THE REGIONAL MIGRATION STUDY GROUP

Ripe with Change:

Evolving Farm Labor Markets in the United States, Mexico, and Central America

By Philip Martin and J. Edward Taylor

Wilson Center

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University of California, Davis

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The Study Group's mission, membership, and research can be found at: www.migrationpolicy.org/regionalstudygroup.

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Executive Summary

This report contributes to the Regional Migration Study Group's vision for human-capital infrastructure development in the United States, Mexico, Guatemala, Honduras, and El Salvador by assessing trends in agriculture and their implications for farm labor markets. Such implications include demand for skills and requisite education and workforce development. Four major questions are addressed:

- ***How and why is agriculture changing?*** Changes considered include shifts in the volume and composition of production, trade, and other factors likely to influence the supply of and demand for farm labor by 2020.
- ***What are the implications of these changes for workers?*** Workers include those with tacit, informal skills as well as technicians, managers, and specialized equipment operators.
- ***What might these changes mean for the migration of workers?*** This includes within each country and from country to country.
- ***What are the training and education implications of these changes?*** From a larger perspective, how might agricultural changes and new migration patterns inform labor migration policies?

The demand for hired farm labor is complex. In each country, it depends on individual farmer decisions about what to produce and how to produce it. These decisions, in turn, are influenced by factors that include the demand for farm commodities and the cost of farm labor. The source of farm labor is domestic in Central America, overwhelmingly domestic but with some Central American immigrants in the mix in Mexico, and overwhelmingly Mexican in the United States.

The global demand for labor-intensive fruits and nuts, vegetables and melons, and horticultural specialties from flowers to mushrooms (known as FVH commodities) is expected to continue to increase due to population growth and changes in food consumption patterns. This demand can be satisfied by production in North America or imports from outside the region (see Appendix Figure A-2, for growth in US imports and exports of fresh produce).

The methods used to produce FVH commodities in North America depend, among other things, on wages. For example, if farm workers continue to be available to US farmers at wages that are roughly half of the $20/hour average in the US economy, US FVH production will continue to rely on low-wage and low-skilled workers. The production of some FVH commodities has become more mechanized (e.g., wine and raisin grapes are increasingly machine-harvested and -pruned). Other crops, such as strawberries, continue to rely on labor-intensive methods of production (in the United States, strawberry farmers employ many indigenous workers from southern Mexico, for example).

Agriculture is unlike most other key sectors of the North American economy in that its comparative advantage has rested on having access to abundant low-skilled labor instead of on the accumulation of human capital (education and skills). The human capital of US farm *operators* is rising in proportion to trends in US education levels, but the human capital of US farm *workers* is rising in proportion to Mexican education levels. The gap between US farm operators under 50 and Mexican-born hired workers is typically 8 to 16 years — wider than during the 1942-64 Bracero era, when the education gap was 6 to 10 years.[1]

Skill requirements are rising fastest for the nonfarm firms that provide services to farmers, ranging from finance and equipment to pesticides, chemicals, labor, and other inputs. Except for farm labor contractors, most of the workers hired by these nonfarm firms were never farm workers. Most farm workers find it hard to make the transition from farm work to skilled nonfarm work, even though some farm worker jobs

1 The Bracero program was a series of laws and agreements passed in 1942 that allowed Mexican farm laborers to work temporarily in the United States. An estimated 4 million workers were recruited through the program, which ended in 1964.

have been converted to nonfarm jobs, as when broccoli and melons are packed in the field.[2]

Mexico is the major supplier of hired labor to US farms, and Guatemala has become a supplier of farm labor to Mexico; thus, Mexico is in the transitional phase of being both a farm labor exporter and importer. Mexico, Guatemala, Honduras, and El Salvador have the opportunity to develop export-oriented farming systems that build on their comparative advantage, namely, off-season production of high-value and labor-intensive commodities for the United States and other export markets. Extended seasons, such as when Mexican tomatoes and table grapes are grown, increase exports and the jobs that support them (and sometimes compete with US production). The production of these crops is increasing, and new data from rural Mexico suggest that expanding export-oriented agriculture in Mexico may be competing with US farms for a diminishing supply of farm labor. Importers sensitive to the risks of farm labor abuse and pesticide exposure, among other issues, can exert upward pressure on wages and working conditions in both Mexico and the United States.

Mexico is in the transitional phase of being both a farm labor exporter and importer.

The supermarket revolution in Latin America also potentially alters the labor market dynamics of the region, favoring the creation of fewer and larger producers of fresh fruits and vegetables relying on a hired farm workforce, rather than the family farms that have traditionally dominated the landscape. Mass merchandisers (e.g., Wal-Mart) set strict quantity, quality, and timing standards, with which individual small farmers cannot easily comply, and it is more profitable to buy from a few large farmers than from many small ones. Many small producers lack the capital to pack, cool, and transport perishable commodities to standards that satisfy supermarkets, and co-ops that serve groups of farmers have been slow to evolve. As consumers shift from open-air markets to supermarkets, many small producers of labor-intensive commodities find it hard to compete.[3]

It is not clear how much of the rising demand for agricultural labor in the region is due to the expansion of supermarkets and how much to exports; the two are closely interrelated inasmuch as large retailers increasingly think regionally when building their supply chains, utilizing trade to adapt across seasons. Californian produce is on Mexican supermarket shelves during some seasons, Mexican produce on Californian shelves during others.

These trends, together with the US border enforcement and drug-related violence that have slowed the influx of newcomers to the US farm labor force and disrupted seasonal movement of workers across borders, appear to be putting upward pressure on US farm wages. Average farm worker earnings in recent years have been rising (though not at the rates witnessed in the mid-1960s, when the first union contracts after the Bracero program led to 40 percent wage increases). Some farmers who complained of labor shortages in summer 2012 raised wages; others did not.[4] If real US farm wages were to rise at a rapid rate, the shift toward labor-saving mechanization and increased imports of commodities that defy easy mechanization would likely accelerate.

2 Many of the workers employed to walk behind conveyor belts in the fields are women, who are typically not part of hand-harvesting crews that are paid piece-rate wages.

3 Hope Michelson, "Small Farmers, NGOs, and a Wal-Mart World: Welfare Effects of Supermarkets Operating in Nicaragua," *American Journal of Agricultural Economics* (in press, 2013).

4 J. Edward Taylor, Diane Charlton, and Antonio Yúnez-Naude, "The End of Farm Labor Abundance," *Applied Economic Perspectives and Policy* 34, no. 4 (2012): 587-98.

I. Agricultural Production and Employment

Agriculture was once the largest source of employment in every country of the region; today it employs a stable 2 percent share of the labor force in the United States and a shrinking share of workforces in Mexico, Guatemala, Honduras, and El Salvador.[5]

A. United States

The United States had 2.2 million farms producing almost $300 billion worth of commodities in 2007, according to the Census of Agriculture.[6] About 52 percent of farm sales were from livestock and 48 percent from crops. The number of farms has been relatively stable over the past several decades. The value of labor-intensive FVH commodities, however, roughly doubled between 1990 and 2010, from $25 billion to $50 billion (nominal). In both years it represented almost 30 percent of total crop sales. The consumption of fresh produce has risen with income: higher-income consumers put a premium on freshness, good flavor, organic methods, and locally or regionally produced crops. The demand for FVH is expected to continue to increase along with income levels.

Three major types of workers are employed on US farms: farm operators (also referred to here as farmers), unpaid family workers, and hired workers. During the 1990s, the US Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) estimated an average 2 million farmers and unpaid family workers and 1.3 million hired workers.[7] Thus, farmers and unpaid family members accounted for 60 percent of the average 3.3 million workers employed on US farms. The employment of all three types of workers has trended downward, but farmers and unpaid family members have declined fastest. Farmers and unpaid family members today account for about 40 percent of employment in US agriculture, and hired workers 60 percent. In other words, US agriculture has become increasingly reliant on hired farm workers.[8]

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

Sector and Labor Type	2000	2010	2020	Change	
				2000-10	2010-20
Agriculture Workforce	2,396	2,135	2,005	-11%	-6%
Wage & Salary	1,354	1,282	1,236	-5%	-4%
Operator and Family Workers	1,042	853	769	-18%	-10%
Share	43%	40%	38%		
US total workforce	**143,236**	**143,068**	**163,536**	**0%**	**14%**

Sources: Dixie Sommers and James C. Franklin, "Overview of Projections to 2020," *Monthly Labor Review* 135, no. 1 (2012): 14, www.bls.gov/opub/mlr/2012/01/; Richard Henderson, "Industry Employment and Output Projections to 2020," *Monthly Labor Review* 135 (1): 66, www.bls.gov/opub/mlr/2012/01/.

As summarized in Table 1, the US Bureau of Labor Statistics (BLS) projects that the employment of farm operators and unpaid workers will continue to decline faster than the employment of hired workers; by 2020 hired workers will account for 62 percent of average employment in US agriculture. Note that

5 Central Intelligence Agency (CIA), *CIA World Factbook 2005* (Langley, VA: CIA, 2006), www.cia.gov/library/publications/download/download-2005/index.html.

6 US Department of Agriculture (USDA), "2007 Census of Agriculture," www.agcensus.usda.gov.

7 USDA National Agricultural Statistics Services (NASS), www.nass.usda.gov.

8 There are several ways to calculate average employment on US farms. The 2007 Census of Agriculture, which reported on 2.2 million farms, found 1 million farm operators who said their primary occupation was farming. Since average employment of wage and salary workers on US farms is about 1.2 million, this suggests that hired workers do about 60 percent of the work on US farms. The US Bureau of Labor Statistics (BLS), using Current Population Survey data, estimated average farm operator and unpaid family labor on US farms at 850,000 in 2010, and average wage and salary farm worker employment at 1.3 million, suggesting that hired workers were 60 percent of average farm employment of 2.1 million. Dixie Sommers and James C. Franklin, "Overview of Projections to 2020," *Monthly Labor Review* 135, no. 1 (2012): 3–20, www.bls.gov/opub/mlr/2012/01/.

the BLS projects slower declines in agricultural employment between 2010 and 2020 than those that occurred between 2000 and 2010.

Hired workers are not spread evenly throughout the US agricultural sector. Instead, their concentration is decided by three interrelated factors: commodity type, geography, and farm size. Fewer than 75,000 producers of fruits, berries and nuts, vegetables, potatoes and melons, and horticultural specialties such as greenhouse and nursery crops (FVH commodities) paid half of the $26 billion in US farm labor expenses in 2007, according to the Census of Agriculture. Most of these labor expenses were paid by large farm employers producing FVH commodities in California, Florida, Texas, and Washington.

Hired farm workers are concentrated on large farms producing FVH commodities and on large dairies (see Appendix Table A-1).[9] Farms producing FVH commodities were 15 percent of farm employers in 2007, but they accounted for almost half of farm labor expenses. The 7,500 FVH farms that had labor expenses of $250,000 or more accounted for over half of all farms with such labor expenses in 2007, and incurred most of the labor expenses of FVH farms (some 2,676 dairies also had labor expenses of more than $250,000 each). It might be noted that dairies had higher labor expenses ($2.8 billion) than vegetable and melon farms ($2.2 billion), although some of the gap may be explained by the greater tendency of vegetable farms to rely on farm labor contractors (FLCs) and custom harvesters to obtain workers. FVH farms accounted for an even higher, 70 percent, share of contract labor expenses.

