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Is There a Demand Pull or Supply Push Between Southwest Border Apprehensions and Employment in the United States?

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Abstract
The effects of immigration on a host country's economy and welfare have been widely studied. Little research has been done on the causality between immigration patterns and economic factors. The purpose of this study is to empirically test the immigration theory of labor supply-demand pull. The author uses a Vector Error Correction Model and annual data to determine if Southwest Border apprehensions Granger-cause employment level changes in the U.S. The results suggest that U.S. employment and physical capital investments Granger-cause Southwest Border apprehensions in the short run, while U.S. employment, investments, and economic growth Granger-cause SW Border apprehensions in the long run. Shocks to employment and physical investments have nonlinear effects on Southwest Border apprehensions. A 1-million-unit annual increase in employment in the United States leads to a decrease of 80,000 Southwest Border apprehensions the following year. This is followed by an increase of 67,922 apprehensions the year after. This empirical evidence supports the theory that U.S. employment creates demand for Southwest Border apprehensions, not the other way around.

Keywords: Employment, Immigration, investments, Solow-Swan Model, Southwest Border crossings apprehensions

JEL: F43, J61

1. Introduction

America is a nation of immigrants. Gifted by France to the United States in 1886 and residing in Ellis Island, New York, the Statue of Liberty serves as a symbol of hope to all immigrants entering the United States. Since post Reconstruction, immigration has been a major contributing factor in the country's economic growth. Incumbent residents of a country have not always welcomed immigrants. The symbolism of the Statue of Liberty has not meant the same as it did for residents from Ireland, Great Britain, and other European countries.

Political party affiliation has historically taken opposing views on the topic of immigration. The Democratic Party has been more accepting of immigrants, passing supporting laws such as the Dream Act and Democratically led cities implementing Sanctuary City policies that provide protection and coverage for immigrants. With the exception of the Immigration Reduction and

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Control Act passed by President Ronald Reagan, the Republican Party has taken a more restrictive approach. The Party's platform enforces strict laws to limit the flow of immigration. This political dichotomy is at the core of the demand-pull or supply-push debate.

Obviously, this debate and subsequent actions are strictly political in nature. They either act to impose restrictions on individuals who attempt to supply their labor—or results in policies that affect the demand for foreign labor. Domestically, microeconomic theory explains the dynamics of the labor market. Aside from income taxes levied on earned income from wages or other forms of labor-related income, little of it is political in nature. As required and essential for all functioning markets, there is a supply of labor, described by a supply function of individuals and a demand function for labor, fully described by the production function of profit maximizing firms.

The stylized labor supply function begins with an individual with a fixed amount of time attempting to maximize their utility, constrained by their income received from units of labor supplied to the labor market. Depending on the amount of leisure desired, the individual supplies an endogenously determined number of hours of labor. Given the level of human capital embodied, firms pay workers a market wage that is exogenously determined by market forces. Any shocks to the individual's utility function, or non-labor income, or any exogenous factors such as transactions costs, discrimination, etc. will affect that individual's supply of labor. Collectively, those factors will also affect the supply of labor in the labor market.

The supply of labor to the global market is obviously more complex. Due to the explicit travel and opportunity costs involved, the decision is comparative and incorporates a longer time horizon. In addition to the domestic factors, the individual's supply function now includes relative wages, cultural choices, political obstacles, familial conflicts, environmental impacts, etc. (Cornelius, 2005). Of course, any changes to these exogenous variables will result in supply shocks to the individual and market labor supply (Brausmann & Djajic, 2021). This is a supply push on immigration—and in the case of the U.S. Southern Border, it will manifest in more crossings: legal, illegal encounters, and apprehensions.

