Implications of Immigration Policies for the U.S. Farm Sector and Workforce

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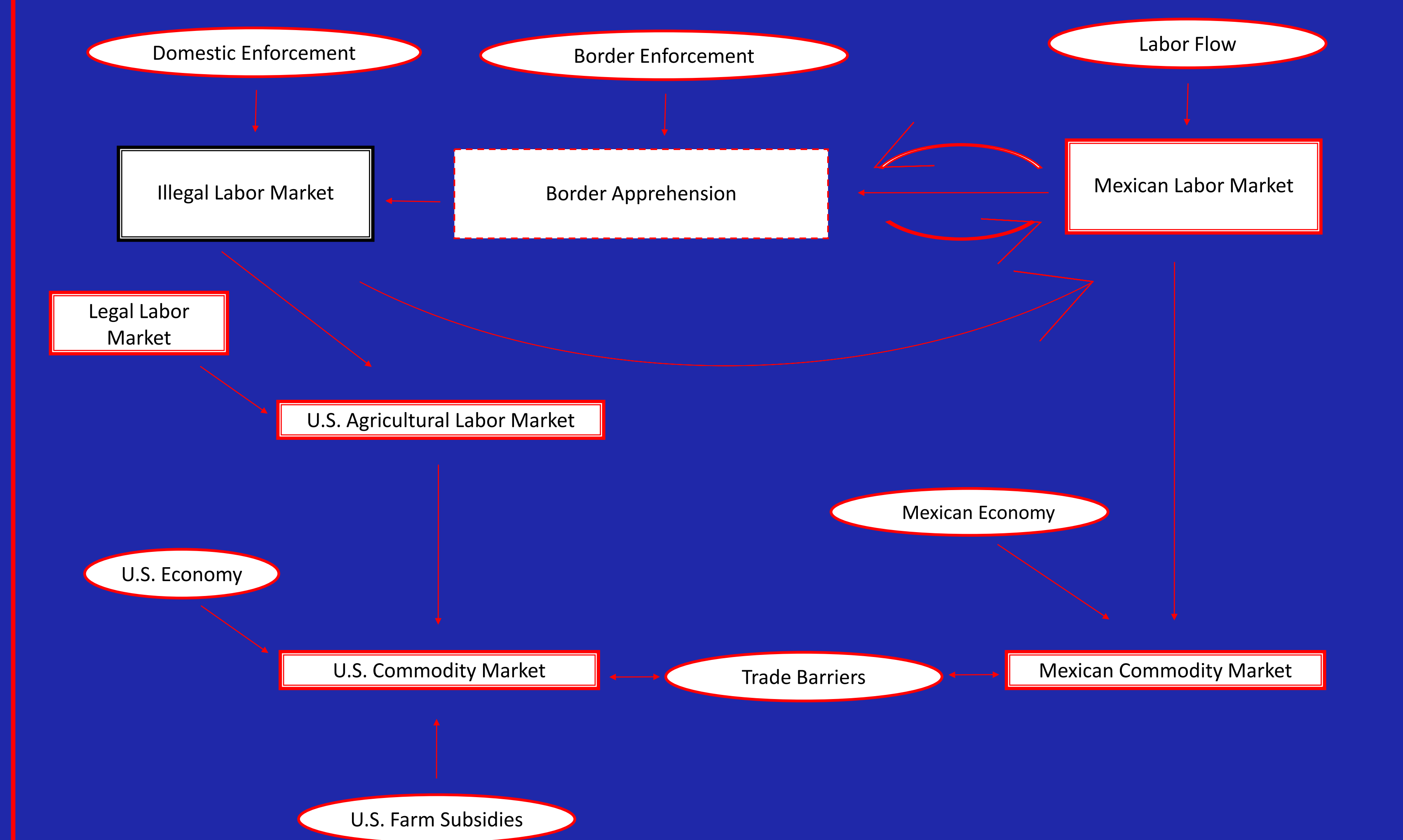This paper is published in Economic Inquiry, 2010

Background

- Congress passed the 1986 Immigration Reform and Control Act (IRCA) to:
  1) Curb the influx of illegal immigrants by increasing the border enforcements
  2) Eliminate undocumented workers through domestic enforcement and amnesty.
- In spite of the IRCA, the illegal immigrant population continued to rise to about 12 million in the United States by 2007.
- The Congressional debate on immigration resumed and after much heated debate, no new legislation was passed into law.
- Due to the failed legislations and the 9/11 attack, the U.S. government focused on **border control** and **domestic enforcement** to curb illegal immigration.
- For example, by 2005 border expenditure experienced a six-fold increase over the last 25 years and by 2008 the number of arrests by domestic enforcement increased 14 times over the domestic level.

