The Effects of NAFTA and U.S. Farm Policies on Illegal Immigration and Agricultural Trade

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Poster prepared for presentation at the Agricultural & Applied Economics Association's 2010 AAEA, CAES & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010.

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Introduction

- Economic inequality is the root cause of illegal immigration from Mexico to the United States.
- Trade theory predicts that through free trade factor prices will equalize.
- However, the United States and Mexico's factor prices (wage rate) are far from equal even though NAFTA is completed because
  - Massive U.S. agricultural subsidies are still paid to U.S. farmers
  - Technological difference between the two countries
- In addition to distorting factor prices, U.S. farm supports encourage overproduction.
  - Since NAFTA removed tariffs, this excess supply floods the Mexican market driving down commodity prices.
  - Mexican farmers are forced out of business and become unemployed.
  - These unemployed Mexicans immigrate illegally to the United States seeking employment.
- Though NAFTA took a crucial step toward free trade, U.S. agricultural subsidies undermine the positive effects.

Objectives

- Develop a theoretical model to study the effects of U.S. farm subsidies and NAFTA on U.S. and Mexican agricultural commodity and labor markets
- Quantify the impacts of U.S. farm subsidies and NAFTA on U.S. and Mexican agricultural commodity and labor markets
- Draw policy implications for guest-worker programs and freer trade

Theoretical Analysis

Model

Labor Market

U.S. Labor Supply: $L_U^S(W_U)$ — U.S. Labor Demand: $L_U^D(W_U, P_U^S)$

Mexican Labor Supply: $\overline{L}$ — Mexican Labor Demand: $L_M^D(W_M, P_M)$

U.S. Legal and Illegal Wages: $W_M = \psi W_I$ — Porosity Coefficient: $\psi = \left((1-d)(1-r)\right)/\left(1-d(1-r)\right)$

U.S./Mexican Wage Linkage: $W_U = W_I + \beta(E)c$

Commodity Market

U.S. Commodity Supply: $A_U^S(P_U^S, W_U)$ — U.S. Commodity Demand: $A_U^D(P_U, Z_U)$

Mexican Commodity Supply: $A_M^S(P_M, W_M)$ — Mexican Commodity Demand: $A_M^D(P_M, Z_M)$

U.S. Domestic Price Linkage: $P_U^S = P_U + s_U$ — U.S./Mexican price Linkage: $P_M = P_U(1+T)$

Trade Equilibrium Conditions

Labor Market: $L_U^D(W_I + \beta(E)c, P_U + s_U) - L_U^S(W_I + \beta(E)c) - \psi\left[\overline{L} - L_M^D(\psi W_I, P_U(1+T))\right] = 0$

Commodity Market: $A_M^D(P_U(1+T), \mathbf{Z}_M) - A_M^S(P_U(1+T), \psi W_I) - A_U^S(P_U + s_U, W_I + \beta(E)c) + A_U^D(P_U, \mathbf{Z}_U) = 0$

Variable Definitions

Supply (S), Demand (D), Labor (L), Excess supply (ES), Excess demand (ED), United States (U), Mexico (M), Illegal labor flow (I), Agricultural goods (A), Price of agricultural goods (P), Support price of agricultural goods (P_U^S), Wage rate (W) Subsidy to U.S. agricultural producers(S_U), and Import tariff by Mexico on U.S. agricultural products (T), Probability of getting caught at the border (d), Time wasted crossing the border (r), and Porosity coefficient (ψ).

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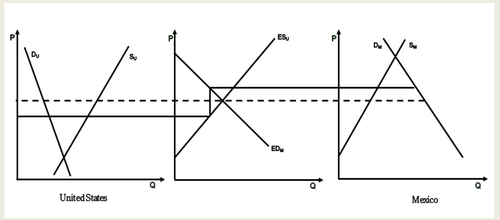
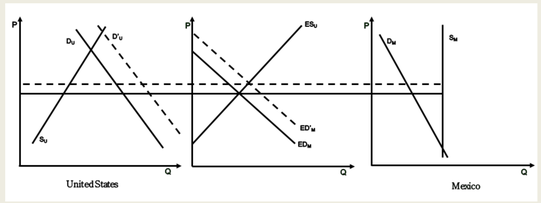
This research project was partially funded by the University of Idaho Student Grant Program