The demand for labor begins with each firm and its objective function. Given the structure of the output market, each firm attempts to maximize profits, subject to the constraints that it faces. Each firm has a production function that employs a level of technology, units of physical capital, human capital, and labor. The firm has access to domestic labor, as well as foreign-born labor. The firm maximizes profit by producing and selling its output while efficiently employing units of input. The firm determines the level of input by equating the marginal revenue product from each input to its factor price. Of course, there are a myriad of exogenous factors that affect this production process (Padilla & Cachanosky, 2022). Exogenous variables from each market impact the price of inputs. The level of human capital embodied by each immigrant (refer to the Solow-Swan Model in the forthcoming section); political environment in the U.S. and source countries; social conflicts, etc affect the market for foreign-born labor. Shocks to the immigration laws will affect the demand for foreign-born labor, or impact demand-pull of foreign labor (Winter, 2020).

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Economists and demographers have extensively studied immigration. They have thoroughly studied Southwest Border crossings, a subset of the larger immigration problem. To the author's knowledge, there are no time series analyses on supply push-demand pull factors of immigration. The purpose of this research is to add to the body of literature and determine if immigrants entering the Southwest Border of the United States are categorically pushing their supply to the United States labor market, or if they are satisfying the demand-pull factor of immigration. It is a consequential component of the argument embroiling the United States. By its nature, the supply-push factor can produce prolonged unemployment, leading to an economic burden to the host land. Whereas the demand-pull factor leads to employment and means convergence in the economy, social environment, and culture.

The next section of the paper provides a brief discussion on immigration in the Southwest Border of the United States and its various components. A literature review follows this section; followed by a literature review; a theoretical and econometric model, including a description of the data; and an analysis of the empirical results. The paper concludes with a brief discussion and policy implications.

2. United States Southwest Border Crossings and Immigration

Empowered by Title 8 of the Code of Federal Regulations, the Department of Homeland Security has the responsibility to enforce and administer the immigration laws of the United States. Among a host of other responsibilities under the immigration umbrella is border security. Geographically, the United States border is comprised of three borders: Coastal, Northern, and Southwest. Consisting mainly of 6,000 miles of U.S.–Mexico border, the Southwest Border is divided into 9 sectors and manages approximately 90% of total U.S. encounters.

In the context of border security there are two types of interactions between border patrol agents and contacts along the border: both, at legal entry points and illegally at other points along the border. An encounter is an interaction or contact between border security personnel (such as border patrol agents) and individuals crossing at or near the border. Encounters may include various scenarios, such as questioning individuals, conducting inspections, or engaging in surveillance activities.

Apprehensions refer to the act of capturing or arresting individuals who are attempting to cross a border illegally or who are suspected of violating immigration laws. Apprehensions can involve detaining individuals who are found to be unlawfully present or attempting to enter the country without proper authorization. Figure 1. is a graphical display of total apprehensions for the Southwest Border since 1960. On the heels of the Cuban Crisis of the 1950's, and ending in 2020, SW Border crossings have been cyclical. During this period, border crossings were lowest in 1960 (21,022 apprehensions) and peaked in the year 2000 (1,615,044 apprehensions).

Once authorities apprehend a migrant, the encounter can result in multiple ways. If the migrant does not have proper documentation, they could self-deport. They could also be fast-tracked and removed from the U.S. without an adjudication process. This process does not require an immigration hearing before a judge. If the migrant is fearful of persecution back home, they can

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apply for asylum. Authorities either detain apprehended immigrants in a camp or released into the country with a notice to appear in immigration court for a hearing. Given the complexity of the case and available court resources, it is important to note that detention can be an indefinite amount of time. If processed migrants are not determined to be a threat to society, they are released into society on bond or parole.

It is important to note that migrants not held in detention can apply for temporary employment permits and enter the labor market as well as avail themselves of a subset of the rights and benefits enjoyed by domestic citizens. This begins the path from apprehensions and the U.S. economy. Do migrants travel long distances on occasions because of economic factors? Do migrants flock to the border to be employed? Does U.S. economic expansion drive migration patterns? Does the increasing pool of foreign labor supply at the Southwest Border apprehensions drive economic expansion in the U.S.? Are migrants driving employment, or is U.S. employment attracting migrants to the border? This research sheds light on these questions.

3. Literature Review

The economics literature covers immigration very broadly. There is a range of topics from the impact of immigration on employment, wages, economic growth, physical capital, human capital, and culture. These impacts are both short term and long term. The analysis centers on immigration into the United States; and many of the studies look at immigration's effect on the source country, the United States, and on both.

