



OXFORD JOURNALS
OXFORD UNIVERSITY PRESS

Immigration Policy and Its Possible Effects on U.S. Agriculture and the Market for Hired Farm Labor: A Simulation Analysis

Author(s): Steven Zahniser, Tom Hertz, Peter Dixon and Maureen Rimmer

Source: *American Journal of Agricultural Economics*, January 2012, Vol. 94, No. 2, Proceedings (January 2012), pp. 477-482

Published by: Oxford University Press on behalf of the Agricultural & Applied Economics Association

Stable URL: <https://www.jstor.org/stable/41331278>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



and Oxford University Press are collaborating with JSTOR to digitize, preserve and extend access to *American Journal of Agricultural Economics*

JSTOR

IMMIGRATION POLICY AND ITS POSSIBLE EFFECTS ON U.S. AGRICULTURE AND THE MARKET FOR HIRED FARM LABOR: A SIMULATION ANALYSIS

STEVEN ZAHNISER, TOM HERTZ, PETER DIXON, AND MAUREEN RIMMER

Large shifts in the supply of foreign-born farm labor, such as those that might result from substantial changes to U.S. immigration law or its enforcement, could have important implications for U.S. agriculture. Labor accounts for about 17% of the sector's variable production expenses and nearly 40% of such expenses for farms specializing in fruit, vegetables, and/or nursery products, according to 2004–08 data from the Agricultural Resource Management Survey (ARMS) (Economic Research Service 2010). Many of the persons employed by U.S. agriculture lack the immigration status needed to work legally in the United States. According to the U.S. Department of Labor's National Agricultural Workers Survey (NAWS), about half of the hired workers in U.S. crop agriculture are unauthorized, with the overwhelming majority of these workers coming from Mexico (Carroll, Georges, and Saltz 2011). There is no comparable, survey-based estimate for livestock workers, who are not surveyed by NAWS.

The federal government's H-2A Temporary Agricultural Program "establishes a means

for agricultural employers who anticipate a shortage of domestic workers to bring nonimmigrant foreign workers to the U.S. to perform agricultural labor or services of a temporary or seasonal nature" (U.S. Department of Labor [USDOL] 2009). Participation in this program is low, however, relative to the size of the unauthorized workforce. In Fiscal Year 2009, USDOL (2010, p. 30) certified 86,014 positions for the program.

The reasons for the H-2A program's limited use are varied. The program is only for temporary or seasonal workers, so dairy, livestock, and nursery operations, which tend to need labor year-round, are largely precluded from participating. In addition, some prospective employers may be discouraged by some requirements of the program, such as payment to H-2A workers of the highest of the federal or state minimum wage, the prevailing hourly or piece rate, the agreed-upon collective bargaining rate, or the adverse effect wage rate, as determined by USDOL.

Agriculture's reliance on foreign-born workers, coupled with the desire of many Americans to control unauthorized immigration, makes the question of how to address the unauthorized status of many farmworkers one of the more challenging agricultural policy issues of the early 21st century. This paper considers the implications of two policy scenarios: (a) an increase in the number of H-2A workers and (b) greater enforcement of existing immigration restrictions and more repatriations of unauthorized immigrants. The increase in the number of H-2A admissions in the first scenario and the decrease in the number of unauthorized workers in the second scenario are both set by assumption. This paper does not estimate the actual number of farmworkers who would be affected by legislative proposals

Steven Zahniser, (zahniser@ers.usda.gov), is an agricultural economist and Tom Hertz, (thertz@ers.usda.gov), is an economist for the Economic Research Service (ERS) of the USDA. Peter Dixon is the Sir John Monash Distinguished Professor and Maureen Rimmer is professor at the Centre of Policy Studies, Monash University. This study was supported by cooperative agreement 58-3000-7-0135 between ERS and Monash University. In addition, the authors thank William Kandel for his role in adapting the model and Linda Calvin, Mark Gehlhar, Philip Martin, Mary Anne Normile, Greg Pompelli, Agapi Somwaru, Stephen Vogel, and participants in an ERS seminar for their suggestions. Views presented in this paper are those of the authors and do not necessarily represent the views of the institutions with which they are affiliated.

