What is the relative effect on illegal immigration as a function of domestic enforcement versus stimulation of a foreign government’s economy?*
Failure to control illegal immigration raises questions of national security, blame for economic conditions, fears of national identity crisis, and accusations of incompetence, yet illegal immigration persists and appears to be growing. In *US Immigration and Policy Responses: The Limits of Legislation*, Kitty Calavita explains the problem facing policy makers in the United States,

US immigration policies have exhibited a pronounced gap between their purported intent and their practical effects. Some analysts have suggested that this gap is due to the difficulty of controlling through legislation what is essentially an economically driven phenomenon. Others have postulated that it indicates the incompetence of the Immigration and Naturalization Service and the failure of its enforcement policies. (p.76) According to this description, altering the economic conditions that underlie illegal immigration may prove an effective strategy for control. Another proposed strategy is the use of domestic enforcement measures that will ensure that illegal immigration attempts are unsuccessful. By knowing if and when these two leading policy solutions are effective under different conditions, immigration policy can be made more efficient and effective. With this goal in mind, I developed a model that seeks to answer the question, “What is the relative effect on illegal immigration as a function of domestic enforcement versus stimulation of a foreign government’s economy?”

The model consists of three actors: the government of a receiving nation, the government of a sending nation, and a prospective immigrant residing in the sending country. In consensus with neoclassical microeconomic theory of migration, the logic of this model is based on the understanding of illegal immigration as the collective result of individual, rational decisions

---

I would like to thank Professor Bruce Bueno de Mesquita for his help in constructing the model outlined in this paper, and for his guidance throughout the project. Thank you also to Saverio Spagnolie for providing valuable assistance in deriving the computational results of the model.
made by immigrants (Massey et. al. 1993). Given this assumption, the receiving nation’s
government must create policy that will make attempting illegal immigration less attractive to a
given individual, the prospective immigrant, who is considering an attempt. I assume that legal
immigration is not an option for the prospective immigrant.

In an effort to prevent illegal immigration, the government of a receiving nation allocates
a certain budget (“B”) for the purpose of deterring illegal immigration. I define the value of “B”
as the minimum amount of money necessary to successfully deter illegal immigration. The value
of B is exogenously determined and must be a value greater than zero. (The government cannot
allocate a negative amount of money to the cause.) Any action taken by the receiving country’s
government to deter illegal immigration is subject to this budget constraint. With the money
allocated to deterring illegal immigration, the receiving government seeks to implement the most
efficient and effective policy, or combination of policies, that will achieve its goal.

How can the receiving nation’s government make illegal immigration appear less
attractive to a prospective immigrant? One method is to make the prospective immigrant happier
at home in the sending country, so that leaving home to attempt illegal immigration is less
desirable. In The United States: Benign Neglect toward Immigration, Philip Martin (1994)
proposes policy with this aim. “Ultimately the answer lies in reducing the pressure to come to
the United States. This means economic development and job creation on a massive scale…” (p
118). The pressure described by Martin resonates with neoclassical macroeconomic theory,
which explains migration as the result of both “push” factors that exist in sending countries and
“pull” factors that exist in receiving countries. “Push” factors may be poverty, unemployment,
constrained political or civil liberties, or any other factor that causes a sending country to be an
undesirable place to live. “Pull” factors, such as the opportunity for employment, family ties,
and greater political and civil liberties, are conditions in the receiving country that make it an attractive place to live relative to a sending nation. Macroeconomic theory suggests that by improving the macroeconomic conditions affecting life in the sending country, relative to those of the receiving country, the occurrence of illegal immigration attempts from the sending country will be reduced. Both “push” and “pull” factors must be present for migration to occur under this theory. Therefore, any policy that reduces the “push” factors in a sending country will reduce immigration, holding all other factors constant.