A significant majority of farm workers perform agricultural work for only part of the year. In 2007 farm operators reported 2.6 million directly hired workers, including 911,000 who worked for more than 150 days on their farms and 1.7 million who worked for fewer than 150 days.[10]

FVH farms accounted for almost half of both more-than-150- and less-than-150-day workers. Three-fourths of workers hired on fruit and nut farms were employed fewer than 150 days, as were two-thirds of those employed on vegetable farms and almost half of the workers employed in greenhouses, nurseries, and dairies, where production is less seasonal. Thus, being employed for fewer than 150 days can reflect both seasonality and high turnover. In theory, farm FLCs could match a small number of workers with a larger number of jobs, weakening the link between the seasonality and stability of farm employment. In the past, that does not seem to have happened, though there has been significantly more turnover in FLC employment than in direct farm hiring.[11]

A count of unique individuals reported by agricultural establishments to unemployment insurance (UI) authorities in California found more than two individuals employed for each full-time equivalent (FTE) farm job in the 1990s.[12] If we apply this 2-to-1 ratio of workers to FTE jobs, average US employment of 1.2 million hired farm workers translates into 2.4 million individuals working for wages on US farms during a typical year, including 800,000 in California. The high ratio of farm workers to farm jobs reflects a relatively abundant supply of immigrant farm labor.

9 Dennis Fisher and Ronald Knutson, "Uniqueness of Agricultural Labor Markets," *American Journal of Agricultural Economics Proceedings*, (In Press). Fisher and Knutson used the Agricultural Resource Management Survey (USDA, Economic Research Service, 2011) to examine hours worked by farm operators, operator spouses, and hired workers in 2009-10 on various types and sizes of farms. They found distinct differences in dependence on hired workers. For example, hired workers contributed one-quarter of the hours worked on field-crop farms but three-fourths of the hours worked on farms producing high-value fruits and nuts, vegetables and melons, and horticultural specialties from flowers to mushrooms (FVH) commodities. Hired workers contributed one-fifth of the hours worked in all types of animal agriculture, but almost half of the hours worked in dairies. The share of hours worked by hired workers rose with farm sales. Hired workers contributed almost two-thirds of the hours worked on field crop farms with sales of $1 million or more in 2009-10, 97 percent of the hours worked on FVH farms with $1 million and more in sales, and three-fourths of the hours worked on large animal agriculture farms, including over 85 percent of the hours worked in large dairies.

10 This 2.6 million jobs-on-farms number must be interpreted carefully. It does not include workers brought to farms by contractors, and it double counts individuals who are reported by two farmers.

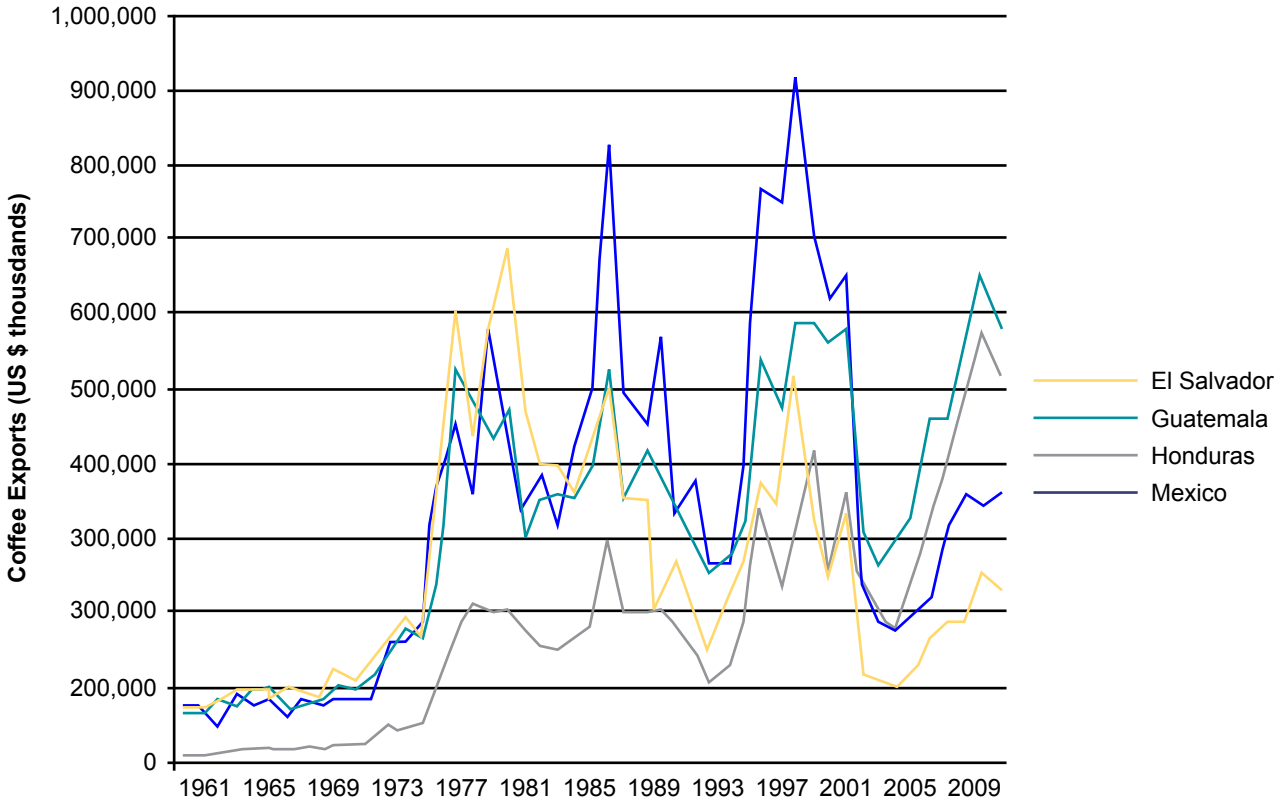
11 J. Edward Taylor and Dawn Thilmany, "Worker Turnover, Farm Labor Contractors and IRCA's Impact on the California Farm Labor Market," *American Journal of Agricultural Economics* 75, no. 2 (May 1993): 350-60.

12 Akhtar Khan, Philip Martin, and Phil Hardiman, "Expanded Production of Labor-Intensive Crops Increases Agricultural Employment," *California Agriculture* (January-March 2004): 35–9, http://californiaagriculture.ucanr.org/landingpage.cfm?article=ca.v058n01p35&fulltext=yes. California requires all employers paying $100 or more in quarterly wages to pay unemployment insurance taxes.

B. Mexico and Central America

Mexican and Central American agriculture are in the throes of a transition to nontraditional export crops. The most noteworthy development in Central American agriculture over the past two decades has been a shift from some traditional (i.e., tropical) crops toward other types of fruits and vegetables. This is illustrated by export trends from the three countries. The value of the region's traditional exports has oscillated — influenced by price fluctuations and hurricane damage — but risen little over the past three decades, as illustrated by coffee (see Figure 1).

Figure 1. Coffee Exports from Mexico, El Salvador, Guatemala, and Honduras, 1961-2009



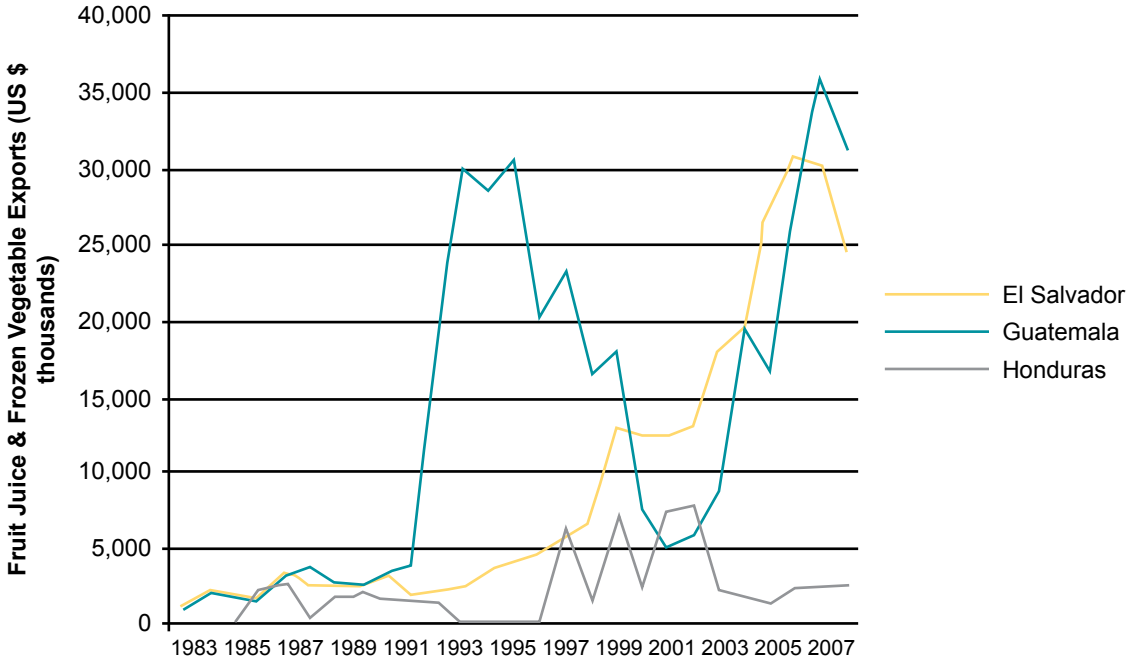
Source: Food and Agriculture Organization of the United Nations (FAO), "FAOSTAT," http://faostat3.fao.org/home/index.html#DOWNLOAD.

Meanwhile, nontraditional agricultural exports have risen, as illustrated by frozen fruits and juices (see Figure 2a and 2b).

Mexico and Central American agriculture are in the throes of a transition to nontraditional export crops.

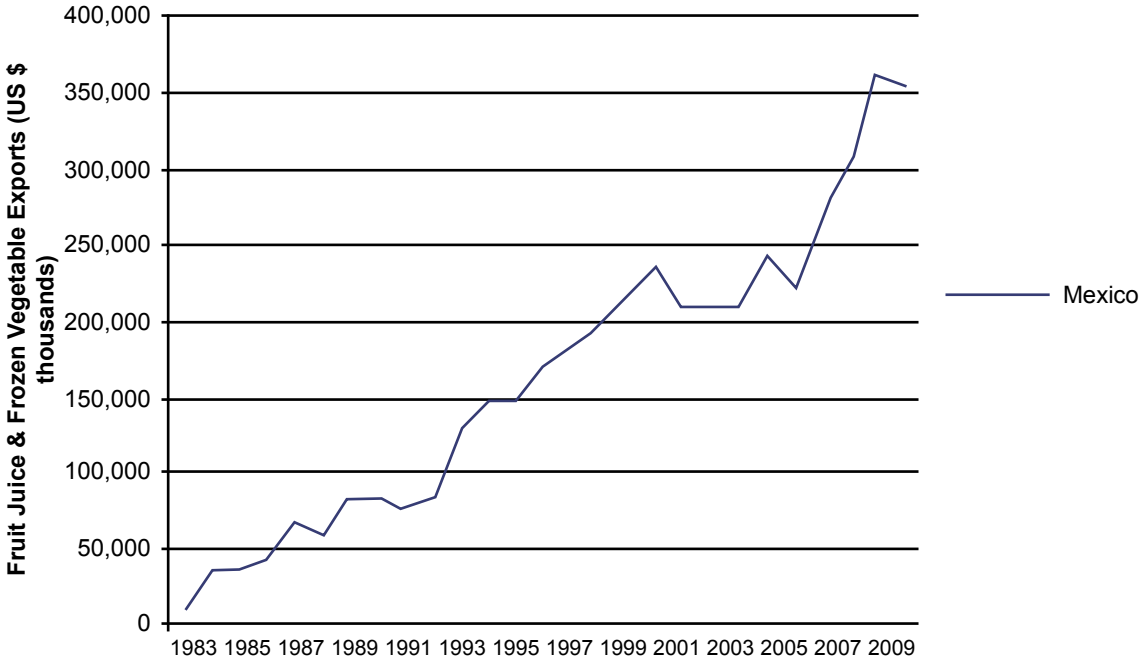
Figure 2. Frozen Fruit and Juice Exports, 1983-2009

a. El Salvador, Guatemala, and Honduras



Source: FAO, "FAOSTAT."