This article was presented in an invited paper session at the 2011 AAEA annual meeting in Pittsburgh, PA. The articles in these sessions are not subjected to the journal's standard refereeing process.

Amer. J. Agr. Econ. 94(2): 477–482; doi: 10.1093/ajae/aar082

Published on November 20, 2011

© The Author (2011). Published by Oxford University Press on behalf of the Agricultural and Applied Economics Association. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

such as a mandatory E-Verify program or AgJOBS.

To conduct this analysis, we employ a modified version of the U.S. Applied General Equilibrium (USAGE) model, a recursively dynamic, computable general equilibrium (CGE) model of the U.S. economy, developed by Peter Dixon and Maureen Rimmer of the Centre of Policy Studies at Monash University. We compare earnings and employment levels for U.S.-born and foreign-born workers in each scenario against a base forecast in which there are no changes in immigration law or its enforcement over the fifteen-year period simulated by the model. We also look at the effects on agricultural output and exports and the U.S. economy as a whole.

Application of the USAGE Model to Immigration

To apply the USAGE model to immigration, Dixon and Rimmer use estimates of unauthorized migration from Van Hook, Bean, and Passel (2005) to disaggregate the workforce into three categories: (a) native U.S. citizens, (b) foreign-born persons who have permanent legal U.S. immigration status and are authorized to work in the United States, and (c) foreign-born persons who are not authorized to work in the United States. Results of several economy-wide simulations of immigration policy scenarios using this model are reported by Dixon and Rimmer (2008, 2009, 2010) and Dixon, Johnson, and Rimmer (2011). For the present analysis, the USAGE model was further adjusted to reflect ARMS data on employment in the model's base year (2005)¹ and more recent agricultural trade data. In 2005, there were about 3.1 million people employed in U.S. agriculture, including 1.1 million hired workers and 2 million self-employed operators and family members (Kandel 2008). The unauthorized are assumed to make up 12.4% of the total.

Participants in the labor force can have one of three activities: (a) employment in the United States in one of the model's 50

occupations, (b) unemployment in the United States, and (c) employment outside the United States. The supply of labor to each U.S. occupation is determined by the occupation's wage rate and a preference matrix that represents the relative utility that workers in a specific category (e.g., foreign-born authorized hired farmworkers in the United States in 2006) obtain from employment in a particular occupation.

Like many CGE models, the USAGE model assumes that labor and capital are nearly fully employed in the long run. This means that the simulations reported here do not apply to the current economic environment, in which more than 9% of the workforce is unemployed. Instead, they should be interpreted as applying to a hypothetical, not-so-distant future when the U.S. unemployment rate has fallen back to around 5%.

Policy Simulations

Our first simulation (H-2A expansion scenario) considers the effects of increased participation in the H-2A program by foreign-born workers who are not currently in the United States. Compared with the base forecast, the number of previously unauthorized, foreign-born persons employed as U.S. farmworkers is assumed to increase by about 30,000 in year 1 of the simulation and by 83,000 in year 2. Thereafter, this assumed increase rises more slowly, reaching 156,000 in year 15 (figure 1 and table 1). "Previously unauthorized" persons are defined as not having the immigration status of a permanent legal resident of the United States in the base year, and as the scenario progresses, this group encompasses both unauthorized workers in the United States and newly authorized H-2A participants. The scale of the increase in H-2A admissions was chosen arbitrarily: we do not specify a particular modification to the H-2A program that leads to its increased use, although we do allow the market for hired farm labor to adjust without reference to the program's wage requirements.