(Sirojudin, 2009) synthesizes the various social and economic topics of immigration into four theories. The Rational Choice Theory, developed by (Borjas, 1994), is a neo-classical economics model of utility maximization. Individuals decide whether to emigrate to a foreign labor market based on economic costs and expected derived benefits, using a utility maximization model. Economic costs are complete and robust. Included are explicit and implicit opportunity costs that can be monetary, social, and political. Individuals forecast expected earned benefits over a lifetime. The decision-making criterion is to maximize the individual's utility subject to the cost constraints over a lifetime. This model is based on individual traits to decide whether to supply one's labor to a foreign market. It is introspective in nature. For the complete development of the model, see (Borjas, 1989) and (Massey, 1993).

The Supply and Demand Theory of Emigration, as the name implies, postulates that the decision to emigrate employs a more structural approach. The foreign entity in deciding whether to migrate to another market views the world as divided into various labor markets, having various demands for that person's supply of labor. Considering the fundamental components of this model, one can categorize it as a demand-pull theory. Based on the demand for an individual's skill sets and market wages to earned, that individual will be pulled in by the demand.

The World System Theory of immigration begins with developing countries exploiting developing countries. Developed hegemonic powers exploit the natural resources of impoverished, developing countries. This theory reasons that large capital investments by developed countries in developing countries displaces the population, devaluing the supply of

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labor and the earning potential of said labor. This vicious process increases the value of the developing countries at the expense of the developed country. This exacerbates income and wealth inequality between the countries. This is a supply-push model--a theory of immigration that displaces inhabitants of developing countries.

The fourth and last theory of immigration in the synthesis is the Network Theory that explains the continued path of migration, once established. It postulates that once the first family member establishes its roots in a foreign country, they establish networks and human relationships to enable members of their community, family, and others to continue to emigrate to the foreign land. This theory clearly belongs to the supply push side of the immigration debate.

A comprehensive work covering a breadth of economic theories, (Melcor Del Rio & Thorwarth, 2009) reviewed eight prevailing economic models on immigration, trade, and economic growth. Using monthly economic data and apprehensions from the Southwest Border on the U.S. from 1968-2004, they estimated a distributed lag model to conclude that increasing trade flows cause larger illegal immigration from Mexico to the U.S.

(Sgro & Hazari, 2000) developed a two-sector theoretical economics on immigration with mobile domestic labor and illegal immigration. Their results suggest that increase in border control expenditures results in a positive effect on wages in the sector producing goods with illegal labor, while having ambiguous on wages in the domestic worker only sector.

Representing a small sample of the time series empirical analyses, (Ziemer & Muysken, 2013) used a Vector Error Correction Model with data from 1973 to 2009 for the Netherlands to find that temporary immigration would positively contribute to economic growth if immigrants were allowed to integrate into the labor market.

(Trott, 2012) analyzes the effects of immigration on native wages using the traditional Solow-Swan Model with immigration. The results suggest that the effect on wages depends on the level of capital that accompanying the immigrants upon entry. They estimate that stress-free immigration would reduce wages by 5%.

(Kang & Kim, 2018) try to answer the question of origin and destination. Based on border control policies, they analyze whether immigrants with higher levels of human capital from developed countries contribute to the development and growth of developing host countries. They conclude that the determination of whether host or receiving countries benefit depends on a myriad of factors. Most important of all is the level of capital of the immigrant, relative to that of workers in the host country. They use the results of Solow-Swan Model, augmented for immigration, and estimate a generalized method of moments model using OECD data over 5 decades. Their results are that origin and destination countries matter.

(Boubtane et al., 2016) contribute to the literature on the effects of immigration on per capita economic growth of the receiving country. Using a 22-country OECD model and a specialized dataset identifying human capital of immigrants, they use a generalized method f moments model to conclude that in the short-run, a 505 increase in net migration of foreign-born migrants

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increase per-capita GDP of the host country by .3% per year. Gross domestic product grows by 2% per year.