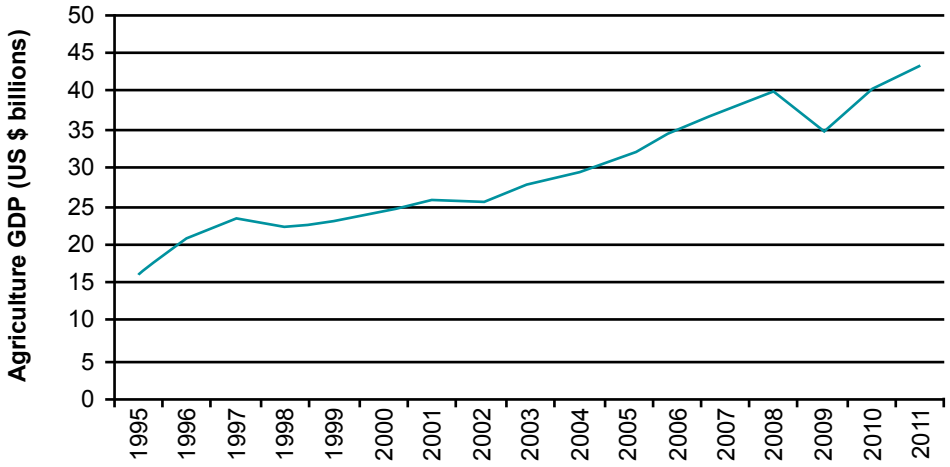
b. Mexico



Source: FAO, "FAOSTAT."

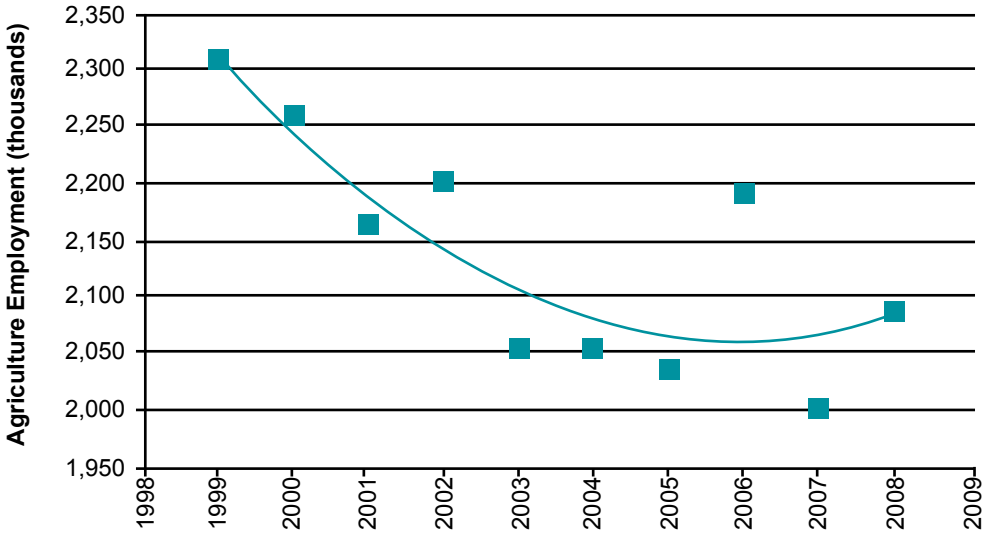
Exports of some traditional tropical crops, such as pineapple, have also increased. This puts farmers in these countries in a position to potentially compete with US agriculture for farm workers. In Mexico, during the first ten years following the 1994 implementation of the North American Free Trade Agreement (NAFTA), the value of agricultural production increased sharply (see Figure 3), as did worker productivity. Figure 4 shows that agricultural employment decreased sharply between 1999 and 2004, then leveled off.

Figure 3. Mexico's Agricultural GDP, 1995-2010



Source: The World Bank, "Agriculture and Rural Development Data," http://data.worldbank.org/indicator.

Figure 4. Agricultural Employment in Mexico, 1999-2008



Source: The World Bank, "Agriculture and Rural Development Data."

Mexico's most recent Census of Agriculture, in 2007, counted 3.7 million operational agricultural production units covering 30.2 million hectares of land, or 15.4 percent of the national territory. Corn, beans, and sorghum dominated, accounting for 78 percent of planted cropland. The most important perennial crops were coffee, sugarcane, and oranges.[13]

Since 2005 both the value of agricultural production and the size of the farm workforce in Mexico have increased. Mexico's Department of Agriculture (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, or SAGARPA) measures farm employment in worker-days. Between 2000 and 2010 the total number of worker-days rose 3.8 percent in crop and 7.9 percent in livestock production.

In **Guatemala**, the number of farms has increased over the past several decades, while the total acreage of agricultural land has decreased. According to Guatemala's most recent Census of Agriculture, released in 2004, farms covered more than 3.7 million hectares, or 34 percent of the national territory. Of the approx-

13 Instituto Nacional de Estadística y Geografía (INEGI), "Resultados del VIII Censo Agrícola, Ganadero y Forestal," (Comunicado Núm. 088/09, March 23, 2009), www.inegi.org.mx/sistemas/comunicados/AbrirArchivo.aspx?consec=17065&a=2009&m=3&n=comunica22.pdf.

imately 823,000 producers, the vast majority — 99.6 percent — were individuals, and nearly 44 percent of farms covered less than 45 hectares each. Annual crops such as corn and beans accounted for 38 percent of agricultural land, while perennial crops such as coffee, pineapple, and sugarcane accounted for almost 17 percent.[14] Notably, production of palm oil has seen a significant increase in Guatemala in recent years — more than doubling between 2005 and 2010[15] — with foreign and domestic investors buying up significant areas of land for the purpose.[16]

As of 2007 there were 397,000 farms in **El Salvador**.[17] Agriculture accounts for 12.7 percent of its gross domestic product (GDP);[18] 74.5 percent of the country's land area is agricultural.[19] The top three crops by value in 2010 were sugarcane, coffee, and mangoes; top crops by production were sugarcane, corn, and sorghum.[20]

In **Honduras** agriculture accounts for 12.4 percent of GDP,[21] and 28.5 percent of the country's land is agricultural.[22] The top three crops by value in 2010 were coffee, bananas, and sugarcane, and by production were sugarcane, bananas, and corn.[23]

C. *An Integrated North American Farm Labor Market*

Both farm labor supply and demand in Mexico are key to maintaining an abundant supply of low-wage labor to US farms. However, on the supply side, workforces are becoming less agricultural throughout the region. The share of the total workforce employed in agriculture is high in Mexico and Central America relative to the United States, but it is falling fast. Across Mexico and Central America, educational attainment is increasing and incomes are rising, though these advances and demographic trends are evolving at different speeds in each country. Mexico and El Salvador are seeing their populations age and total population growth slowdown.[24] In contrast, birth rates remain high in Guatemala and Honduras, with rapid

The share of the total workforce employed in agriculture is high in Mexico and Central America relative to the United States, but it is falling fast.

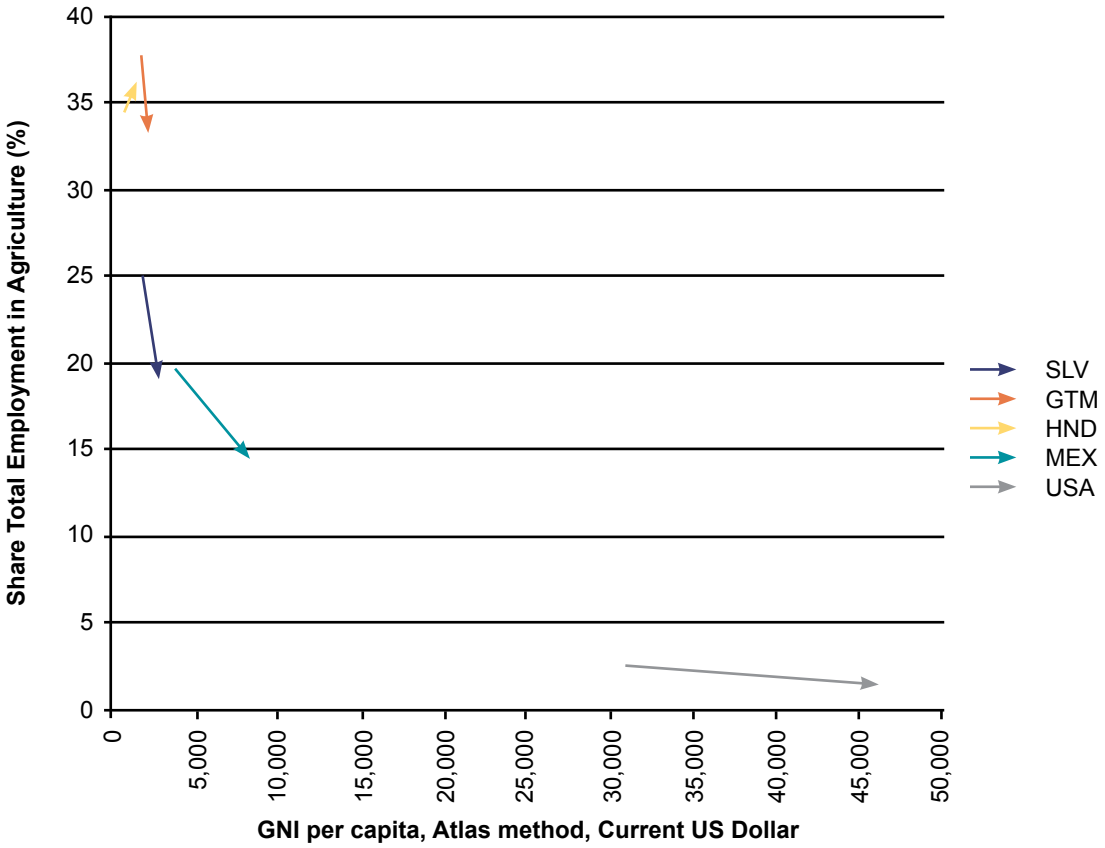
population growth. As young people in these countries attain higher levels of education, they increasingly seek employment opportunities beyond domestic agricultural work, migrating away from rural areas and, within rural areas, leaving farm jobs for jobs in the services sector.

14 Instituto Nacional de Estadística (INE), Guatemala, "Características Generales de las Fincas Censales y de Productoras y Productores Agropecuarios," *Fourth National Census of Agriculture* (Guatemala City: INE, 2004), www.ine.gob.gt/np/agropecuario/index.htm.
15 FAO, "FAOSTAT," http://faostat3.fao.org/home/index.html#DOWNLOAD.
16 International Land Coalition (ILC) and Landtenure.info, "The Land Matrix, Online Public Database on Land Deals," http://landportal.info/landmatrix.
17 Ministerio de Economía, El Salvador, "Metodología y Resultados Generales," *Fourth Agricultural Census of 2007- 2008* (San Salvador: Ministerio de Economía, 2009), www.censos.gob.sv/util/datos/CENAGRO_0708.PDF.
18 World Bank, "World Development Indicators," http://data.worldbank.org/indicator, from World Bank and Organization for Economic Cooperation and Development (OECD) National Accounts data files.
19 World Bank, "World Development Indicators," from Food and Agriculture Organization, http://data.worldbank.org/indicator/AG.LND.AGRI.ZS/countries/SV-MX-GT-HN?display=graph.
20 FAO, "FAOSTAT."
21 World Bank, "World Development Indicators," from World Bank and OECD National Accounts data files.
22 World Bank, "World Development Indicators," from FAO.
23 FAO, "FAOSTAT."
24 Aaron Terrazas, Demetrios G. Papademetriou, and Marc R. Rosenblum, *Evolving Demographic and Human-Capital Trends in Mexico and Central America and Their Implications for Regional Migration* (Washington, DC: Migration Policy Institute, 2011), www.migrationpolicy.org/pubs/RMSG-human-capital.pdf.