The second simulation (enforcement scenario) involves the stepped-up enforcement of immigration restrictions, either at the border or in the workplace, with the effect of reducing new, unauthorized entries into the United States and causing a significant share of unauthorized immigrants to return (or be returned) to their countries of origin. We assume that the unauthorized labor force (farm and nonfarm)

¹ Specifically, the ARMS data for employment levels were allocated across the USAGE model's farm sectors in a way that closely corresponds with ARMS's aggregate employment data and approximates its sector-specific data while maintaining the model's value-added numbers and achieving reasonable implied average wage rates and rates of return on capital. Based on the ARMS employment data and the model's input-output data, the annual earnings (full-time equivalent) of an unauthorized farmworker were set at \$15,659 for all agricultural sectors in the base year.

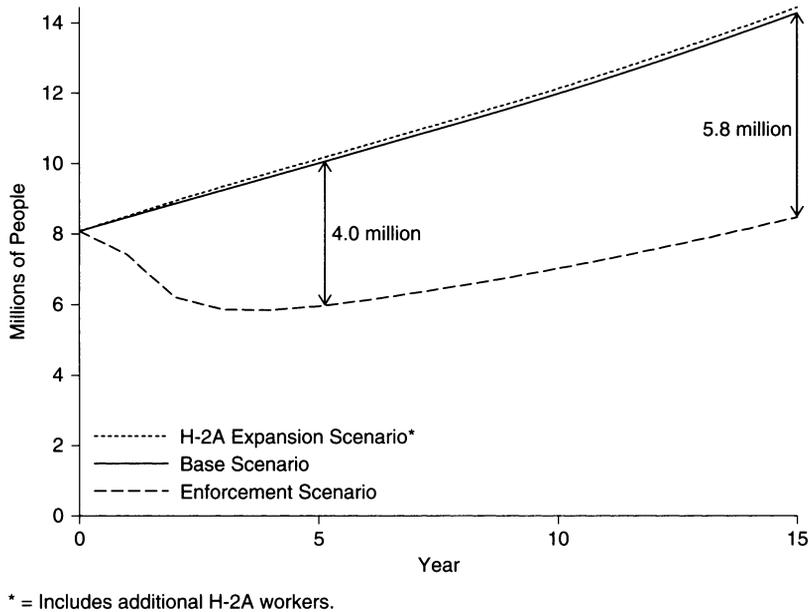


Figure 1. Effects of policy scenarios on size of previously unauthorized, foreign-born labor force (all occupations)

falls by 2.1 million persons over the first five years of the scenario. Compared with the base forecast, this represents a relative reduction of 4.1 million people (figure 1 and table 1). Growth in the unauthorized workforce resumes thereafter, but at a slower pace than in the base forecast. By year 15, the projected size of the unauthorized workforce is 8.5 million people, compared with 14.3 million in the base forecast, a difference of 5.8 million. Again, we do not specify a particular policy change that would lead to this arbitrarily scaled outcome.

The model's occupational preference matrix makes possible the consideration of these policy scenarios. To implement an increase in H-2A workers, the parameter in the matrix that represents the preference for employment as a U.S. farmworker of foreign-born persons who were employed outside the United States in the base year is increased. To implement a decrease in unauthorized workers, the parameters that represent the preferences of such persons for employment in all U.S. occupations are decreased.

Effects on the Labor Market

The middle panel of table 1 reports the levels of agricultural employment in the two policy scenarios. The H-2A expansion scenario leads

to a long-run increase in farm employment of 1.7% (43,000 people) compared with the base forecast, while the enforcement scenario reduces farm employment by 3.4% (89,000 people). The net increase in employment in the H-2A expansion scenario occurs for two reasons. First, lower labor costs shift the capital/labor ratio in favor of labor. Second, the reduction in total costs causes farm output to expand, which increases demand for all factors of production. Both arguments operate in reverse in the enforcement scenario, leading to a net loss of farm employment.