There is a myth that immigrants enter the U.S. penniless and soon climb the social and economic ladder faster than anyone. This myth is consistent with some economic models that postulate that immigrants with elevated levels of human capital will become more productive and earn a higher real wage. (Tabellini, 2024) debunks these two myths. First, taking a long-term view, the author shows that migration does improve the lives of immigrants--sometimes over generations-- and quality should be measured in other qualitative ways. Secondly, the immigration process is consistent across countries. Immigrants, on average improve their individual lives. They also improve the economies they enter, regardless of the host country. This is like (Sequiera et al., 2020) who studied the high-volume immigration period, the Age of Mass Migration from 1850 to 1920 to determine the short run and long run effects of immigration. They also find historically that in the long-run, immigration in the U.S. resulted in the construction of larger manufacturing establishments, greater agricultural capabilities, and a higher rate of innovation. Equally important is their finding that immigration can be a burden to the local economy in the short-run, but results in long-run contributions.

(Paddilla & Cachanosky, 2022) analyzed the relative economic difference between the host and source countries to determine if there are relevant factors. They use the Economic Freedom of North America to find that economic freedom of the source country does not affect the economic freedom of the host state to where the immigrant arrives.

(Brausmann & Djajic, 2021) develop a theoretical model to analyze the effect of border control policy and population flows between countries. They find a trade-off between the speed of border control response and the cost of obtaining target levels of immigration levels in the target country. A simulation model using the Syrian refugee crisis corroborates the theoretical model.

(Hanson et al., 2023) provide a thorough historical account of immigration channels at the Southern Border of the United States. What began as a cross-border economic migration from Mexico to Southern states, has transformed to migrants seeking asylum from Latin America. Covid, more intense border control, the 1986 Immigration Reform and Control Act, and laborers seeking opportunities to improve the economic output of the United States triggered the change in migration at the Southern Border.

While there is a broad approach to the effect of immigration on economic systems, there is very little empirical work done on causality. This paper focuses on this topic.

4. The Theoretical Model of Immigration

The immigration growth model used builds upon the work of Barro and Sala-I-Martin (1995), also ubiquitous in the economics growth literature. The setup is straightforward and highlights the positive of immigration on an economy at steady state.

Let $Y_t = F[K_t, L_t]$ (1)

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be the production of a typical firm that employs labor from its population consisting of domestic residents born in the domestic country and employees who immigrated from abroad. Domestic employment is determined by: $L_t = {L_0}^D e^{nt}$; andM_t, the flow of migrants to the domestic country.

Rewriting equation (1) in intensive form, $\frac{Y}{L} = F\left[\frac{K}{L}, \frac{L}{L}\right]$= f (k).

The rate of change of employment can be obtained by:

$\frac{\dot{L}}{L} = \frac{n{L_0}^D e^{nt}}{L} + \frac{M}{L}$, this results to: $\frac{\dot{L}}{L} = n + m$. The physical capital per worker formation process is

described as:

$$\frac{\dot{K}}{L} = \frac{sF(K,L)}{L} - \frac{\delta K}{L} + \frac{Mkap}{L}$$

$$\frac{\dot{K}}{L} = sf(k) - \delta k + mkap \qquad (2)$$

Recall that$k = \frac{K}{L}$. Taking logs and time derivatives result in:

$$\frac{\dot{K}}{K} = \frac{\dot{k}}{k} + \frac{\dot{L}}{L}$$

Multiplying by K and dividing by L,

$$\frac{\dot{K}}{L} = \dot{k} + nk \qquad (3)$$

Setting equation (2) equal to (3), results in:

$\dot{k} + nk = sf(k) - \delta k + mkap$. At steady state,

$$k^{SS} = \frac{sf(k^{SS}) + mkap}{n+\delta} \qquad (4)$$

Equation (4) indicates that steady state physical capital per worker is positively related to income per worker, the nation's savings rate, the immigration rate, and the capital imported into the destination country. Steady state capital per worker, on the other hand, is negatively related to population (employment) increases and depreciation of domestically employed physical capital. This result supports the hypothesis that, ceteris paribus, immigration positively effects steady state physical capital and income per worker.