Neoclassical microeconomic theory of migration also supports policy aimed at increasing the happiness of a prospective immigrant in the sending country. Rather than using “push” and “pull” factors of countries, microeconomic analysis focuses on the decision of an individual who considers the expected utility of attempting immigration relative to the expected utility of continuing life in the sending country. In *Migration Unemployment and Development*, Harris and Todaro (1970) show that so long as a gap exists between the expected earnings available in a receiving locale and those available in a sending locale, that immigration will continue. While their model pertains to migration within a country, its results can be applied to international migration as well. Immigration flow causes the labor force to grow in the receiving nation, and, as a result, the wage for labor in that country falls. In addition, the unemployment rate in the recipient nation rises. The reverse is occurring in the sending nation as the supply of labor shrinks and unemployment rates drop. According to their model, immigration ceases when wage and unemployment rates in the receiving country equal that of the sending country, unless equilibrium is offset by economic development in the receiving country occurring at a faster rate than in the sending country. This theory supports any policy that accelerates economic
development in the sending nation to reduce disparity in growth rates between the sending and receiving country as a means of reducing illegal immigration.

Harris and Todaro make the assumption, common to neoclassical microeconomic theory of migration, that maximizing expected income is the main motivating factor of a prospective immigrant’s decision. I also make this assumption in my model. By making this assumption, I allow for the happiness of the prospective immigrant to be quantified in terms of expected income. Under this assumption, the happiness of a prospective immigrant at home can be increased or decreased directly by increasing or decreasing the income that he or she earns in the sending country. Therefore, any policy that increases the income of the prospective immigrant in the sending country, relative to the expected income in the receiving country, reduces the attractiveness of illegal immigration to that individual.

How can the receiving government increase the income of a prospective immigrant within a sending country? To answer this question, it is important for policy makers to examine the characteristics that describe individuals who attempt illegal immigration, from what types of countries they come, and to what types of countries they go. Trends in modern immigration show that the majority of today’s immigrants are leaving poor nations to pursue life in rich nations. While Northern Europe formerly experienced the majority of immigration from South and Eastern Europe, in past decades the number of immigrants arriving from the Middle East, North Africa and Southeast Asia has dramatically increased. In addition, countries such as Spain and Italy, formerly considered sending nations, now face the role of receiving nations. The United States, which received the majority of its immigrants from East and Western Europe at the start of the twentieth century, now receives the vast majority of its immigrants from Latin America and Asia. Japan faces immigration from Thailand, South Korea, and China, among
other East Asian countries (Borjas 1999). According to George Borjas’s (1987) “negative-selection” theory, individuals with low-level skills living in poor countries, where economic returns to education and dispersion of wages are high, will tend to immigrate to rich countries where they can receive higher economic returns to their labor due to a greater demand for low-skilled, uneducated workers and less dispersion of wages. In other words, low-skilled workers leave low paying jobs in poor sending countries for higher paying low-skilled jobs in a rich receiving country.

In support of Borjas’s “negative-selection” theory, the Hecksher-Ohlin theorem proposes that wealthy countries tend to be capital-intensive and tend to export capital-intensive goods or capital. Poor countries tend to be labor-intensive and tend to export labor-intensive goods or labor. As a result, if the supply of labor in the poor country exceeds the demand of the labor-intensive industries in its economy, unemployment results and labor itself may be exported through immigration. Similarly, because the supply of labor is so great in poor countries, wages are low because there is always someone willing to work for a little bit less just to have a job in the sending country. Because of this dilemma, immigrant laborers seek equally low-skilled jobs in the domestic labor-intensive industries of rich nations where the supply of laborers is lower and the wages are higher.

The Stolper-Samuelson theorem offers hope in face of these trends. Given full mobility of both labor and capital, this theorem states that a change in the price of a product is more than proportionally reflected in the economic return of the factor that is used in its production (Bueno de Mesquita 2003). Therefore, by increasing the price paid for labor-intensive goods, the wages paid to laborers will increase. Free trade between a rich and a poor country causes this growth in wages for laborers in the poor country, due to the expected behavior of rich and poor countries
according to their comparative advantage as described by the Hecksher-Ohlin theorem. Free trade benefits the labor-intensive industries of the poor country and the capital-intensive industries of the rich country. In doing so it raises wages of laborers in poor countries, while it hurts the domestic labor-intensive industries in the rich country. Lowering barriers to free trade with a sending nation, according to these theories, is a method by which the receiving nation’s government can make the prospective immigrant happier staying at home by raising his or her current income relative to the income expected abroad.