The employment impact differs by immigration status, as is also reported in the middle panel of table 1. Employment of previously unauthorized farmworkers—a group that includes both the additional H-2A workers and those farmworkers who are in the United States and lack legal immigration status—rises by 32.4% by year 15 of the H-2A expansion scenario, while employment of U.S.-born and previously authorized, foreign-born farmworkers falls by 5.7% and 5.6%, respectively. The numbers are roughly reversed in the enforcement scenario, although the long-run employment gains to U.S.-born and previously authorized, foreign-born farmworkers are smaller (4.0% and 3.7%, respectively) due to the overall negative effect on agricultural output.

Table 1. Effects on Immigration Levels, Earnings per Job, and Employment in Agriculture

Long-run (year 15) Difference in Outcomes: Policy Simulation versus Base Forecast	H-2A Expansion Scenario	Enforcement Scenario
H-2A workers admitted (thousands)	156	–
Unauthorized workers, all occupations (millions)	–	–5.8
Employment in agriculture (%)	1.7	–3.4
U.S.-born (%)	–5.7	4.0
Foreign-born, authorized (%)	–5.6	3.7
Foreign-born, unauthorized and new H-2A (%)	32.4	–34.1
Earnings per job in agriculture (%)	–4.4	3.9
U.S.-born (%)	–3.4	3.3
Foreign-born, authorized (%)	–3.4	3.3
Foreign-born, unauthorized and new H-2A (%)	–10.0	13.6

The bottom panel of table 1 reports the change in earnings per job for farmworkers. The H-2A expansion scenario lowers the earnings of the new H-2A workers and unauthorized workers by 10.0% and has a smaller, negative effect (–3.4%) on the earnings of previously authorized and U.S.-born farmworkers. Earnings per job in agriculture fall by 4.4% in the long run, taking account of both changing wage rates by immigration status and the changing composition of the workforce. Again, results are approximately reversed in the enforcement scenario: earnings per agricultural job rise by 13.6% for the unauthorized, 3.3% for the authorized, and 3.9% on average.

Effects on Agricultural Output and Exports

Table 2 reports the effect on agricultural output. Farm sectors with a high share of labor, particularly unauthorized labor, in total costs reap the greatest cost savings when the supply of foreign-born labor increases. Thus, output of fruit, vegetables, and greenhouse products

Table 2. Effect on Agricultural Output

Long-run (year 15) Difference in Outcomes: Policy Simulation versus Base Forecast	H-2A Expansion Scenario	Enforcement Scenario
<i>Percent</i>		
Fruit	1.2	–2.0
Vegetables	1.2	–2.9
Greenhouse and nursery	1.1	–3.5
Tree nuts	2.0	–2.8
Feed grains	0.4	–2.5
Food grains	0.3	–2.6
Oilseeds	0.1	–1.7
Sugar crops	0.3	–2.2
Cotton	1.3	–3.4
Grass seeds	0.4	–2.9
Tobacco	0.3	–2.0
Miscellaneous crops	0.6	–3.1
Meat	0.3	–2.4
Poultry	0.2	–2.0
Dairy	0.3	–2.2
Miscellaneous livestock	1.5	–3.4

rise under the H-2A expansion scenario by about 1% over the long run, while output of less labor-intensive sectors, such as grains and oilseeds, expands by less than 0.5%. The enforcement scenario has a negative effect on agricultural output, ranging from 1.7 to 3.5%, compared with the base forecast. These declines result from both the increase in labor costs and the macroeconomic effects discussed below.

Table 3 reports the change in agricultural exports. In the H-2A expansion scenario, agricultural exports grow by 0.2–3.2%, depending on the sector, while in the enforcement scenario, agricultural exports fall by a much larger percentage (0.8–6.3%). Unlike the expansion scenario, in which the change in the labor supply is restricted to agriculture, the enforcement scenario significantly changes the size of the U.S. economy. Under enforcement, there is inward movement in the supply curves for all U.S. exports, which causes a terms-of-trade improvement with an associated appreciation of the real exchange rate. This outcome exerts an additional negative effect on U.S. agricultural exports, beyond that caused by the reduction in the supply of labor to the sector.