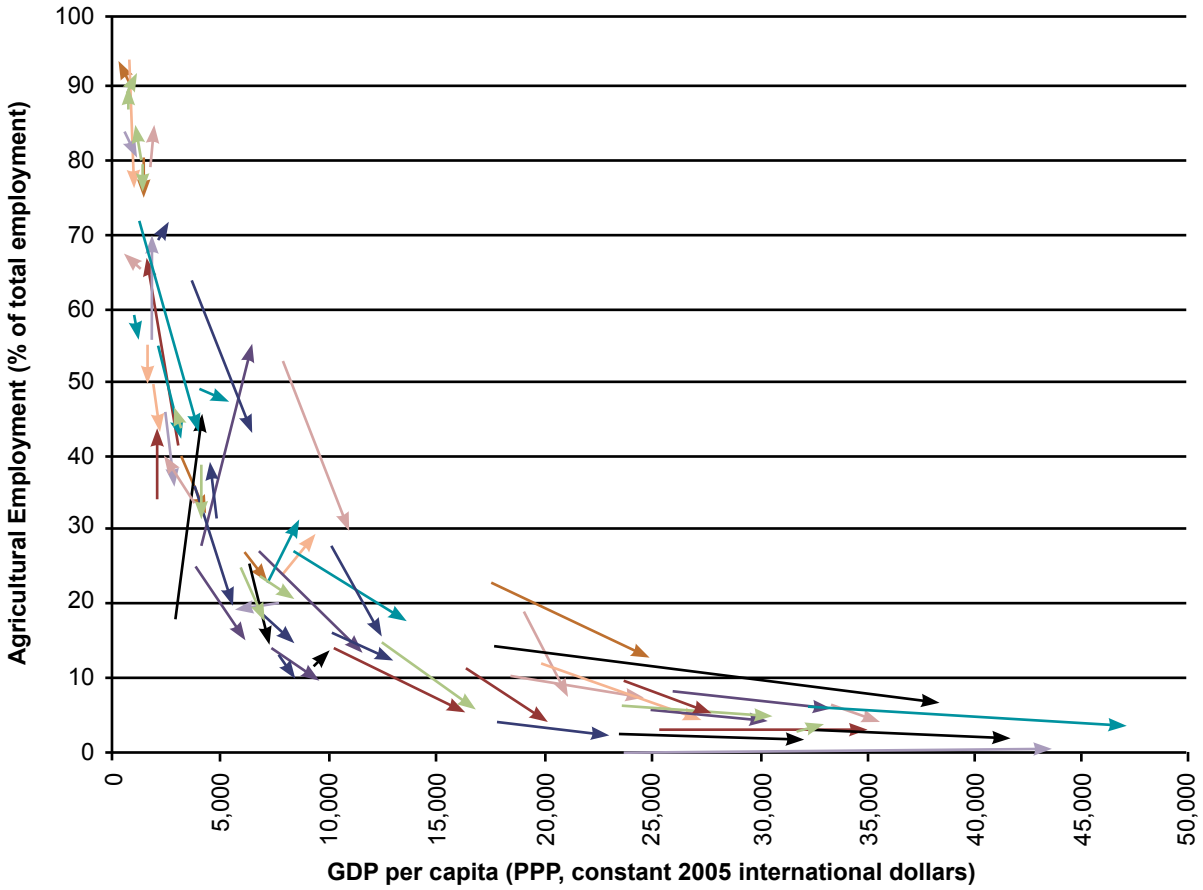
Figure 5a shows changes in per capita income and the farm workforce share for Mexico, Guatemala, El Salvador, Honduras, and the United States. The origin of each ray in this figure shows per capita income and the farm workforce share in 1998; the tip of the ray shows the same in 2006. Both the slope and positions of the rays reveal that the share of the workforce in agriculture falls precipitously as incomes rise. The only exception to this is the ray corresponding to Honduras, which is very short and indicates a slight increase in the farm workforce share. Nevertheless, its position at the top of the workforce transition curve reaffirms the negative correlation between per capita income and workforce share.

Figure 5. Trajectories of Per Capita Income and Share of Labor in Agriculture, 1998-2006

a. Mexico, Guatemala, Honduras, El Salvador, and the United States



b. International Comparison

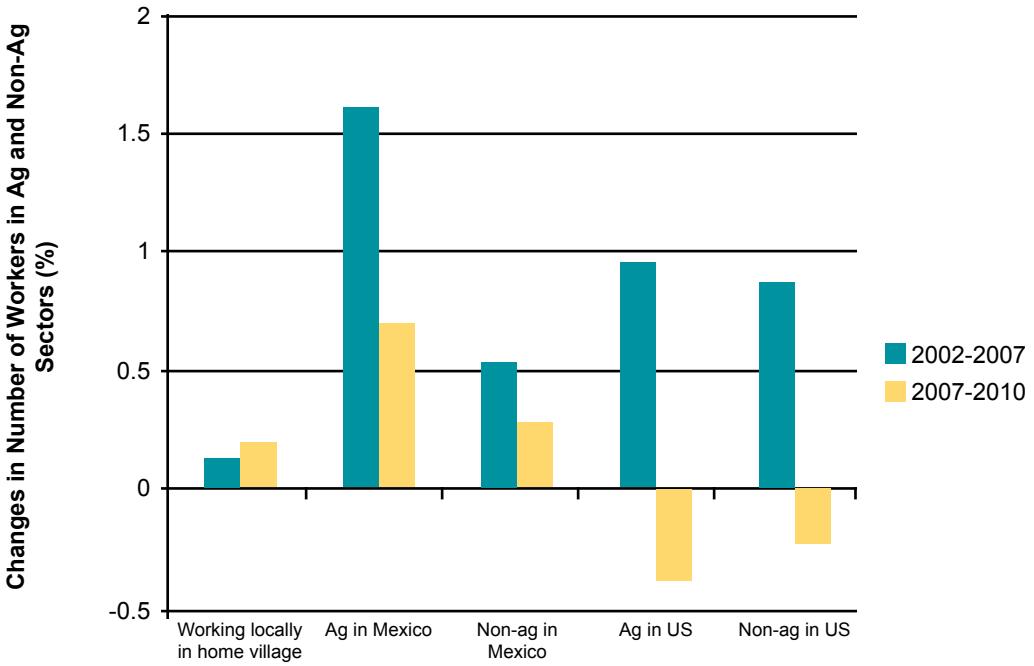


Source: J. Edward Taylor, Diane Charlton, and Antonio Yúnez-Naude, "The End of Farm Labor Abundance," *Applied Economic Perspectives and Policy* 34, no. 4 (2012): 587-98.

Recent data from Mexico offer more direct evidence of a shrinking farm workforce. Between 2002 and 2007, US farms relied on migrant networks to reach into new source areas — for example, villages in southern Mexico — to supply workers to US farms.[25] A study by Steve Boucher et al. documented a downward trend in the supply of rural Mexican labor to US farms using retrospective data from the 2003 round of the Mexico National Rural Household (Spanish acronym: ENHRUM) survey.[26] New research using matched data on individuals and households in rural Mexico finds that, contrary to expectations, the supply of rural Mexican labor to US farms fell disproportionately during the 2008 Great Recession compared to the supply to nonfarm jobs.[27] Although some individual workers shifted from US nonfarm to farm work after 2008, more workers shifted from farm to nonfarm (see Figure 6). Analysis of the ENHRUM data suggests that the observed decrease in US farm labor is the consequence of long-term structural changes in the supply of Mexican labor rather than a temporary response to the US recession. The overall trend in agricultural labor supply from rural Mexico over the years covered by the ENHRUM data (1990 through 2010) is flat or negative, while the expansion of nonfarm migration networks has a significant negative effect on the farm labor supply. The relevant impacts of immigration enforcement and drug-related violence along the border appear to be small compared to the overall trend and network effects.

25 J. Edward Taylor, "Agricultural Labor and Migration Policy," *Annual Review of Resource Economics* 2 (2010): 369–93.
26 Steve Boucher, Aaron Smith, J. Edward Taylor, and Antonio Yúnez-Naude, "Impacts of policy reforms on the supply of Mexican labor to U.S. farms: New evidence from Mexico," *Review of Agricultural Economics* 29 (1) (2007): 4-16.
27 Taylor, Charlton, and Yúnez-Naude, "The End of Farm Labor Abundance."

Figure 6. Change in Number of Workers in Each Sector, United States and Mexico (%), 2002-07 vs. 2007-10



Source: J. Edward Taylor, Diane Charlton, and Antonio Yúnez-Naude, "The End of Farm Labor Abundance," *Applied Economic Perspectives and Policy* 34, no. 4 (2012): 587-98.

The shrinking of the domestic farm workforce in Mexico is also a result of a shift away from owner-operated small farms, subsistence farming, and unpaid family workers, meaning that the share of hired (rather than family) farm labor has gained importance in agricultural production. This shift has led average farm worker productivity in Mexico to rise dramatically in recent years, quadrupling from 1995 to 2009 (see Figure 7).

Figure 7. Average Farm Worker Productivity in Mexico, 1995-2010

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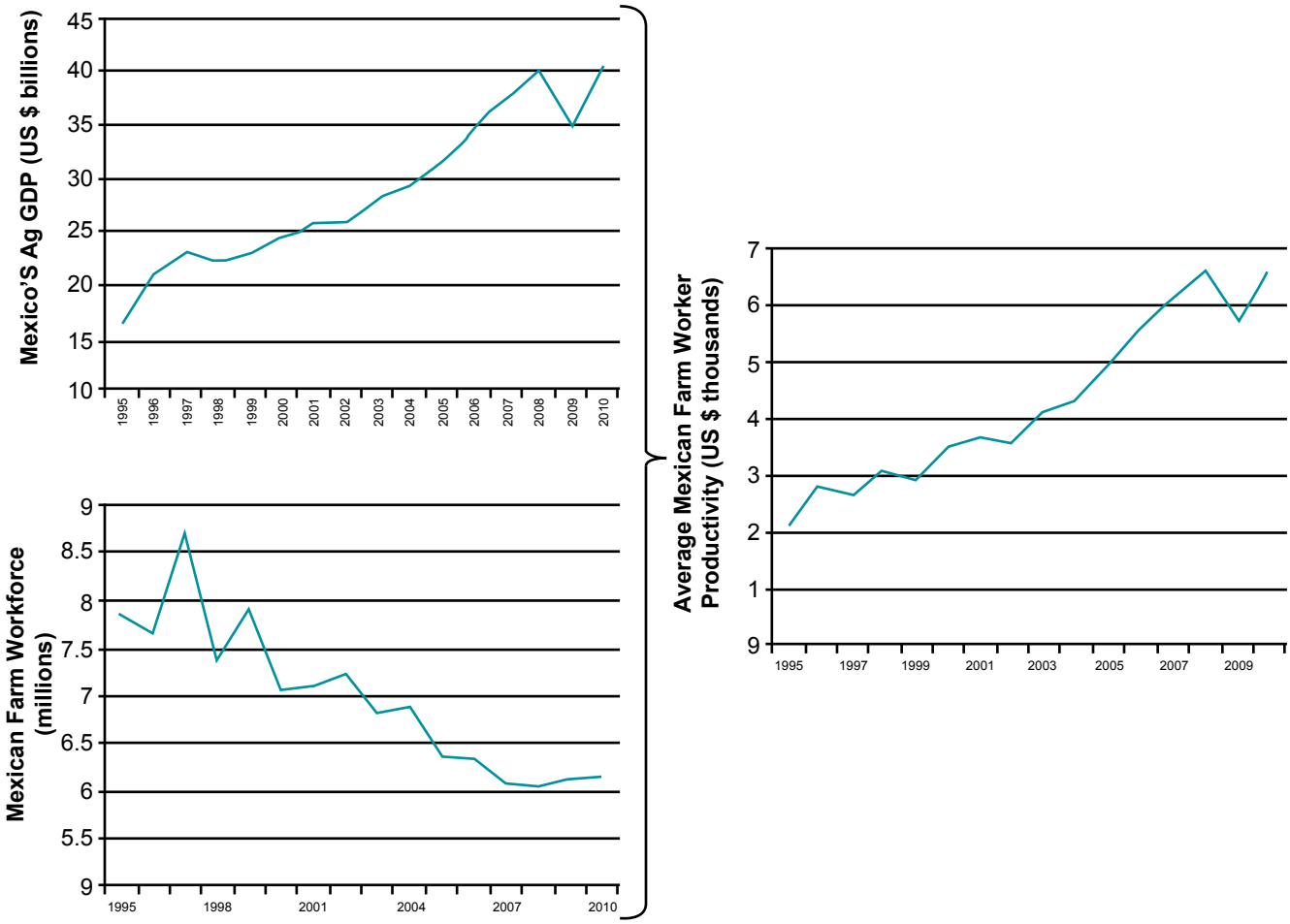


Source: FAO, "FAOSTAT."