Objectives

1. Analyze theoretically through immigration and trade theory the effects of domestic and border enforcements on the illegal farm wage rate, unauthorized entry, and commodity trade between the United States and Mexico.
2. Empirically implement the theoretical model through econometric estimation and simulation analysis.
3. Provide policy recommendations for solving labor shortages in U.S. agriculture and immigration problems.

Theoretical Analysis

Immigration, Farm, and Trade Policy Impacts on Illegal Labor Flow and Trade

Theoretical Model

Labor Market
U.S. Excess Labor Demand: $L_U^{ED} = L_U^D\left(W_U, P_U^S\right) - L_U^S\left(W_U\right)$
Mexican Excess Labor Supply: $L_I^{ES} = \psi\left[\bar{L} - L_M^D\left(W_M, P_M\right)\right]$
U.S./Mexican Wage Linkage: $W_M = \psi W_I$
Border Porosity Coefficient: $\psi = \left((1-d)(1-r)\right)/\left(1-d(1-r)\right)$
Commodity Market
U.S. Excess Supply of Agricultural Goods: $A_U^{ES} = A_U^S\left(P_U^S, W_U\right) - A_U^D\left(P_U, Z_U\right)$
Mexican Excess Demand of Agricultural Goods: $A_M^{ED} = A_M^D\left(P_M, Z_M\right) - A_M^S\left(P_M, W_M\right)$
U.S. Producer/Consumer Price Linkage: $P_U^S = P_U + s_U$
U.S./Mexican price Linkage: $P_M = P_U\left(1+T\right)$

Theoretical Model (Contd.)

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 good (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), Time wasted in crossing the border (r), probability of getting caught at the border (d), and Porosity coefficient (ψ).

Theoretical Results

Labor Flow from Mexico	U.S. Exports to Mexico
$\dfrac{d\left(\text{Labor Flow}\right)}{d\left(\text{domestic enforcement}\right)} < 0$	$\dfrac{d\left(\text{U.S. Exports}\right)}{d\left(\text{border enforcement}\right)} < 0$
$\dfrac{d\left(\text{Labor Flow}\right)}{d\left(\text{border enforcement}\right)} < 0$	$\dfrac{d\left(\text{U.S. Exports}\right)}{d\left(\text{domestic enforcement}\right)} < 0$

Empirical Analysis

Data Source:
Economic Research Service and National Agricultural Statistical Service of USDA, National Agricultural Workers Survey and Bureau of Labor Statistics of the U.S. Department of Labor, Banco de Mexico, and Comision National de los Salarios Minimos, International Monetary Fund, Food and Agricultural Organization

System of Equations Estimated:

United States	Mexico	Linkage Equations
Ag. Demand	Ag. Demand	Wage Linkage (U.S. illegal/legal)
Ag. Supply	Ag. Supply	Wage Linkage (U.S./Mexico)
Labor Demand	Labor Demand	Price Linkage
Labor Supply	Labor Supply	

- 3SLS is used to estimate the model
- system weighted R-Square: 0.97

Simulation 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 domestic and border enforcement policies.
- **Alternate Scenario 1:** 10 percent increase in the domestic enforcement budget over the baseline.
- **Alternate Scenario 2:** The baseline is run using border apprehension probability increasing from 0.30 in 1994 to 0.40 in 2001, from 0.50 in 2002 to 0.60 in 2007. The alternate scenario is run by setting the apprehension probability at 0.60 over the entire simulation period.