Another method of increasing the growth in productivity of the labor-intensive economy of the sending country is by providing foreign aid. In the past fifty years, bilateral and multilateral foreign aid has become a common policy of wealthy countries to foster economic growth and poverty reduction abroad. Economists commonly refer to aid as “financing the gap” between what poor countries can provide for themselves and what is needed to bring about desired levels of economic growth. This gap is filled using grants, concessions, and low-interest loans that are often conditional on, or specifically given for, the fulfillment of certain economic objectives that are expected to advance the country towards self-sustained growth. In The Elusive Quest for Growth: Economists’ Adventures and Misadventures in the Tropics, William Easterly (2001) cites examples of past and current objectives as increasing capital and investment, expanding education and technology, and decreasing population growth. In poor countries with economic policies that allow for low levels of corruption, low deficit spending, low inflation and open markets, aid has proven highly successful. Perhaps the benefits of foreign aid can best be seen through one of its first applications, the Marshall Plan, in which the United States successfully financed the reconstruction of the European economy after the devastation of World War II. More recently, foreign aid in combination with economic reform spurred rapid
per capita growth in Korea and Thailand, as well as in Argentina and Peru, during the 1980’s and early 90’s (Easterly 2001 p. 104). Unfortunately, economic growth in these countries has proven less permanent than that of the European beneficiaries of the Marshall Plan.

Foreign aid and free trade, when effectively administered, are methods by which the receiving country’s government can provide economic stimulus to a sending nation as a means of deterring illegal immigration. Proponents of the “social dislocation theory,” which proposes that economic development causes, rather than reduces, immigration, have opposed this position (Sassen-Koob 1988). The theory suggests that, rather than benefiting from development, a prospective immigrant may suffer unemployment and social dislocation. A common example given is that of a poor, subsistence farmer living in a rural area of the sending country. Economic development may allow the larger farmers to afford better technology, and to produce more than before at lower cost. The small rural farmer can no longer compete with the larger agricultural company, and is forced out of business. To seek employment, the poor farmer moves to an urban area where unemployment is rising as a result of the influx of workers from rural areas. Because this individual has already left his or her home and cannot find a job, the costs of immigration are greatly reduced. While the social dislocation theory raises an important consideration about the complex realities of economic development, in this model it is assumed for simplification that economic stimuli provided to the sending nation’s economy has a solely beneficial impact on the income of a prospective immigrant.

The receiving country’s government can also make illegal immigration less attractive to a prospective immigrant by making it difficult or impossible to penetrate its borders. A prospective immigrant will not attempt illegal immigration if he or she knows that there is no chance that the attempt will be successful. A receiving country can reduce the probability of
successful attempts for a prospective immigrant by creating border-control police forces, by updating documentation systems to prevent forgery of visas and residency papers, and by installing security measures and inspection crews in airports and harbors. An effective patrol force may also be necessary to insure that illegal immigrants within the country are not hired by employers and that they are located and returned to their country of origin. For the remainder of this paper I will group these various policies together under the label of “domestic enforcement.”

Domestic enforcement has gained support as a means of increasing national security due to the growing threat of international terrorism. At the 2002 summit meeting of the European Union (EU) held in Seville, Spain, the EU established its first phase of a European border control police force in response to the estimated 500,000 illegal immigrants thought to be living within the borders of its member nations (Willey 2002). Better known is the extensive US border control operation along the US-Mexican border maintained by the US Immigration and Naturalization Service (INS). The INS estimates that over five million illegal immigrants were living in the United States in 1996, and that the undocumented immigrant population is increasing by 300,000 each year (Borjas 1999 p. 41). Such numbers raise questions about the efficiency and effectiveness of domestic enforcement. This paper will not examine specific methods of domestic enforcement, nor will it offer policy solutions for how to increase efficiency within current systems. However, if domestic enforcement proves to be more effective at deterring illegal immigration than providing economic stimuli in sending countries, then it will offer strong theoretical support to the call for reform.

In summary, the receiving country’s government can make illegal immigration appear less attractive to the prospective immigrant by providing economic stimuli in the sending country or by providing domestic enforcement measures. To represent these two policy options within
the model, the receiving nation’s government can choose to spend some proportion (“x”) of the budget on providing economic stimuli, and some proportion (“1-x”) on domestic enforcement. (0 ≤ x ≤ 1) Because these policies are subject to a budget constraint, any increase in spending on one policy must be balanced by a decrease in spending on the other.

