of the unauthorized newcomers from southern Mexico stay in the US because of the difficulty of re-entry if they return to Mexico temporarily.
Conclusions
Ever larger and more sophisticated US fruit and vegetable farms depend on ever less educated Mexican-born workers, widening the gap between farm operators and farm workers. The fact that many hired workers are brought to farms by intermediaries and supervised by a variety of middlemen who may not speak English well enlarges gaps between workers and the beneficiaries of their work.

Most farm employers say that migrant workers are necessary for the indefinite future, and that if there are fewer available in Mexico, farmers will turn to Central America or Asia for workers. There are efforts to combine biological and mechanical innovations so that fewer and better educated workers produce what are now labor-intensive crops, but these efforts have not been intense over the past quarter century because hired workers have been readily available.

If farm labor costs were to rise, history suggests that the flexibility in production agriculture is likely to lie on the demand rather than the supply side of the labor market. This means that, if wages were to rise 20 or 30 percent, it is more likely that farmers would respond by reducing the demand for farm workers via labor-saving innovations rather than induce more US workers into the fields. Some commodities that defy mechanization would likely be imported, as with fresh asparagus and green onions.

US agriculture is a case of migrant workers improving competitiveness in the short run by holding down wages and reducing competitiveness in the long run as lower labor costs discourage productivity improvements. In a globalizing world, what farmers may feel is necessary in the short term could be harmful to US agriculture in the long run.

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