5. Econometric Model

To determine if long-run relationships exist between the number of migrants entering the country

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at the Southern border and the U.S. economy, the endogenous variables will be tested for Granger-causality. Tests will be conducted to see if real GDP, real physical capital, level of U.S. employment, and Southwest Border apprehensions are cointegrated with real GDP. If the variables are cointegrated, a vector error correction model will be estimated (VECM). A vector autoregression model (VAR) in level form will be estimated if the existence of an error correction term in the VECM is statistically insignificant. Ordinary Least Square (OLS), albeit the most efficient linear estimator, is an inappropriate model to determine directional relationships because it requires the dependent variable to be determined by exogenous regressors.

The researcher can use a system of endogenous nonstationary variables to determine short-run relationships among the variables (Enders, 1995). The theoretical model above regarding steady-state intensive capital, short-run, and long-run relationships between the level of physical capital, employment, real economic growth and the number of immigrants apprehended at the Southwest border of the United States can be empirically tested. The following Vector Error Correction Model will be employed to test short-run and long-run relationships:

$$\Delta Rgdp_t = a_{10} + \theta_1 ce1_{t-1} + \sum_{i=1}^{k} \vartheta_{i,1} \Delta Physcap_{t-i} + \sum_{i=1}^{k} \varphi_{i,1} \Delta Emp_{t-i} + \sum_{i=1}^{k} \gamma_{i,1} \Delta SWBorder_{t-i} + \sum_{i=1}^{k} \tau_{i,1} \Delta Rgdp_{t-i} + \varepsilon_{1t} \quad (5)$$

$$\Delta SWBorder_t = a_{11} + \theta_2 ce1_{t-1} + \sum_{i=1}^{k} \vartheta_{i,2} \Delta Physcap_{t-i} + \sum_{i=1}^{k} \varphi_{i,2} \Delta Emp_{t-i} + \sum_{i=1}^{k} \gamma_{i,2} \Delta SWBorder_{t-i} + \sum_{i=1}^{k} \tau_{i,2} \Delta Rgdp_{t-i} + \varepsilon_{2t} \quad (6)$$

$$\Delta Emp_t = a_{12} + \theta_3 ce1_{t-1} + \sum_{i=1}^{k} \vartheta_{i,3} \Delta Physcap_{t-i} + \sum_{i=1}^{k} \varphi_{i,3} \Delta Emp_{t-i} + \sum_{i=1}^{k} \gamma_{i,3} \Delta SWBorder_{t-i} + \sum_{i=1}^{k} \tau_{i,3} \Delta Rgdp_{t-i} + \varepsilon_{3t} \quad (7)$$

$$\Delta Physcap_t = a_{13} + \theta_4 ce1_{t-1} + \sum_{i=1}^{k} \vartheta_{i,4} \Delta Physcap_{t-i} + \sum_{i=1}^{k} \varphi_{i,4} \Delta Emp_{t-i} + \sum_{i=1}^{k} \gamma_{i,4} \Delta SWBorder_{t-i} + \sum_{i=1}^{k} \tau_{i,4} \Delta Rgdp_{t-i} + \varepsilon_{4t} \quad (8)$$

6. Data

The production function data are taken from Penn World Table 10.01. U.S. Real gross domestic product (Output-side real GDP) is chained PPPs (in mil. 2017 US$); U.S. total employment (number of persons engaged (in millions); and real physical capital stock at current PPPs (in mil.

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2017US$). Southwest Border apprehensions are from the U.S. Border Patrol. Total Illegal Alien Apprehensions by Fiscal Year (Oct. 1st through Sept. 30th). Figure 2 graphs all four variables. Refer to Tables A1 and A2 for source details and data description.