Simulation Results

Year	1998	2000	2002	2003	2004	2005	2006	2007
US Legal Wage Rate ($)	6.53	7.64	7.43	7.75	8.05	8.27	8.79	9.17
Domestic Enforcement Impact (%)	0.13	0.21	0.52	0.76	1.12	1.66	2.37	3.40
Border Enforcement Impact (%)	1.16	0.98	0.55	0.45	0.34	0.22	0.11	0.00
US Illegal Wage Rate ($)	6.36	6.93	7.06	7.25	7.39	7.37	7.58	7.56
Domestic Enforcement Impact (%)	-1.50	-2.69	-6.69	-10.15	-15.51	-24.10	-36.11	-55.23
Border Enforcement Impact (%)	1.19	1.08	0.58	0.48	0.37	0.25	0.13	0.00
Mexican Wage Rate (NP)	30.66	35.95	40.17	42.07	43.70	45.33	47.31	48.95
Domestic Enforcement Impact (%)	-0.16	-0.33	-0.75	-1.17	-1.81	-2.72	-3.99	-5.81
Border Enforcement Impact (%)	-1.43	-1.51	-0.80	-0.69	-0.54	-0.37	-0.19	0.00
Illegal Immigration (1000)	496.03	521.34	501.07	500.21	471.57	476.51	474.64	441.83
Domestic Enforcement Impact (%)	-0.27	-0.48	-1.13	-1.71	-2.70	-3.95	-5.82	-9.12
Border Enforcement Impact (%)	-2.43	-2.21	-1.21	-1.00	-0.81	-0.53	-0.27	0.00
US Ag. Demand (bil. $)	182.73	184.15	189.77	202.92	222.42	232.95	234.30	265.73
Domestic Enforcement Impact (%)	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.02	-0.02
Border Enforcement Impact (%)	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
US Ag. Supply (bil. $)	201.44	195.94	203.20	219.40	235.96	237.05	242.19	287.35
Domestic Enforcement Impact (%)	-0.01	-0.02	-0.05	-0.08	-0.11	-0.17	-0.26	-0.33
Border Enforcement Impact (%)	-0.09	-0.10	-0.06	-0.05	-0.03	-0.02	-0.01	0.00
Mexican Ag. D. (bil. NP)	244.96	250.53	267.78	276.82	285.17	277.65	274.03	285.39
Domestic Enforcement Impact (%)	-0.02	-0.05	-0.11	-0.21	-0.35	-0.52	-0.78	-1.11
Border Enforcement Impact (%)	-0.16	-0.24	-0.12	-0.12	-0.11	-0.07	-0.04	0.00
Mexican Ag. Supply (bil. NP)	226.47	249.66	255.31	256.39	245.92	276.57	264.58	271.91
Domestic Enforcement Impact (%)	0.03	0.09	0.24	0.43	0.77	1.12	1.86	2.80
Border Enforcement Impact (%)	0.28	0.40	0.26	0.25	0.23	0.15	0.09	0.00
Net Exports to Mex. (bil. $)	4.11	1.21	2.67	3.13	4.21	0.90	2.37	3.94
Domestic Enforcement Impact (%)	-0.44	-3.31	-3.78	-4.93	-5.72	-42.35	-24.89	-22.67
Border Enforcement Impact (%)	-3.98	-15.35	-4.05	-2.90	-1.72	-5.72	-1.17	0.00

- Domestic enforcement curbs illegal labor use by an average of 8947 workers to U.S. agriculture and reduces the commodity trade by an average of $180 million.
- If the recent tighter border security were enforced from 1994, the illegal labor force to U.S. agriculture would have declined by 8147 annually and U.S. agricultural exports to Mexico would have been reduced by an average of 5 percent.
- The results for these two scenarios show the distinct tradeoff between a reduction **in illegal labor flow and commodity trade**.

Conclusions

- In response to the heightened border surveillance, new workplace enforcements, and economic downturns, fewer immigrants are attempting to enter the United States, which reduce the farm labor supply.
- As a result, the U.S. agricultural sector is facing labor shortages in labor-intensive production.
- Producers in several states — beset with labor scarcity — are experiencing devastating effects on farm production and profitability.
- Consequently, consumers have incurred higher costs for labor-intensive products.
- Any reduction of the immigrant workforce, by deporting undocumented workers and scuttling the guest-worker program, has several adverse implications for U.S. agriculture.
- Therefore, U.S. government policies aimed at deporting unauthorized workers — without taking adequate measures to supply farm laborers through guest-worker programs — will adversely affect the supply of farm laborers to crop production.
- If immigration reform allows a well-functioning guest-worker program, it can increase the availability of the farm workforce and will have a positive impact on the agricultural sector.