This increased productivity means that Mexican farm workers have a higher agricultural reservation wage, and may be opting to stay at home rather than emigrate to work in agriculture abroad. Adjusted for inflation, the average daily wage in the Mexican agricultural sector rose nearly 14 percent from 2000 to 2007.[28] Meanwhile, real hourly wages rose by just over 3 percent for newly arrived, foreign-born farm workers in the United States over approximately the same period (though the average number of farm days worked increased from 76 to 90, or by more than 18 percent).[29]

> *Mexico farm workers…may be opting to stay at home rather than emigrate to work in agriculture abroad.*

28 Calculated using data from the Mexican Social Security Institute, available in UN Economic Commission for Latin America and the Caribbean (ECLAC), "Subregión Norte de América Latina y El Caribe: Información del Sector Agropecuario, 2000-2010," Chart 7 (Santiago, Chile: ECLAC, 2011), www.eclac.org/publicaciones/xml/6/44886/2011-060-Inf.sect.agrop.2000-2010-L.1040-1.pdf.

29 National Agricultural Workers Survey (NAWS) interviews, 1998-2000 and 2007-09; US Department of Labor (DOL), Employment and Training Division, "The National Agricultural Workers Survey," www.doleta.gov/agworker/naws.cfm.

At the same time, Mexico continues to rely on Guatemalan farm labor. In recent years, approximately 28,000 Guatemalans annually, the vast majority of them farm workers, have been issued multiple-entry, year-long border worker cards.[30] It is difficult to estimate how many Guatemalans are employed in agriculture in Mexico overall, as the border between the two countries is porous, undocumented entry and employment are widespread, and work is seasonal and often short term, leading to multiple entries. A survey of Central American migrants crossing the Mexico-Guatemala border estimated 153,000 border crossings on average per quarter by Guatemalans going to work in Mexico, from the second quarter of 2011 through the first quarter of 2012. Forty-eight percent to 58 percent of migrants returning to Guatemala after working in Mexico during this time period had been working in agriculture, depending on the quarter; upwards of 79 percent of them were unauthorized.[31]

Taken together, these data suggest an incipient tension between agricultural labor and demand in the region. On one hand, labor-intensive FVH production is expanding in Mexico, Guatemala, El Salvador, and Honduras. On the other hand, as incomes increase, the workforce shifts out of agriculture. The pattern in this regard is not unlike what one finds in virtually every other country in the world (see Figure 5b). The United States marks the extreme of the downward trend in domestic farm labor supply: in 2010 only 1.6 percent of the US workforce was employed in agriculture, and a significant majority of farm workers were Mexican.

As incomes increase, the workforce shifts out of agriculture.

II. Human Capital: Worker Characteristics

This section reviews the skills of hired workers employed in agriculture and the implications of production trends for newcomers to the agricultural labor force by 2020. There is a special focus on the human-capital requirements for newcomers filling jobs in expanding farming sectors and occupations, including FVH commodities. The goal is to discern the skills required in ever-larger and more complex farming operations that produce commodities for global markets.

The US Department of Labor (DOL) National Agricultural Workers Survey (NAWS) interviews about 2,000 workers a year who are employed on crop farms; NAWS does not interview workers employed on livestock farms and excludes H-2A guest workers employed on crop farms.[32] In recent years, 70 percent of crop workers were born in Mexico, three-fourths were male, and half were unauthorized. Half of crop workers were under 35, two-thirds had less than 10 years schooling, and two-thirds spoke little or no English.

Some 1.1 million unauthorized farm workers were legalized in 1987-88 under the Special Agricultural Workers (SAW) program created in the *Immigration Reform and Control Act of 1986*, and there were four workers so legalized 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 SAW-legalized workers was overtaken by

30 Instituto Nacional de Migración (INM), Mexico, "México Documentó a Más de 26 Mil Trabajadores Fronterizos," (press release, January 3, 2011), www.inm.gob.mx/index.php/page/Noticia2_030111; and INM, Mexico, "El INM Favorece el Ingreso Documentado de Más de 29 Mil Trabajadores Fronterizos" (Boletín No. 002/12, January 3, 2012), www.inm.gob.mx/index.php/page/Boletin_0212.

31 El Colegio de la Frontera Norte et al., Encuesta sobre Migración en la Frontera Sur de México (EMIF Sur), "Indicadores Trimestrales de Coyuntura de la EMIF Sur, 2010-2012," www.colef.net/emif/resultados/indicadores/indicadores/Indicadores%20EMIFSUR%20I-2012.pdf.

32 DOL, "The National Agricultural Workers Survey." NAWS was launched in 1989 to help assess the extent of farm labor shortages in the wake of the *Immigration Reform and Control Act of 1986* (IRCA). H-2A is a temporary agricultural program that allows agricultural employers who anticipate a shortage of domestic workers to bring nonimmigrant foreign workers to the United States to perform agricultural labor or services of a temporary or seasonal nature.

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 shrunk to about half its 2000 size, but the share of SAW workers has declined to less than 10 percent.

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 workforce depends on factors ranging from legalization requirements (whether newly legalized workers have to continue working in agriculture), worker characteristics (whether workers have the fluency in English and contacts needed for many nonfarm jobs), and the unemployment rate (whether nonfarm jobs are readily available).

Between 2007 and 2009, almost 30 percent of crop workers were born in the United States; 70 percent were born abroad, almost all in Mexico.[33] Table 2 shows that foreign-born and US-born crop 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, one-third of foreign-born families received some means-tested welfare benefit versus one-quarter of US-born families, and very few farm workers were follow-the-crop migrants.

According to the same NAWS study, there were also significant differences between foreign-born and US-born crop workers in 2007-09. For example, 55 percent of foreign-born workers were unauthorized, only 13 percent had completed high school, and only 3 percent spoke English well. Foreign-born crop workers were also more likely than US-born crop workers to be married.

Both foreign-born and US-born crop workers got their first farm jobs in their early 20s, and they had done an average 13 years of farm work when interviewed for NAWS. However, foreign-born workers were more likely to have been hired by contractors and other intermediaries (17 percent versus 2 percent); to be working in FVH crops; and to be filling harvest jobs (52 percent versus 27 percent). Almost 40 percent of US-born workers were employed in field crops such as corn and grains, and over 35 percent were employed in nurseries.

US-born workers had average hourly earnings of $9.74 in 2007-09, almost $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. One-seventh of foreign-born workers, versus one-quarter of US-born workers, had employer-provided health insurance in their current job. (Data on the characteristics of farmers who do and do not offer health insurance are not available.)

The number of workers with employer-provided health insurance might diminish if more workers were H-2A guest workers, since employers must provide them with workers' compensation but not health insurance. If, however, more farm workers are US born and employed in year-round jobs, the share with health insurance might increase, since US-born workers with health insurance are most likely to have employer-provided coverage.

Over three-fourths of foreign-born workers and two-thirds of US-born workers plan to continue working in agriculture for at least five more years. One-third of the foreign-born farm workers, versus two-thirds

33 An increasing share of Mexican-born farm workers is indigenous. 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- 30 percent of the 110 million Mexican residents. About 7 percent, or 8 million, speak an indigenous language and 1 percent, or over 1 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 20-30 percent are indigenous. Indigenous Mexican-born farm workers are concentrated in two of the lowest-wage but labor-intensive crops, namely, harvesting raisin grapes around Fresno and harvesting strawberries from Watsonville south to Oxnard. See Richard Mines, Sandra Nichols, and David Runsten, "Indigenous Mexicans in California Agriculture," Web Version I: Indigenous Farmworkers, January 2010, www.indigenousfarmworkers.org/final_report.shtml.

of the US born, said they think they could find a nonfarm job within a month, although these shares may be lower currently because of persisting high unemployment rates in states with large numbers of crop workers, such as California.

Table 2. US-Born and Foreign-Born Crop Workers, 2007-09

	All	US-Born	Foreign-Born
Demographics			
Authorized (%)	52	100	45
Male (%)	78	77	78
Average age (years)	36	37	36
High school & more education (%)	28	68	13
Speak English well (%)	30	97	3
Married (%)	59	44	65
Families below poverty income (%)	23	23	23
Families with welfare (%)	30	23	32
Follow-the-crop migrant (%)	6	1	7
Farm Work			
Age first farm job (years)	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-harvest jobs (%)	45	27	52
Wages, Benefits, Future 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

Note: US born were 29 percent of crop workers between 2007-09.
Source: DOL, "NAWS Survey," 2007-09.

Table 3 examines two groups of foreign-born farm workers: those legalized under the SAW program, and foreign-born newcomers to the United States.[34] SAW-legalized farm workers fell sharply, from 32 percent to 15 percent of workers, between 1989-91 and 1998-2000, then declined to 12 percent in 2007-09. Foreign-born newcomers, defined as workers living in the United States less than a year before they were interviewed, rose sharply during the 1990s. They represented almost one-quarter of all crop workers in the late 1990s, but less than 10 percent of workers interviewed between 2007 and 2009.

If the United States were once again to legalize unauthorized farm workers, as proposed by the *Agricultural Jobs, Opportunity, Benefits and Security Act* (AgJOBS) that has been repeatedly introduced in Congress, the SAW experience suggests that most newly legalized farm workers would leave for nonfarm jobs

34 The SAW program provided that workers with 90 days of qualifying work in the 12 months ending May 1, 1986, could become legal US residents. This provision was designed to ensure farmers a continued supply of workers once employer sanctions on knowingly hiring illegal workers took effect. See Philip Martin, Edward Taylor, and Philip Hardiman, "California Farm Workers and the SAW Legalization Program," *California Agriculture* (November-December 1988): 4-6, http://ucce.ucdavis.edu/files/repositoryfiles/ca4206p4-68819.pdf.

as soon as they were free to do so, although a significant group would remain farm workers. Legalized SAW farm workers who remained in the farm workforce displayed sharply increased welfare usage and sharply declining follow-the-crop migrant behavior; depending on conditions attached, such trends may be repeated with another legalization.

Table 3. Foreign-Born Farm Workers in the United States, 1989-2009

Variable	SAW-Legalized			Foreign-Born Newcomers		
	1989-91	1998-00	2007-09	1989-91	1998-00	2007-09
Share of workers (%)	32	15	12	4	23	9
Demographics						
Authorized (%)	100	100	100	13	1	1
Male (%)	86	88	84	74	88	88
Average age (years)	32	40	49	23	25	25
High school &more education (%)	2	1	2	7	1	1
Speak English well (%)	3	4	2	7	1	1
Married (%)	63	77	87	41	36	34
Families below poverty income (%)	36	12		94	94	
Families with welfare (%)	13	31	37	2	2	3
Follow-the-crop migrant (%)	25	13	3	16	14	7
Farm Work						
Average years of farm work	8	17	26	1	1	1
Directly hired (%)	76	76	88	58	60	70
FVH crops (%)	86	87	87	93	77	93
Harvest and post-harvest jobs (%)	59	39	45	72	44	51
Wages, Benefits, Future Plans						
Average hourly earnings ($)	5.51	6.93	9.82	4.91	5.98	7.87
Federal minimum wage ($)	3.8	5.15	7.25	3.8	5.15	7.25
Farm days worked, past year	191	193	226	77	76	90
Health insurance, current job (%)		11	26		1	4
Find nonfarm job <1 month?	45	40	37	20	13	12

Source: DOL, "NAWS Survey," 1989-2009.