Figure 1 Southwest Border Apprehensions

U.S. Border Patrol -Southwest Border

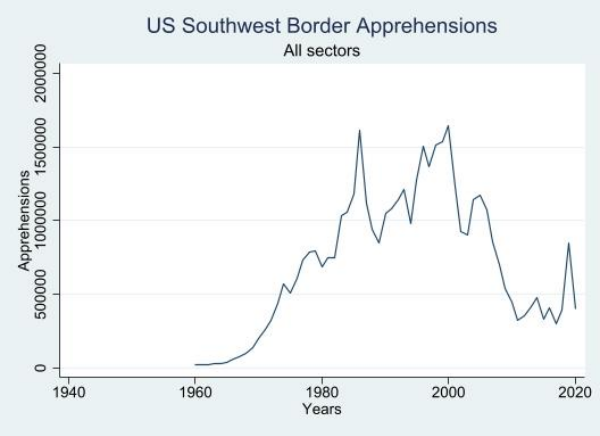
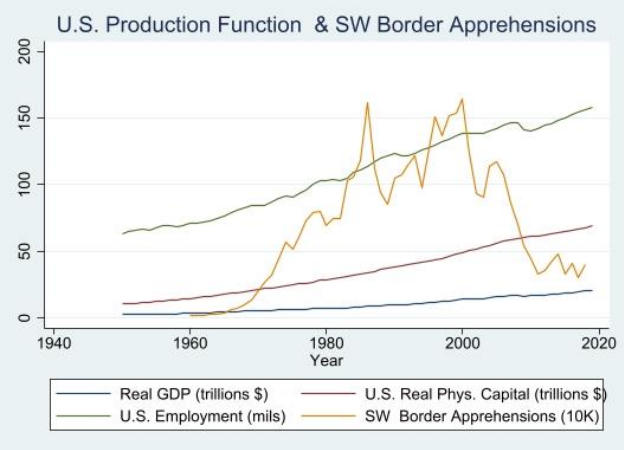


Figure 2 U.S. RGDP, Physical Capital, Employment, and SWB Apprehensions



7. Results

Table A3 contains the results of the lag order selection criteria tests. Four of five tests suggest 3 lags – with the (SBIC) Schwarz's Bayesian Information Criterion suggesting only 2 lags. Three lags are used to test stationarity, using three different unit-root tests. Referring to Table A4, the null hypothesis of the existence of a unit root is accepted in the levels of the four endogenous

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variables using the Augmented Dickey-Fuller, DFGLS, and the Phillips-Perron tests. The null hypothesis of a unit root is rejected in their first differences. Albeit nonstationary in their levels, these variables could be cointegrated, paving way for long run relationships between the variables.

The results of the Johansen Cointegration test tests are inconsistent. Table A5 lists their results. The Trace, Max, and SBIC test statistics suggest a max rank of 2, or two cointegrating equations. HQIC and AIC suggest a max rank of 3 cointegrating equations. For simplicity, the choice is to estimate one cointegrating equation.

Table 1. displays the results of the Vector Error Correction Model. Specification (1) provides the model for Southwest Border apprehensions. The coefficient of the correction error term is -0.179, with a p-value of .093. The null hypothesis that the term is zero can be rejected at the 10% significance level. The results indicate lags of SW Border apprehensions, U.S. employment, U.S. economic growth, and physical capital investments weakly Granger-cause Southwest Border apprehensions in the long run. This finding corroborates current political arguments as well as economic theories postulated in large tranches of the economics literature.

The results indicate short-run causality, running from the first and second lags of U.S. employment to SW Border apprehension. Statistically significant at the 5% level, the coefficient of first lag of employment is -79953. Ceteris paribus, an increase of 1 million U.S. employed workers leads to a reduction of Southwest Border apprehensions by approximately 80,000 the following year. Contrarily, an increase of one million in U.S employment leads to an increase of approximately 68,000 Southwest Border apprehensions in two years. The Wald Test in Table 2 supports unidirectional causality. The null hypothesis that both lags of the employment variable are zero is rejected at the 1% level.

Interestingly, the coefficients of both lags of Southwest border apprehensions are statistically insignificant. Neither the first lag nor the second lag of the border apprehensions influences employment, physical capital investment, and economic growth.

Albeit opposite in signs as employment, the coefficients of the first and second lags of physical capital investments are statistically significant. The first lag of physical capital investment is 2.191 and the second lag is -2.195. This suggests that a one $1 mil physical capital investment results in approximately 2 Southwest Border apprehensions. The results of the Wald test do not suggest that both coefficients are jointly statistically different from zero at the at the standard 5% level.