Table 3. Effect on Agricultural Exports

Long-run (year 15) Difference in Outcomes: Policy Simulation versus Base Forecast	H-2A	
	Expansion Scenario	Enforcement Scenario
	<i>Percent</i>	
Fruit	1.7	-2.5
Vegetables	2.7	-5.6
Greenhouse and nursery	3.1	-6.3
Tree nuts	3.2	-3.5
Feed grains	0.8	-3.9
Food grains	0.5	-3.0
Oilseeds	0.2	-0.8
Sugar crops	1.7	-5.0
Cotton	1.7	-3.6
Grass seeds	0.6	-3.2
Tobacco	0.7	-1.6
Miscellaneous crops	1.5	-4.7
Meat	1.9	-4.5
Poultry	0.7	-3.5
Dairy	2.3	-5.4
Miscellaneous livestock	2.6	-4.6

Economy-wide Effects

Much of the debate around unauthorized immigration is centered on its effects on U.S.-born and authorized immigrant workers. These effects are summarized in table 4. The first line of the table—gross national product (GNP) less payments to unauthorized workers—indicates the size of the economy, leaving out the earnings of unauthorized workers. This is a measure of the aggregate economic well-being of U.S. citizens and other legal residents of the United States. As one might expect, the H-2A expansion scenario has negligible effects on this measure, since the supply of foreign-born labor is increased for only the agricultural sector. There is a small relative increase in employment and earnings per job for U.S.-born and previously authorized, foreign-born workers in the economy as a whole, measured in the hundredths of a percentage point.

The enforcement scenario has a much larger effect on the economy due to the far greater number of unauthorized workers involved. GNP less payments to unauthorized workers falls by about 1% over the course of the fifteen-year projection, relative to the base forecast. The occupational distribution of U.S.-born and previously authorized workers also shifts

Table 4. Economy-wide Outcomes for U.S.-born and Authorized Foreign-born Workers

Long-run (year 15) Difference in Outcomes: Policy Simulation versus Base Forecast	H-2A	
	Expansion Scenario	Enforcement Scenario
	<i>Percent</i>	
GNP less payments to unauthorized workers	0.064	-1.008
Employment	0.020	-0.186
Hired farm labor*	-5.683	3.980
Other low paying occupations*	0.102	3.210
Higher paying occupations	0.091	-0.660
Earnings per job	0.034	-0.481
Hired farm labor*	-3.358	3.311
Other low paying occupations*	-0.001	1.688
Higher paying occupations	-0.013	-0.235

* = Occupations with average annual earnings below \$20,000.

downward, as such workers move into vacancies in hired farm work and other low-paying occupations (less than \$20,000 per year on average; examples include food service, child care, and housekeeping) and out of higher-paying occupations (a much larger category). The net effect is a slight reduction in overall employment of U.S.-born and authorized, foreign-born workers because lower-paid occupations have higher rates of turnover and unemployment.

Average earnings per job for U.S.-born and authorized, foreign-born workers in the enforcement scenario rise in hired farm labor and other low-paying occupations and fall in higher-paying occupations. This confirms that the parameter choices and structure of the USAGE model place it within what might be called the Borjas school (see, e.g., Borjas, Grogger, and Hanson 2010), which contends that U.S.-born and authorized, foreign-born workers in lower-paying occupations would see their wages rise if there were fewer unauthorized workers in their respective skill groups.