SAW-legalized workers are much older than newcomers; their average age was 49 in 2007-09, versus 25 for newcomers. Three-fourths of SAW-legalized workers did not migrate, but one-quarter had returned to Mexico in the previous year, usually over the Christmas holidays (almost none were follow-the-crop migrants). More than 90 percent of newcomer farm workers were Mexican.

Educational levels have been rising in Mexico, which explains why, in the United States, SAW-legalized workers have *less* education than newcomers, an average five versus six years (7 percent of both groups graduated from high school in 2007-09). However, those legalized by SAW 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. One-third of newcomers work for labor contractors, versus less than one-fourth of SAW-legalized workers (only one-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 postharvest jobs has been falling; it was half or less in 2007-09.

SAW-legalized workers earned an average of 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. One-third of SAW-legalized workers, but only one-eighth of newcomers, believed they could find a nonfarm job in a month.

In a hired farm workforce that includes perhaps 2.4 million individuals, equivalent to the combined 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 immigrants were recruited by the Bracero program.

Most farm workers seeking upward mobility find it easier to move out of agriculture rather than move up the agriculture job ladder.

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 workforce. 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 United States because of the difficulty of crossing the border.[35]

A. Farmers and Farm Workers

Most US farm operators are older white US-born men, while most hired farm workers are younger immigrant Hispanic men. The median age of all US workers is 41; the median age of farm operators is in the late 50s, and the median age of hired farm workers is less than 30. Farming is a multigenerational career for many farm operators but a less-than-a-decade job for most hired workers.

There may be no other US industry in which most employers are older white US citizens and most hired workers are young, Hispanic immigrants. Many of the Hispanic immigrants are from rural Mexico, and many would like to move up the agricultural job ladder from worker to owner. However, the job pyramid in agriculture is steep, offering relatively few opportunities for those who begin as seasonal workers to move up to year-round jobs in agriculture or to become farm operators.

The inability of most seasonal farm workers to climb the agricultural ladder to operating a farm themselves means that the best way to assist them in obtaining family-sustaining wages is to help them find nonfarm jobs. The best way to help children of farm workers achieve higher incomes than their parents is to encourage their education, which will in turn help them obtain nonfarm jobs. The federal government's Migrant and Seasonal Farm Worker (MSFW) assistance programs, launched during the 1960s when farm worker wages were rising rapidly after the end of the Bracero program, aimed to help MSFWs and their children "escape" from (mostly seasonal) farm jobs.[36]

Most farm workers seeking upward mobility find it easier to move out of agriculture rather than move up the agriculture job ladder, and their children educated in the United States rarely follow their parents into seasonal farm work. There are many reasons why most hired farm workers find it hard to move up in agriculture, including limited access to capital in the capital-intensive FVH sectors of agriculture where

35 Rick Mines, *Migrant Farmworkers: Pursuing Security in an Unstable Labor Market*, Research Report No. 5 (Washington, DC: Office of the Assistant Secretary for Policy, Office of Program Economics, US Department of Labor, 1994), www.doleta.gov/agworker/naws.cfm.

36 Philip Martin and David Martin, *The Endless Quest: Helping America's Farm Workers* (Boulder, CO: Westview Press, 1993).

most farm workers are employed, low educational and language attainment, and a lack of agriculture-specific expertise, for example, in cooling and marketing perishable commodities.

1. Mexico

The demographic portrait of those working in the agriculture sector in Mexico differs somewhat from those in the United States. They are less educated, have lower income, are more likely to be unpaid, and work on smaller farms. In 2010, of the 5.9 million people employed in Mexican agriculture overall, the vast majority — 96.2 percent — were farm workers and 10.7 percent of those employed in the sector were women. Out of those employed in the agriculture sector, 43.7 percent had not completed primary school, 29.7 percent had completed primary school only, 20.6 percent had completed secondary school, and 5.9 percent had completed high school or greater.

One-quarter (25.3 percent) of those employed in the sector earned up to the minimum daily wage (MDW, approximately $4.25 in current dollars), 22.8 percent received up to twice the MDW, 9.3 percent were paid up to three times the MDW, and 3.5 percent earned up to five times the MDW. Just 1.8 percent earned more than five times the MDW, or more than $21.25 a day. Nearly one-third — 32.6 percent — received no income. Also, 37.8 percent were own-account workers, 37.7 percent were paid workers, 19.6 percent were unpaid workers (largely family members), and 4.9 percent were employers.

The vast majority of workers in Mexico's agricultural sector worked in small businesses — 23.4 percent of farm workers were the sole employee, and 59.5 percent of workers worked for agricultural enterprises that employed two to five people. Only 3 percent of workers were in enterprises that employed more than 50 people.[37]

2. Central America

There is considerably less information available about the farm labor force in Central America, many of whom are subsistence farmers. In **Guatemala**, where 38 percent of the employed labor force works in agriculture, workers in this sector had, on average, just three-and-a-half years of education (compared to six years for the total workforce). Among the agricultural workforce, 87 percent were men, 54 percent were indigenous, and 40 percent were between the ages of 15 and 29. Average wages in agriculture were around $160 a month in 2011 (in current dollars).[38]

In **El Salvador**, 79 percent of people working in the agricultural sector overall were male,[39] and in 2004 the wages of those working in the farming, forestry, and hunting sector averaged $102 a month (in current dollars). In **Honduras**, 91 percent of people working in agriculture were male.[40]

B. Climbing the Agricultural Job Ladder

In the United States, the market structure around some crops allows workers to more easily become operators. One such crop is strawberries, for which most workers making the transition need bring only their own labor to newly established farming operations. Many smaller strawberry growers lease land and plants from a cooler and marketer, whose field man tells them when to irrigate and fertilize. Small strawberry growers are contractually required to harvest and deliver their berries to the cooler, who deducts the cost of any loans and selling costs from revenue before sending the balance to the grower.

By some estimates, two-thirds of strawberry growers are Latinos, many of whom used to be pickers (it should be emphasized that most Latino strawberry farmers often have only five to 10 acres; they farm

37 INEGI, "Encuesta Nacional de Ocupación y Empleo (ENOE)," 2010, www.inegi.org.mx/prod_serv/contenidos/espanol/bvinegi/productos/encuestas/hogares/enoe/enoe2010/ENOE_2010.pdf.
38 Migration Policy Institute (MPI) calculations using data from INE, Guatemala, "Encuesta Nacional de Empleo e Ingresos — INEI 2011," September 2011, www.ine.gob.gt/np/enei/documentos/Mercadolaboral%202011.pdf.
39 FAO, "FAOSTAT."
40 Ibid.

much less than two-thirds of the almost 40,000 acres of California strawberries. Earnings for berry pickers are the lowest for any commodity in California — an average $10 an hour in 2010, when the average for California agriculture was $11.62 and employees of labor contractors were being paid $10.50.

Strawberries are very labor intensive, requiring an average 1.5 to 2 workers per acre. However, they also generate high revenues of $40,000 to $60,000 an acre, so that even a five-acre operation can have up to ten employees and up to $300,000 in annual revenue. Managing cash flow when workers are typically paid weekly but farmers may go weeks without a payment can be difficult, prompting some to conclude that small Hispanic strawberry growers are essentially sharecroppers for the marketers.[41] A few former workers have been successful as operators, but many struggle and some revert to being a hired worker.

It may be easier for immigrant workers in year-round jobs in smaller dairies and nurseries to climb the agricultural ladder from worker to farmer, since year-round workers often live on dairy farms and work alongside their employers every day. Farmers who get to know and trust year-round workers may finance their transition from worker to operator; however, there are few examples of such farmer-financed transfers of operations to hired workers. Alternatively, there may be an evolution toward fewer and larger farms that rely both on hired managers and hired workers. If pension and insurance funds continue to buy land and rely on farm management firms to farm it, there may be more rather than fewer layers between seasonal farm workers and the beneficiaries of their work.

A system of large farms with hired managers and hired workers may continue to embrace the adage that "agriculture is different" and requires a foreign-born workforce to fill especially seasonal jobs. If the government were to embrace the notion that the hired farm workers of tomorrow are growing up today somewhere outside of the United States, the focus of policy debates might shift from whether immigrant farm workers are necessary to how they should be admitted into the country and managed. The "agriculture is different" mantra is repeated frequently in debates over immigration reform. For example, Senator Charles Schumer (D-NY) asserted that "even if [farm employers] offer Americans twice or sometimes three times the minimum wage and provide benefits, American workers simply won't stay in these [farm] jobs for more than a few days." Senator Dianne Feinstein (D-CA) said: "I think a country that's strong really should be able to produce its own food, but you can't do it with domestic labor, and that's just a fact."[42] However, the US government has been unwilling to explicitly state that agriculture requires foreign workers, preferring to allow farmers who anticipate labor shortages to request permission to employ H-2A guest workers, and certifying them to do so only after they try and fail to recruit US farm workers.

In Mexico and Central America, which have experienced long-term internal migration from rural to urban areas and, in general, a shift away from agricultural work, upward career mobility for hired farm workers and subsistence farmers is rare within the sector. Improving education in rural communities and encouraging entrepreneurship are seen by the international development community as key to improving the lives of people in agriculture-based households.

III. Implications for Migration

Most farm-related migration involves relatively low-skilled workers moving from poorer to richer areas, whether within or between countries. Those leaving poorer rural areas may find nonfarm jobs at home or abroad; others transition from being small farmers in their areas of origin to being farm workers in a richer area — of their country, as do those moving from Oaxaca to Sinaloa; or abroad, moving from Guatemala to Chiapas or from Chiapas to Fresno.

41 Miriam Wells, *Strawberry Fields: Politics, Class and Work in California Agriculture* (Ithaca, NY: Cornell University Press, 1996).
42 Senator Charles Schumer (D-NY) quoted in "H-2A Reform, Cases, H-2B," *Rural Migration News* 17, no. 4 (October 2011), http://migration.ucdavis.edu/rmn/more.php?id=1643_0_4_0. Senator Dianne Feinstein (D-CA) quoted in "AgJOBS Immigration Reform," *Rural Migration News* 16, no. 1 (January 2010), http://migration.ucdavis.edu/rmn/more.php?id=1508_0_4_0.

US agriculture has become more complex and productive, as ever-better-educated farm operators and managers rely on increasingly indigenous and non-Spanish-speaking immigrant workers. Most farm employers want easier access to legal foreign workers that they can select from any country, hoping that legal guest workers will return to the seasonal farm workforce year after year, enabling experience to increase productivity. US farm labor markets have evolved to efficiently employ low-skilled, foreign-born farm workers, including those new to the United States and to the commodity with which they are working, making the costs of getting farm work done predictable despite limited spending by employers on recruitment and training.[43] Mexican agriculture is following a similar pattern.

If nearby supplies of Mexican and Central American labor decline, we might expect upward pressure on farm labor costs.

With no policy changes, there is little reason to change the current labor market, which relies on the continued influx of new workers to replace those who exit. As the supply of west-central Mexicans declined, US (and export-oriented Mexican) farmers turned to workers from southern Mexico as well as some workers from more rural Central American countries such as Guatemala and Honduras. If policy remains unchanged and these sources of rural labor diminish over time, US farmers could go further afield for workers, who would likely have to be admitted legally if they came from Asian countries such as Bangladesh or China.

Alternatively — or simultaneously — if nearby supplies of Mexican and Central American labor decline, we might expect upward pressure on farm labor costs that speed up labor-saving mechanization and may partially counteract the movement of workers out of farming.

IV. Policy Directions

A. AgJOBS and H-2A

As the share of unauthorized farm workers rose in the 1990s, farm employers pressed for easier access to guest workers outside the H-2A program, which requires the recruitment of US workers at a DOL-set higher-than-minimum wage known as the Adverse Effect Wage Rate. President Clinton threatened to veto proposals in Congress for changes in and alternatives to the H-2A program, and no new guest worker program was approved during the 1990s.