Diagnostically, the Jarque-Berra normality test produces p-values of at least .163, with a value of .564 for equation (6). The results indicate that the error terms are white noise.

The correction error term has a coefficient of -0.179. This suggests that employment, physical capital investment, and real economic growth Granger-cause Southwest Border apprehensions in the long run. When the model deviates from its long run equilibrium, the error term corrects 17.9% of its disequilibrium error from the previous year.

Table 1. Vector Error Correction Model (VECM)

	$\Delta SWBorder_t$ (1)	ΔEmp_t (2)	ΔGDP_t (3)	$Phys\ cap_t$ (4)
$ce1_{t-1}$	-0.179* (.093)	1.09E-6 (7.11E-07)	-0.082 (.115054)	0.016 (062)
$\Delta SWBorder_{t-1}$	-0.189 (0.156)	-0.7.08E-7 (1.19E-6)	-0.035 (0.192)	-0.079 (.103)
$\Delta SWBorder_{t-2}$	-0.149 (0.145)	6.86E-7 (1.11E-6)	0.213 (0.178)	0.029 (0.096)
ΔEmp_{t-1}	-79953** (32367)	-0.414* (0.248)	-138082*** (39813)	-74255*** (21439)
ΔEmp_{t-2}	67922*** (25866)	0.240 (0.198)	15251 (31817)	9622 (17133)
ΔGDP_{t-1}	-0.610 (0.411)	5.41E-6* (3.14E-6)	0.296 (0.505)	0.051 (.272)
ΔGDP_{t-2}	-0.308 (0.222)	8.75E-9 (1.70E-6)	0.083 (.274)	-0.025 (.147)
$\Delta Phys\ cap_{t-1}$	2.191*** (0.751)	1.78E-6 (5.75E-6)	1.384 (924)	2.013*** (.498)
$\Delta Phys\ cap_{t-2}$	-2.195*** (0.626)	-4.22E-6 (4.49E-6)	-1.396* (.770)	-1.138*** (.414)
Constant	-71589 (193929)	4.582*** (1.484)	204563 (238547)	235801* (128457)
Jarque-Berra Normality test Prob > X^2 All Equations = 0.621	0.564	0.173	0.793	0.674
LM Test of autocorrelation H_o:*No autocorrelation* => res_{-1}: Prob>$X^2 = .966$; res_{-2}: Prob>$X^2 = .378$; res_{-3}: Prob>$X^2 = .269$;				

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Table 2. Wald Chi-Square Test of joint Probability

(Row Variable Granger- causing Column variable)

	SWBorder	Emp	Physcap	RGDP
SWBorder	--	Prob > X^2= .69	Prob > X^2= .37	Prob > X^2= .53
Emp	Prob > X^2= .01	--	Prob > X^2= .00	Prob > X^2= .00
Physcap	Prob > X^2= .16	Prob > X^2= .09	--	Prob > X^2= .09
RGDP	Prob > X^2= .94	Prob > X^2= .05	Prob > X^2= .85	--

8. Discussion and Conclusion

Much attention has been paid to migrants crossing the Southern border of the United States. National leaders have politicized the situation by blaming several societal ills on migrants crossing the border--namely they have argued that migrants crossing the border are illegally taking the jobs of American citizens. Using the augmented Solow Swan Model of economic growth, one can determine that immigration positively impacts steady state capital per effective worker, providing that immigrants are allowed to enter the labor market and bring capital along with them—physical or human. The vector error correction model was used to test the supply push or demand pull of apprehensions at the Southern Border.

There is no evidence that apprehensions at the Southern Border leads to a reduction in employment, physical capital investments, or economic growth the United States. There is no support for the supply-push argument. The results suggest the opposite-- employment and physical investments are the causes of SW Border apprehensions. It suggests a demand-pull model of cross border activity. It is economic activity in the U.S. that creates demand for foreign-born labor (Villarreal, 2014). The effect of physical capital investments on other economic variables is small in scale. This allows for more focus on the causal effects of employment.