Conclusion

This paper illustrates some of the divergent economic interests at stake with respect to immigration and the market for hired farm labor. Agricultural employers were shown

to benefit from expanded use of the H-2A program, with the most labor-intensive agricultural sectors experiencing a long-run increase in output of 1–2%, compared with the base forecast. Accompanying this growth, however, was a 6% relative decrease in the number of U.S.-born and authorized immigrant workers employed in agriculture and a 3% relative decrease in the earnings per job of such persons who continued to work in the sector. By contrast, tighter application of immigration controls resulted in a 2–4% relative decrease in the output of labor-intensive agricultural sectors, a 3% relative increase in the earnings levels of U.S.-born and authorized, foreign-born farmworkers, and a 1% relative decrease in the economic welfare of authorized immigrants and the U.S.-born at the aggregate level.

Unanswered by this modeling exercise is an important question: How might complementary programs that accompany changes to immigration law and policy affect the economic outcomes identified in this paper? Further advances in labor-saving technologies, for instance, might help agricultural employers adjust to increased enforcement of immigration restrictions. Also, providing additional education and training to U.S.-born and authorized immigrant farmworkers and requiring smaller agricultural employers throughout the country to provide unemployment insurance might ease the adjustment of these workers to an expanded H-2A program. Further modifications to the USAGE model are under way in an attempt to address this question.

References

- Websites accessed October 12, 2011.
- Borjas, G. J., J. Grogger, and G. H. Hanson. 2010. "Immigration and the Economic Status of African-American Men." *Economica* 77: 255–282.
- Carroll, D., A. Georges, and R. Saltz. 2011. "Changing Characteristics of U.S. Farm Workers: 21 Years of Findings from the National Agricultural Workers Survey." Presentation at conference "Immigration Reform: Implications for Farmers, Farm Workers, and Communities," Washington DC, May 12. <http://migration.ucdavis.edu/cf/files/2011-may/carroll-changing-characteristics.pdf>.
- Dixon, P. B., and M. T. Rimmer. 2008. "The USAGE Labor-Market Extension for the Study of Illegal Immigration." <http://www.monash.edu.au/policy/ftp/techusage2.pdf>.
- . 2009. "Restriction or Legalization? Measuring the Economic Benefits of Immigration Reform." Trade Policy Analysis No. 40, Cato Institute. Washington DC, August 13. http://www.cato.org/pub_display.php?pub_id=10438.
- . 2010. "U.S. Imports of Low-Skilled Labor: Restrict or Liberalize?" In *New Developments in Computable General Equilibrium Analysis of Trade Policy*, ed. J. Gilbert, vol. 7 of *Frontiers of Economics and Globalization*, ed. H. Beladi and K. Choi, 103–151. Bingley, UK: Emerald Group Publishing.
- Dixon, P. B., M. Johnson, and M. T. Rimmer. 2011. "Economy-wide Effects of Reducing Illegal Immigrants in U.S. Employment." *Contemporary Economic Policy* 29(1) (January): 14–30.
- Kandel, W. 2008. "Profile of Hired Farmworkers, a 2008 Update." Economic Research Report No. 60, Economic Research Service, USDA, July. <http://www.ers.usda.gov/Publications/ERR60>.
- Economic Research Service. 2010. "ARMS Farm Financial and Crop Production Practices." Data set, November 30. USDA. <http://www.ers.usda.gov/Data/ARMS>.
- U.S. Department of Labor. 2009. "H-2A Temporary Agricultural Program." Webpage, October 22. <http://www.foreignlaborcert.doleta.gov/h-2a.cfm>.
- . 2010. "The Foreign Labor Certification Report: 2009 Data, Trends and Highlights Across Programs and States: October 1, 2008–September 30, 2009." Employment and Training Administration, July 19. www.foreignlaborcert.doleta.gov/pdf/2009_Annual_Report.pdf.
- Van Hook, M., F. D. Bean, and J. Passell. 2005. "Unauthorized Migrants Living in the United States: A Mid-Decade Portrait." Pew Hispanic Center, September. <http://www.migrationinformation.org/feature/display.cfm?ID=329>.