The election of new presidents in Mexico and the United States in 2000, both of whom favored expanded guest worker programs, weakened the confidence of farm worker advocates that they could block a new guest worker program and prompted them to negotiate a compromise with farm employers, the *Agricultural Jobs, Opportunity, Benefits and Security Act* (AgJOBS) in December 2000. Farm employers and worker advocates hoped to have Congress enact AgJOBS before President Clinton left office, but AgJOBS was blocked by Senate critics who opposed what they viewed as "amnesty."

AgJOBS would repeat the SAW program's approach to unauthorized farm workers by allowing unauthorized farm workers to legalize their status immediately.[44] However, in order to "earn" a regular immigrant

43 Although agricultural producers and buyers such as Wal-Mart are increasingly acting regionally, the labor market is unable to do so, because there are borders keeping workers from moving to where the jobs are. If abundant farm labor becomes scarcer in the region, addressing this "friction problem" might involve international deployment of farm labor by multinational agricultural producers.

44 The Special Agricultural Worker (SAW) program allowed 1.1 million unauthorized foreigners to become legal immigrants. Unauthorized farm workers who had done at least 90 days of US farm work in 1985-86 could become legal immigrants.

status for themselves and their families, farm workers who are temporarily legalized under AgJOBS would have to continue to do farm work for three to five years. The H-2A program would change as well. If governors certified that there was sufficient nonfarm housing available, AgJOBS would allow employers to pay a housing allowance of $1-$2 an hour to H-2A guest workers rather than provide them with housing. To keep labor costs from rising, this housing allowance would be offset by reducing the Adverse Effect Wage Rate (AEWR)[45] by a similar amount and studying its effects.

The H-2A program involved about 7,400 farm employers requesting certification to fill 89,200 farm jobs with H-2A workers in fiscal year 2010; nearly 89 percent of employer requests were certified.[46] The Department of Homeland Security (DHS) makes the final decision on an employer's petition or request for H-2A workers. DHS normally rejects employer petitions unless they are accompanied by a DOL certification that (1) US workers who are "able, willing and qualified" are not and will not be available to fill the job vacancy for which the employer is requesting H-2A workers, and (2) the employment of the H-2A workers will not adversely affect US workers similarly employed.

Farm employers seeking DOL certification to fill jobs with H-2A workers must follow a process set out in law and regulation.[47] They complete ETA Form 750, Application for Alien Employment Certification, Part A, which spells out the job offer for which foreign workers are sought, including the start and end dates and the details of the job, wages, and working conditions. They also complete ETA Form 790, Agricultural and Food Processing Clearance Order, in which they must provide more detailed information including piece rates, and transportation and housing arrangements. Form 750 is sometimes called the contract for H-2A workers and Form 790 the recruitment tool for US workers. There is no application fee, and DOL analysts ensure that employer applications are accurate and complete by reviewing them and accepting them or returning them with explanations of what must be changed in order to make them acceptable, the opposite of the Internal Revenue Service (IRS) model for completing tax returns.

Farm employers must satisfy four conditions before their applications are accepted and H-2A workers can be employed. First, employers must cooperate with their local State Workforce Agency (SWA) to prepare a job order for local, intrastate, and interstate recruitment of US workers, and interested US workers are directed to the closest SWA for referral to the employer. Second, employers must place at least two recruitment ads in daily newspapers or other appropriate publications, contact former US workers to advise them of the jobs that are available, and continue to engage in "active recruitment" of US workers until the H-2A workers depart for the United States, usually three days before the scheduled start of work.

Third, employers must provide proof that the recruitment ads appeared in the local media. Fourth, employers must submit a "recruitment report" to DOL — at least 30 days before the date they expect work to begin — that lays out the employer's recruitment efforts, identifies US workers who applied for jobs, and explains "lawful job-related reason(s)" for not hiring any US worker who applied but was not hired. The DOL acceptance letter explains that DOL will reduce the number of jobs that can be filled by H-2A workers for each US worker hired and each one who was wrongly rejected by the employer.

45 The Adverse Effect Wage Rate (AEWR) is one of the measures of minimum wage that DOL has determined that H-2A workers and those in corresponding employment must be paid. The AEWR is generally equal to the annual weighted average hourly wage rate for field and livestock workers (combined) for the region as published annually by USDA ("Offered Wage Rate," *Code of Federal Regulations* Title 20, pt. 655.120).

46 DOL, Employment and Training Administration, "H-2A Temporary Agricultural Visa Program, FY 2012 — Quarter 3: Select Statistics," www.foreignlaborcert.doleta.gov/pdf/h_2a_selected_statistics.pdf.

47 DOL, Employment and Training Administration, "Foreign Labor Certificate: H-2A Temporary Agricultural Program," www.foreignlaborcert.doleta.gov/h-2a.cfm.

The contradiction in the H-2A recruitment process is that most farm employers do not apply for certification to recruit and employ H-2A workers until they have found these workers abroad. However, the heart of the DOL certification process is to help employers to find US workers. Few US workers are found via required recruitment, raising many questions. US worker advocates assert that farmers prefer foreign workers; employers counter that US workers who respond to their ads do not really want to do farm work.[48]

The H-2A program is often described by farm employers as broken and bureaucratic, and by worker advocates as unable to achieve the goal of protecting US workers. Employers often complain about the "complex" paper-based application system, the requirement that they plan when they will need workers (when on-the-ground conditions are fluid and respond to weather conditions, etc.), and the fact that some are sued after they fail to hire US workers who respond to required ads. Worker advocates assert that some farm employers are certified to employ H-2A workers despite the availability of US workers and that some farm employers violate the letter and spirit of H-2A regulations aimed at protecting US workers from the adverse impacts of H-2A workers, such as assigning H-2A workers to "better" fields or jobs.

The H-2A program is often described by farm employers as broken and bureaucratic.

Some of the foreign workers hired via the H-2A program are skilled, but most are not. Some Canadians and South Africans are hired via the H-2A program to operate large combines that move north from Texas to Canada harvesting wheat, while Australian and New Zealand sheep shearers with H-2A visas shear US sheep for piece rate wages that can top $25 an hour. However, most H-2A workers are Mexicans with low levels of education, usually less than nine years. If AgJOBS were to be enacted, unauthorized workers who are legalized would likely move on to nonfarm jobs after fulfilling farm work requirements, and replacement H-2A workers would likely be low-skilled workers from Latin America and Asia.

B. Implications for Education, Training, and Skills

Rural residents who obtain education and training usually find nonfarm jobs. Theodore Schultz observed that the best way to reduce rural poverty is to educate people so they can move away from low-productivity jobs in rural areas and find higher-productivity nonfarm jobs that offer higher wages.[49] While rural poverty is still a problem, the trend of rural-to-urban migration can be observed across the United States. Strengthening education systems in rural areas speeds up out-migration as more youth acquire the skills to obtain nonfarm jobs.

The United States has an extensive agricultural education system in secondary schools and universities, but the focus is on training farmers and food-system workers, not farm workers. Indeed, lack of education may be the most important guarantor of farmers' access to hired farm workers, given the current way the agricultural sector is structured.

48 According to the findings of a 2011 study by the National Council of Agricultural Employers — conducted by Washington State University and overseen by the former head of statistical programs at the National Agricultural Statistics Service (NASS) — of 36,000 "domestic" workers referred to H-2A employers in 2010, the vast majority either did not accept the offered job (68 percent), or accepted the job but didn't start work (7 percent). Only 5 percent actually worked through the contract period. See Statement of Libby Whitley on behalf of the National Council of Agricultural Employers, House Education and the Workforce Committee, Subcommittee on Workforce Protections, *Workforce Challenges Facing the Agriculture Industry* 112th Cong., 1st sess., September 13, 2011, www.gpo.gov/fdsys/pkg/CHRG-112hhrg68264/pdf/CHRG-112hhrg68264.pdf.

49 Theodore Schultz, *The Economic Value of Education* (New York: Columbia University Press, 1963).

Over 500,000 of the 16.2 million students enrolled in grades 9 through 12 participate in high-school agricultural education programs and Future Farmers of America (FFA).[50] Some 25,000 bachelor's degrees and almost 5,000 master's and doctorate degrees were awarded in 2009 in agriculture and natural resources,[51] with over three-fourths awarded by the land-grant universities created by the *Morrill Act of 1862*. The Cooperative Extension System, created by the *Smith–Lever Act of 1914*, employs extension agents who act as intermediaries between university researchers and farmers and other clientele groups.

There is an element of positive and negative selection in the contrast between who gets advanced degrees in agriculture, who participates in FFA, and who does seasonal farm work. A large share of those earning advanced degrees in agricultural sciences are foreign students, often from developing countries and drawn mainly from families nearer the top of the education and income ladders, an example of positive selection of those who come from abroad to study in the United States. Instead of returning to their countries of origin, many foreigners earning advanced degrees in agriculture from US universities stay in the United States, and replace US workers retiring from jobs that require advanced degrees, such as agricultural and food scientists.

Most of the youth enrolled in FFA and high-school agricultural programs are white US citizens. Some have farm operator parents; very few are the sons and daughters of hired farm workers.[52] Most newcomer farm workers are youth from rural areas of Mexico, and most are drawn from the bottom of Mexico's education ladder, an example of negative selection. Their children educated in the United States tend to avoid farm-related jobs, and few earn degrees in agriculture and related fields if they go to college. Some children of farmers, who typically have greater education than their parents, still follow in their parents' footsteps; but the children of farm workers educated in the United States try to avoid agriculture even in areas where the economy is dominated by farming.

Many reports predict shortages of skilled workers in the evolving US food system, but most of these predictions are general rather than specific. For example, Allan Goecker et al. estimated that there would be 54,500 "agriculture-related" job openings annually for those holding BS degrees or more between 2010 and 2015, up 5 percent from job openings between 2005 and 2010.[53] However, three-fourths of these job openings are projected to be in general business and science and 10 percent in government and education; only 15 percent are projected to involve agriculture and forestry production. Many of the production jobs will be with nonfarm firms providing services to farmers, including as crop management consultants, land-use managers, and precision agriculture specialists. There are relatively few openings projected for herd managers, organic farmers, and renewable energy crop producers.

Many reports predict shortages of skilled workers in the evolving US food system, but most of these predictions are general rather than specific.

Most of the reports dealing with agricultural education conclude with generalities, and none mention hired farm workers or their children. William Rivera and Gary Alex emphasize that "greater commercialization of agricultural systems and increasing trade liberalization dictate the need for better capacity on the part of the agricultural workforce in the 21st century ... [with] important policy, institutional, and

50 National FFA Organization, "Welcome to the National FFA," www.ffa.org.
51 US Census Bureau, "Statistical Abstract of the United States: 2012," Tables 302 and 303, www.census.gov/compendia/statab/2012/tables/12s0302.pdf.
52 Indeed, high schools in so-called farm cities such as Parlier, CA, have no or very small FFA programs.
53 Allan D. Goecker, Gregory P. Smith, Ella Smith, and Rebecca Goetz, "Employment Opportunities for College Graduates in Food, Renewable Energy, and the Environment: United States 2010 – 2015," (Washington, DC: USDA National Institute of Food and Agriculture, 2010), www.ag.purdue.edu/USDA/employment/Pages/default.aspx.

programmatic implications."[54] A 2009 National Research Council (NRC) report focuses on how to attract more students with no links to agriculture to pursue an undergraduate education in agriculture (there was no mention of attracting children of hired farm workers). The NRC recommendations include: "strategic planning to determine how to best recruit, retain, and prepare the agriculture graduate of today and tomorrow ... broaden the treatment of agriculture in the overall undergraduate curriculum ... [and] prepare the next generation of faculty" to teach and conduct agricultural research. The American Association for Agricultural Education (AAAE) publishes a journal that discusses the need for enhancing agricultural education but offers few specifics.[55]

The Coalition for a Sustainable Agricultural Workforce (CSAW), created in 2009 by ten professional scientific societies and 20 food-related firms, aims "to generate a dialogue that would suggest strategies, including novel partnerships, to bring the best and brightest young students into food-related careers and for garnering increased support for relevant training programs." The CSAW, which complains of "mounting obstacles in attracting the best and brightest students into scientific fields of study to assure a plentiful and safe supply of food, fuel, and fiber," called on Congress to increase funding for agricultural research and education.[56]

It is very hard to translate generalities about the need for "fresh blood" in the US food system to replace aging farm operators and a farm-related workforce into data and specific recommendations. The fresh-blood-for-farming recommendations focus on federal and state programs that provide resources and training for new farmers, but these programs rarely overcome the major challenges, including access to capital and marketing expertise. They usually open with descriptions of the aging workforce in food-related occupations, turn to the relatively few US students interested in "traditional agriculture," and conclude with recommendations on how to interest more students by revamping agricultural education.