Theoretical Results

NAFTA Impacts on Commodity Market



NAFTA Impacts on Labor Market



- The effect of NAFTA on the illegal wage rate is ambiguous because it is unclear whether the push or pull effect is dominant; however, NAFTA does increase commodity prices.
- U.S. farm supports drive the illegal wage rate up and push commodity prices down.
- NAFTA and U.S. farm supports exacerbate the illegal labor flow and increase commodity trade.

Empirical Model

System of Equations Estimated

Specifications for labor demand and supply:

$$L^D = \alpha_0 + \alpha_1 W + \alpha_2 P + \alpha_3 L^D_{t-1} + \alpha_4 V_1 + \alpha_5 V_2 + \alpha_6 V_3 + \mu_1$$
$$L^S = \beta_0 + \beta_1 W + \beta_2 L^S_{t-1} + \beta_3 NW + \beta_4 CL + \mu_2$$

where L^D is the farm-labor employment, W is the farm real wage rate, P is the price of agricultural products, L^D_{t-1} is the one-year lagged dependent variable, V_1 is the number of farms, V_2 is an index of technology or productivity, V_3 is the nonfarm income, L_S is the domestic farm labor supply, L^S_{t-1} is the lagged dependent variable, NW is the index of nonfarm wage rates, and CL is the nonfarm employment.

Specifications for commodity market demand and supply:

$$A^D = \theta_0 + \theta_1 P^C + \theta_2 Y + \theta_3 \mathbf{H} + \mu_4$$
$$A^S = \gamma_0 + \gamma_1 P^S + \gamma_2 W + \gamma_3 \mathbf{G} + \mu_3$$

where A^D is the demand for agricultural products consumed, P^C is the consumer price, Y is the personal disposable income, $\mathbf{H}$ is a vector of variables that influence demand, A^S is the the supply of agricultural products, P^S is the producer price including government support, W is the legal wage rate paid to laborers, and $\mathbf{G}$ is a vector of input costs to produce agricultural products.

Linkage Equations:

Wage Linkage (U.S. illegal/legal)
Wage Linkage (U.S./Mexico)
Price Linkage

The U.S. and Mexican demand and supply for labor and the commodity markets are estimated simultaneously, with the linkage equation using three-stage least squares.

System weighted R-Square: 0.97

Data

Data sources for the above variables are National Agricultural Statistics Services of USDA, National Agricultural Workers Survey and Bureau of Labor Statistics of the U.S. Department of Labor, Economic Research Services, Food and Agricultural Organization, International Monetary Fund, Banco de Mexico, and Comision National de los Salarios Minimos.

Empirical Analysis

- The estimated system of equations is used to run a benchmark simulation by utilizing the historical values of the explanatory variables.
- Two alternate scenarios are run to analyze the impacts of changes in NAFTA and farm policies.
- **NAFTA Scenario:** The baseline incorporates the reduction of the tariff rate from 71% in 1994 to 0% in 2007, as phased out under NAFTA. In the alternate scenario, the tariff was reduced linearly from 71% at the beginning of the simulation period to 36% in 2004, resembling the Uruguay Round tariff schedule fairly closely for developing countries, and from 36% in 2004 to 10% in 2007.
- **Farm Policy Scenario:** The baseline scenario for the U.S. farm subsidy analysis is simulated using the historical farm support as measured by the producer subsidy estimate (PSE). In the alternate scenario, the subsidy is phased out linearly by 7.14% per year from 1994 to 2007.

