Foreign Competition and Adjustments to Higher Labor Costs: A CGE Model of U.S. Agriculture

Steven Zahniser and Tom Hertz
(USDA Economic Research Service)
Peter Dixon and Maureen Rimmer (Monash University)

Presentation delivered at the 2013 Annual Meeting
of the International Agricultural Trade Research Consortium (IATRC)
Clearwater Beach, FL, December 15-17, 2013

United States Department of Agriculture, Economic Research Service

Foreign Competition and Adjustments to Higher Labor Costs: A CGE Model of U.S. Agriculture

Steven Zahniser and Tom Hertz (USDA Economic Research Service) and Peter Dixon and Maureen Rimmer (Monash University)

Presentation delivered at 2013 Winter Meetings
of International Agricultural Trade Research Consortium (IATRC)
Clearwater Beach, FL, December 15-17, 2013

How important is foreign competition to adjustments by U.S. agriculture to higher labor costs?

- Calvin and Martin (2010): Depends on feasibility of mechanization
  - Producers of **mechanized commodities are able to adjust, even in the face of foreign competition**
    - Examples: baby leaf lettuce, raisin grapes, and Florida juice oranges (prior to citrus greening)
  - Producers of **unmechanized commodities that face import or export competition** are likely to lose market share
    - Examples: asparagus, apples, and fresh market oranges
  - Producers of **unmechanized commodities that do not face foreign competition** are likely to cope with rising labor costs by providing labor aids to their workers to raise labor productivity
    - Examples: lettuce and fresh market strawberries

We explore this issue with a simulation model

- USAGE Model = USA General Equilibrium Model. Developed by Peter Dixon and Maureen Rimmer of Australia.
- Hypothetical scenario: Supply of unauthorized labor decreases in all economic sectors, agricultural and nonagricultural
- Two simulations with different parameters:
  - (1) Standard parameter settings
  - (2) Increased foreign competition—trade elasticities (Armington and export-demand) are doubled

Why is farm labor of interest?

- Hired labor (including contract labor) accounts for about 35 percent of variable production expenses in vegetable production, 36 percent in nurseries, and 48 percent in fruit production.
- Roughly half the farmworkers in crop agriculture are unauthorized to work legally in the United States, and unauthorized workers are also present in livestock production and food processing.
- A policy trend towards more effective enforcement of immigration restrictions could lead to a reduction in labor supply and higher labor costs for farm and nonfarm employers.
- In contrast, the creation of a new and expanded guestworker program could have the opposite effect.

This is Our Second Round of Work with the USAGE Model

- Base year updated from 2005 to 2012, incorporating latest information on:
  - Number of unauthorized workers in U.S. economy
  - Numbers of authorized and unauthorized farmworkers by farm sector
  - Number of farm operators by sector
  - Total earnings of those groups of people
- Modeling results focus on long-run effects—15 years after the policy change. In long-run analysis, economy maintains "full employment" (about 5% unemployment).
- We use a baseline forecast to describe how the economy is expected to evolve over the next 15 years under current policies. Then we compare this baseline to our simulations.
- Hypothetical scenario: A 5.8-million-person (40%) decrease in projected size of unauthorized workforce (farm and nonfarm) by Year 15.
- Size of assumed labor supply change was chosen to allow us to illustrate the economic issues involved. We don't know what policies may be adopted, or how large an effect on the size of the labor force they may have.

Results: Farm income, output, and trade

	Standard parameters	Doubled trade elasticities
Agriculture, total		
Farm income	-2.2%	-2.7%
Output	-2.1%	-2.2%
Exports	-1.4%	-1.9%
Imports	-0.6%	-0.1%
Fruit		
Farm income	-4.6%	-4.4%
Output	-1.2%	-0.9%
Exports	-0.4%	-0.4%
Imports	-1.7%	-2.0%
Vegetables		
Farm income	-3.0%	-3.9%
Output	-2.2%	-2.7%
Exports	-2.8%	-4.6%
Imports	0.2%	1.1%
Greenhouse and nursery products		
Farm income	-2.7%	-4.0%
Output	-3.4%	-4.0%
Exports	-4.9%	-7.4%
Imports	3.1%	5.8%
Dairy production		
Farm income	-1.1%	-1.2%
Output	-2.2%	-2.1%
Exports	-3.0%	-5.3%
Imports	0.3%	2.2%

All variables expressed in real terms.

Source: Preliminary simulation results from USAGE Model.

Results: Agricultural Employment & Wages

	Standard parameters	Doubled trade elasticities
Agriculture, total		
Employment, authorized farmworkers	4.3%	4.2%
Employment, unauthorized farmworkers	-29.5%	-29.6%
Wages, authorized farmworkers	2.2%	2.1%
Wages, unauthorized farmworkers	11.4%	11.3%
Fruit		
Employment, authorized farmworkers	16.6%	16.9%
Employment, unauthorized farmworkers	-23.8%	-23.6%
Vegetables		
Employment, authorized farmworkers	12.8%	12.3%
Employment, unauthorized farmworkers	-26.4%	-26.9%
Greenhouse and nursery products		
Employment, authorized farmworkers	7.1%	6.3%
Employment, unauthorized farmworkers	-30.5%	-31.1%
Dairy production		
Employment, authorized farmworkers	2.8%	2.9%
Employment, unauthorized farmworkers	-33.4%	-33.4%

Wages are expressed in real terms.

Source: Preliminary simulation results from USAGE Model.

Results: GDP and Income of Authorized Workers

	Standard parameters	Doubled trade elasticities
GDP	-2.2%	-2.2%
Consumption (authorized only)	-1.1%	-1.1%
Food prices	0.13%	0.11%

All variables expressed in real terms.
Source: Preliminary simulation results from USAGE Model.

Main findings

A 40% reduction in the size of the unauthorized workforce (farm and nonfarm):

- Reduces farm income by about 2% (relative to the baseline) in U.S. agriculture and by 3% to 5% in the labor-intensive sectors of fruit, vegetables, and greenhouse and nursery sectors, using the model's standard parameter estimates.
- Wages of authorized farmworkers increase by about 2%.
- Consumption of authorized workers (all economic sectors) decreases by about 1%.

In general, doubling the trade parameters results in slightly larger effects than those found using the model's standard parameters.

- Doubling the trade elasticities makes it more difficult for farmers to pass cost increases onto consumers in the form of higher prices, reducing farm income by a larger margin than in the initial simulation.

Thank You!

Steven Zahniser (zahniser@ers.usda.gov), Tom Hertz (thertz@ers.usda.gov),
Peter Dixon (pdixon@monash.edu), and Maureen Rimmer (maureen.rimmer@monash.edu)

ERS website: www.ers.usda.gov

First Round of Work with USAGE Model

- *The Potential Impact of Changes in Immigration Policy on U.S. Agriculture and the Market for Hired Farm Labor: A Simulation Analysis*, Steven Zahniser, Tom Hertz, Peter Dixon, and Maureen Rimmer, Economic Research Report, May 2012, http://www.ers.usda.gov/publications/err-economic-research-report/err135.aspx

- "Immigration and Its Possible Effects on Agriculture," *Amber Waves*, June 2012, http://www.ers.usda.gov/amber-waves/2012-june/immigration-policy.aspx

- "Analyzing the Effects of Immigration Reforms on U.S. Agriculture," *Choices Magazine*, June 2012, http://www.choicesmagazine.org/choices-magazine/theme-articles/immigration-and-agriculture/analyzing-the-effects-of-immigration-reforms-on-agriculture