Mexico, it should be noted, graduates 115,000 engineers a year, twice the rate per 100,000 residents as the United States.[57] Mexico created about 700,000 formal sector jobs in 2011, and was expected to add a similar number in 2012. US firms operating in Mexico praise the technical skills of graduates, including their English language proficiency, and emphasize that Mexican agricultural education remains more "practical" compared with the increasing "theoretical" orientation of shrinking agricultural programs in US universities.

A large number of organizations, many of them international, along with national and subnational government programs, focus on training small farmers in Mexico and Central America in sustainable and organic agricultural practices, farm management, pest control, postharvest processing, and entrepreneurship skills, including market development.

C. *Hired Workers*

That hired workers go unmentioned in the fresh-blood-for-agriculture discussions suggests that most of those examining the implications of agricultural trends for education and training needs believe that an ever-more sophisticated US farming system can continue to rely primarily on low-skilled hired workers from abroad to tend and harvest crops. Many farm employers assert that workers who harvest crops must be "skilled," but many consider skill to be the ability to work hard for relatively low wages.

For example, Charles Hall, executive director of the Georgia Fruit and Vegetable Growers Association, explained that "a harvester has to be conditioned like an NFL football player to get out on the field. You're

54 William M. Rivera and Gary E. Alex, "Human Resource Development for Modernizing the Agricultural Workforce," *Human Resources Development Review* 7, no. 4 (2008): 374-86.
55 American Association for Agricultural Education, "Welcome," http://jae-online.org.
56 Coalition for a Sustainable Agricultural Workforce, "CSAW Letter to Congress 2012," www.sustainableagworkforce.org/CSAWLtrtoCongress2012.
57 Felipe Calderón, "El Presidente Calderón en el desayuno de celebración del Día Nacional del Ingeniero," Remarks at the breakfast celebration of the country's National Day of the Engineer, Mexico City, July 6, 2012, http://calderon.presidencia.gob.mx/2012/07/el-presidente-calderon-en-el-desayuno-de-celebracion-del-dia-nacional-del-ingeniero/.

working eight to ten hours a day in the heat, stooping, lifting and picking. It's not an easy job."[58] Most Mexican farm workers are employed in the United States in crops that they have not picked in Mexico, from apples to strawberries, suggesting that skill is more often the capacity to work hard rather than the education or training that would raise productivity.

When farm jobs that employ low-skilled foreign workers are mechanized, the result is usually to replace a large number of foreign-born workers (most with less than nine years of schooling) with fewer US workers (who have high-school diplomas and perhaps some college education). Most of the operators of shake-and-catch machines that surround a tree and shake fruit and nuts into a catching frame speak English and have mechanical skills. Some are ex-pickers, but many equipment operators have not moved up from picking to machine operation.

Given a historical abundance of foreign farm labor, most recent mechanization has been stimulated not by wages but by other considerations, for example, price competition from international trade. As the downward trend in farm labor supply continues, labor costs will become an increasingly important motivator of change in both production and labor management practices. It remains to be seen whether the skill duality of the US farm workforce will persist in an era of dwindling low-skilled farm labor supply. There is good reason to expect that US agriculture will have to produce with a smaller force of more highly skilled workers, paired with labor-saving mechanization and management technologies.

Given a historical abundance of foreign farm labor; most recent mechanization has been stimulated not by wages but by other considerations.

V. Conclusions

This report assesses trends in US, Central American, and Mexican agriculture and their implications for farm labor markets, including the demand for skills and its implications for education and workforce development. The demand for labor-intensive FVH commodities rises with population and income growth, and is increasing throughout the region. Fewer and larger FVH farms account for a rising share of the production of labor-intensive commodities. In the United States, these large farms are outsourcing more work to a variety of nonfarm firms that provide services ranging from planting and pesticide application to seasonal labor services. Relatively few of the skilled workers employed by nonfarm firms providing chemical treatments or precision equipment are ex-farm workers. However, of the workers that labor contractors and other intermediaries bring to US farms to prune, weed, and harvest crops most are from rural areas of Mexico and Central America.

The demand as well as supply side of the North American farm labor market is evolving. There is evidence that the supply of farm labor in the region is decreasing and that, in the future, farmers throughout the region will find themselves competing for a dwindling number of local farm workers. In an era of diminishing regional farm labor supply, current immigration policies may not ensure an abundant supply of low-cost labor to US farms. If there are increasing episodes of labor scarcity and rising seasonal farm worker wages, there will be more incentives for labor-saving mechanization and management strategies. This may lead to a different skill mix, as farmers seek to satisfy a growing demand for fresh FVH crops with a smaller number of more skilled workers who use more capital to plant and harvest crops.

58 Quoted in "Florida: CIW; Southeast: Migrants," *Rural Migration News* 18, no. 3 (July 2012), http://migration.ucdavis.edu/rmn/more.php?id=1696_0_3_0.

The trend of nonfarm firms providing skilled services to farmers no doubt will continue. These firms hire workers who graduate from high school and perhaps community college, or who have experience operating complex equipment in construction, transport, and other nonfarm sectors. Firms providing environmental and other services that require advanced degrees are likely to hire foreigners who earn degrees from US universities, and these workers are more likely to originate from Asia than from Mexico or Central America.

If the supply of available workers in rural Mexico and Central America diminishes, US farmers may recruit in Asia.

As labor forces in Mexico and Central America follow the US example of shifting out of farm jobs, farmers and intermediaries in the United States — and, increasingly, in Mexico — will have to cast ever-wider nets to find low-skilled workers to fill seasonal jobs. The major requirement of these foreign workers is the ability to work hard and to be satisfied with US wages and working conditions. If the supply of available workers in rural Mexico and Central America diminishes, US farmers may recruit in Asia, reverting to the recruitment practices seen a century ago, when most of the hired farm workers in the western states were Asian. Besides presenting obvious political challenges, this could entail significantly higher logistical and hiring costs and may accelerate a trend toward labor-saving mechanization and labor management.

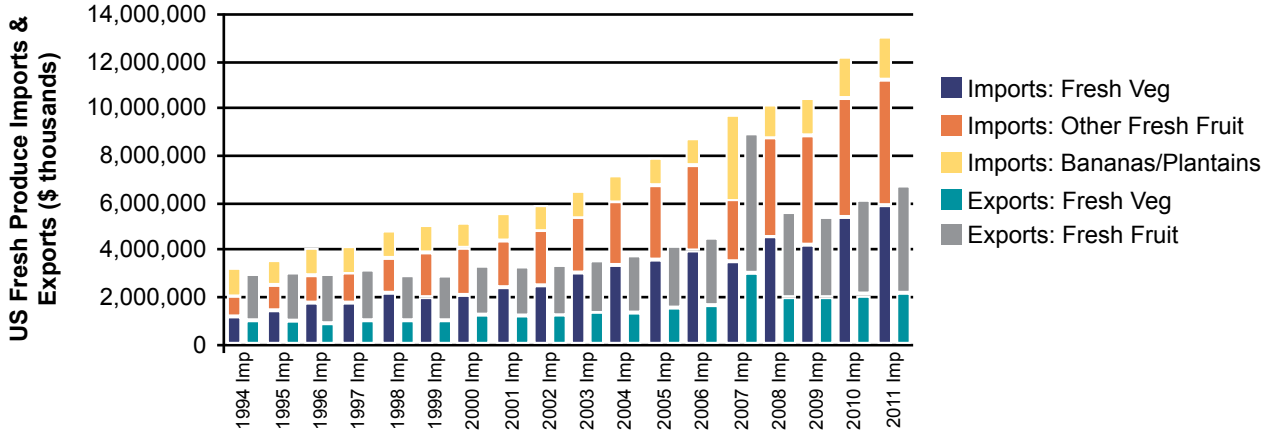
Appendices

Table A-1. US Farms by the North American Industry Classification System (NAICS) and Labor Expenses, 2007

Employment and Labor Expenses	All Farms with Expenses	Vegetables & Melons	Fruits & Nuts	Greenhouse Nursery	3 Sectors	Share	Dairy
Direct Hire farms	**482,186**	**13,642**	**36,293**	**23,615**	**73,550**	**15%**	**30,994**
Distribution	100%	3%	8%	5%	15%	15%	6%
Labor expenses ($000)	21,877,661	2,201,929	3,514,033	4,698,926	10,414,888	48%	2,837,455
Distribution	100%	10%	16%	21%	48%	48%	15%
>$250,000	14,627	1,721	2,574	3,147	7,442	51%	2,676
Contract farms	182,701	5,265	30,075	7,638	42,978	24%	5,313
Labor expenses ($000)	4,514,166	883,842	1,977,432	306,091	3,167,365	70%	123,747
Distribution	100%	20%	44%	7%	70%	70%	4%
>$50,000	11,261	1,399	4,847	802	7,048	63%	543
Direct Hires Farms	**482,186**	**13,642**	**36,293**	**23,615**	**73,550**	**15%**	**41,965**
Workers hired	2,636,509	255,940	613,889	351,064	1,220,893	46%	207,307
>150 days	911,439	84,987	148,705	180,850	414,542	45%	115,003
<150 days	1,725,070	170,953	465,184	170,214	806,351	47%	92,304
<150 days share	65%	67%	76%	48%	66%		45%

Source: Department of Homeland Security (DHS) Office of Immigration Statistics, Class of Admission (COA) Tables, 2007, US, Table 62.

Figure A-2. US Fresh Produce International Trade, Imports and Exports, by Key Category (US $ thousands), 1994-2011



Source: Global Agricultural Trade System; http://www.fas.usda.gov/gats (created by Roberta Cook).

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About the Authors

Philip Martin is Professor of Agricultural and Resource Economics at the University of California, Davis; Chair of the University of California's Comparative Immigration and Integration Program; and Editor of the monthly *Migration News* and the quarterly *Rural Migration News*.

Dr. Martin's research focuses on immigration, farm labor, and economic development. He is the author of *Importing Poverty? Immigration and the Changing Face of Rural America* and a coauthor of Managing *Labor Migration in the Twenty-First Century* (both Yale University Press), in addition to numerous articles and chapters on agricultural labor and immigration reform.

He received his PhD from the University of Wisconsin-Madison.

J. Edward Taylor is Professor of Agricultural and Resource Economics and Director of the Center on Rural Economies of the Americas and Pacific Rim (REAP) at the University of California, Davis, where he teaches courses on international development economics and econometric methods. He is also coeditor of the *American Journal of Agricultural Economics* and founder of the alternative textbook initiative, RebelText.org.

Dr. Taylor has written extensively on the economy-wide impacts of agricultural and development policies and on immigration. He coauthored *Village Economies: The Design, Estimation and Use of Villagewide Economic Models* (Cambridge University Press) and *Worlds in Motion: Understanding International Migration at the End of the Millennium* (Oxford University Press). He is listed in *Who's Who in Economics* and has advised a number of foreign governments and international development agencies on matters related to economic development.

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www.migrationpolicy.org

1400 16th Street NW
Suite 300
Washington, DC 20036

Tel: 001 202-266-1940
Fax: 001 202-266-1900