Simulation Results

Year	1994	1996	1998	2000	2002	2004	2005	2006	2007
US Ag. Demand (bil. $)	161.93	178.46	182.73	184.15	189.77	222.42	232.95	234.30	265.73
NAFTA Impact (%)	0.02	0.07	0.14	0.24	0.35	0.43	0.48	0.56	0.56
Subsidy Impact (%)	-0.05	-0.13	-0.33	-0.48	-0.49	-0.46	-0.47	-0.39	-0.33
US Ag. Supply (bil. $)	182.35	206.57	201.44	195.94	203.20	235.96	237.05	242.19	287.35
NAFTA Impact (%)	-0.14	-0.57	-1.27	-2.33	-3.35	-4.14	-4.80	-5.50	-5.29
Subsidy Impact (%)	-0.16	-0.50	-1.59	-2.78	-2.91	-2.89	-3.09	-2.51	-2.01
Mexican Ag. Demand (bil. NP)	216.26	235.76	244.96	250.53	267.78	285.17	277.65	274.03	285.39
NAFTA Impact (%)	-0.10	-1.96	-6.66	-15.61	-24.26	-43.24	-51.38	-61.34	-68.06
Subsidy Impact (%)	-0.07	-1.11	-5.66	-13.10	-14.90	-21.68	-23.74	-20.11	-18.52
Mexican Ag. Supply (bil. NP)	210.14	223.99	226.47	249.66	255.31	245.92	276.57	264.58	271.91
NAFTA Impact (%)	0.03	0.34	0.88	1.50	2.15	3.64	3.56	4.20	4.58
Subsidy Impact (%)	0.02	0.20	0.76	1.26	1.33	1.84	1.66	1.39	1.26
Net Exports to Mex. (bil. $)	4.64	4.09	4.11	1.21	2.67	4.21	0.90	2.37	3.94
NAFTA Impact (%)	-0.29	-1.32	-2.87	-5.13	-7.67	-11.00	-12.81	-14.98	-17.10
Subsidy Impact (%)	-0.19	-0.75	-2.44	-4.31	-4.71	-5.52	-5.92	-4.91	-4.66
US Legal Wage Rate ($)	5.62	5.69	6.53	7.64	7.43	8.05	8.27	8.79	9.17
NAFTA Impact (%)	-0.06	-0.23	-0.43	-0.65	-0.96	-1.20	-1.33	-1.42	-1.51
Subsidy Impact (%)	-0.07	-0.22	-0.56	-0.80	-0.86	-0.86	-0.88	-0.66	-0.59
US Illegal Wage Rate ($)	5.51	5.56	6.36	6.93	7.06	7.39	7.37	7.58	7.56
NAFTA Impact (%)	-0.06	-0.24	-0.44	-0.71	-1.01	-1.31	-1.49	-1.64	-1.83
Subsidy Impact (%)	-0.07	-0.22	-0.58	-0.88	-0.90	-0.94	-0.98	-0.77	-0.71
Mexican Wage Rate (NP)	14.18	22.29	30.66	35.95	40.17	43.70	45.33	47.31	48.95
NAFTA Impact (%)	-0.01	-0.02	-0.05	-0.09	-0.11	-0.15	-0.17	-0.18	-0.19
Subsidy Impact (%)	-0.01	-0.02	-0.06	-0.11	-0.10	-0.11	-0.11	-0.08	-0.07
Illegal Immigration (1000)	437.53	443.91	496.03	521.34	501.07	471.57	476.51	474.64	441.83
NAFTA Impact (%)	-0.02	-0.11	-0.19	-0.28	-0.38	-0.53	-0.56	-0.60	-0.70
Subsidy Impact (%)	-0.02	-0.08	-0.20	-0.28	-0.28	-0.32	-0.31	-0.24	-0.23

Empirical Results

- Results of the simulation analysis are consistent with the theoretical findings.
- NAFTA trade liberalization increases the illegal labor flow to U.S. agriculture by about 3,092 laborers and increases commodity trade $17.10 billion.
- Decreased subsidies contract the illegal labor flow to U.S. agriculture by an average of about 1,352 workers and commodity trade by $3.42 billion over the simulation period.
- Trade liberalization without eliminating U.S. farm subsidies hurt Mexican farmers.

Conclusions

Elimination of U.S. farm subsidies and continued support for free trade policies will help Mexican farmers to compete effectively with U.S. exports and improve their profitability. This would reduce the incentive for Mexicans to enter the United States illegally.