An increase in U.S. employment leads to an 80,000 reduction in SW Border apprehensions the following year. Because firms serve as employers and hire employees, this suggests that in the short-run, migrant workers serve as substitutes of domestic labor units. After a reduction in SW Border apprehensions the subsequent year following employment increase, this initial employment shock causes an increase in apprehensions two-years forward in the amount of 66,000. This non-linear effect of an initial shock from employment could be related to U.S. domestic policies resulting to the detention of apprehended migrant crossings and signaling by U.S. Employers. Because apprehended encounters at the border are either removed from the U.S. or processed for further action. Those processed in the U.S. are housed in detention camps or released in the United States if conditions are deemed adequate by the judicial system. These

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individuals may enter the workforce, with proper documentation. Because the results do not explicitly conclude with these causal effects, they provide fertile ground for future research.

It is clear from the fervor of current domestic discussion that these results have policy implications. If economic growth is the cause for border crossings into the U.S., it would behoove policymakers to help neighboring countries stabilize their economic and political systems to foster an environment that is palatable for it its residents. This may help reduce SW Border crossings into the U.S. As such policies will decide for the last time, if the United States wants to remain a beacon of hope for all immigrants.

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Declaration of Interest

The author reports no potential conflict of interest.

Appendix

TABLES AND FIGURES

Table A1. Data Description

Variable	Description	Source
RGDP	Output-side real GDP at chained PPPs (in mil. 2017 US$) per capita	Penn World Table Version 10.01
Phys.Cap	Capital stock at current PPPs (in mil. 2017US$)	Penn World Table Version 10.01
Emp	Number of persons engaged (in millions)	Penn World Table Version 10.01
SWBorder	Annual data: 1960-2018 Oct 1 - September 30 # of Apprehensions	U.S. Border Patrol - Southwest Border

Table A2. Descriptive Statistics

Variable	*# of Obs*	*Mean*	*S.D.*	*Min*	*Max*
RGDP	70	9,626,137	5.470,353	2,475,628	20,600,000
Phys.Cap	70	35,700,000	18,400,000	10,600,000	69,100,000
Emp	70	109.26	30.28	62.82	158.30
SWBorder	61	710,751	465,362	21,022	1,643,679

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Table A3. Lag Order Selection Criteria

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-2678.8				2.7E37	97.6	97.6	97.7
1	-2238.4	880.7	16	0.0	5.5E30	82.1	82.4	82.9
2	-2150.0	178.8	16	0.0	3.8E29	79.5	80.0	80.8*
3	-2124.9	48.1*	16	0.0	2.9E29*	79.2*	79.9*	81.1
4	-2112.2	25.6	16	0.0	3.4E29	79.3	80.2	81.8
N= 55		Lags = 4						

Table A4. Unit Root Tests

Variable	Dickey Fuller, Z(t) w/trend	DFGLS, (Tau) (Lag 1)	Phillips-Perron, Z(t) w/trend
RGDP	-1.230	-0.546	-1.036
ΔRGDP	-4.602***	-5.388***	-6.023***
Emp	-2.134	-2.409	-2.164
ΔEmp	-4.309***	-5.669***	-5.318***
Phys.Cap	-2.287	-1.498	-2.547
ΔPhysCap	-2.246	-3..488**	-2.588
SWBorder	-0.690	-1.206	-1.020
ΔSWBorder	-3.823**	-5.566***	-7.260***
N=65			

Table A5. Johansen Tests for Cointegration

Max Rank	Parms	LL	Eigen	Trace Stat	5% CV	Max Stat	5% CV	SBIC	HQIC	AIC
0	32	-2251		63.4	39.9	28.5	23.8	81.25	80.55	80.10
1	39	-2237	0.393	34.9	24.3	23.9	17.9	81.25	80.39	79.85
2	44	-2225	0.342	11.0	12.5	9.55	11.4	81.18	80.22	79.61
3	47	-2220	0.154	1.48	3.8	1.48	3.8	81.23	80.20	79.54
4	48	-2220	0.026					81.27	80.22	79.55
N= 57		Lags = 4		Trend = Constant						

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