An important question that needs to be asked by the receiving nation’s government when deciding between the policy options is, “Will the money we provide as economic stimuli have its desired effect on a prospective immigrant?” Unfortunately, there is much evidence that economic stimuli are not always effective in achieving economic growth. Despite the distribution of over 1.1 trillion dollars in foreign aid (adjusted for inflation), poverty persists in many of the countries that have received the largest portions of aid. Argentina, Bangladesh, Cote d’Ivoire, Ghana, Jamaica, Kenya, Morocco, Mexico, Pakistan, Philippines, Senegal, and Uganda averaged a growth rate of zero between 1980 and 1994, despite the fact that these countries were each recipients of fifteen or more World Bank and IMF adjustment loans during that time (Easterly 2001). Easterly argues that the ineffectiveness of aid is largely the result of perverse incentives that donors and receivers of aid face within the current system. Rather than basing aid on the implementation of good economic policies in poor countries that will allow aid to be effective, donors often give aid to the poorest nations without regard to performance in obtaining economic policy objectives. Therefore, money has consistently rewarded countries that remain in poverty and crisis, rather than those that make genuine efforts at institutional improvement.

In The Political Roots of Poverty: The Economic Logic of Autocracy, Bueno de Mesquita and Root (2002) continue the analysis of incentives by showing why bad economic policy and corruption is politically beneficial for autocratic leaders who rely on the support of a small percentage of their population to remain in power. Because these leaders are only accountable to
this small winning coalition, they can more efficiently satisfy their necessary supporters with private goods than with the public good of economic growth. The leader, who is not accountable to the majority of the population, can keep any money not necessary to maintain the support of the small winning coalition. By supplying foreign aid to autocratic leaders with these incentives, donors may actually support a corrupt leader’s regime and prolong his stay in power without helping to reduce poverty or spur economic growth in the country. As a policy option for deterring illegal immigration, foreign aid is only effective if it is invested into the economy of the sending nation for the betterment of the nation as a whole.

The importance of the behavior of a sending nation’s government in response to its domestic incentives is reflected within my model by the intermediary role of the sending nation’s government. Any economic stimuli (“xB”) provided by a receiving nation cannot go directly to the prospective immigrant, but instead must go through the government of the sending country. The sending nation’s government can invest all of the money in its economy for the provision of economic growth, a public good, to its entire population. However, the sending country’s government can also choose to spend some proportion (“z”) of the stimuli on private goods that only benefit its key supporters. The prospective immigrant in the model does not benefit from any private goods distributed by its government. The only way that the money provided by the receiving country to the sending country will impact the prospective immigrant’s income is if the money is invested into the economy. It is assumed in the model that any money invested into the economy will benefit the entire population equally. Therefore, the model does not account for inequality in distribution of the economic stimuli.

The money that is not spent on providing economic stimuli in the sending country is spent on domestic enforcement. I assume that the proportion of spending on domestic
enforcement (1-x) is used effectively, and it exactly determines the probability of an illegal immigrant getting caught in an attempt. The probability of an illegal immigration attempt being successful is represented by x, because it is the proportion of the optimal budget that is not spent on enforcement. The probability of failure (1-x) does not need to be directly dependent on the actual size of the total budget (B) because the budget is defined as the minimum amount of money needed to successfully deter illegal immigration. Therefore, it is only the allocation of this budget, rather than the size of the budget, that determines the probability that an illegal immigration attempt will be successful.

A trade-off exists between the two policies for the receiving nation’s government. As aid increases, so does the probability that the prospective immigrant will be successful should he or she choose to attempt illegal immigration. The receiving country’s government must try to determine the most efficient and effective combination of these policies. Situations may arise in which the receiving country’s government will be indifferent between all possible policy selections because any value of x will have the same impact on a prospective immigrant’s decision. To solve the model in situations of indifference, it is assumed that the receiving nation’s government would prefer to spend its money on providing economic stimulus rather than on domestic enforcement. It would change nothing in the model to assume the opposite, however, I chose the first in the optimistic view that international development increases future opportunities for mutual benefit through international cooperation.

The prospective immigrant in the sending nation now faces his or her decision of whether to remain in the sending nation or to attempt illegal immigration. I represent this decision in the model by an expected utility calculation made by the prospective immigrant. In accordance with Gary Becker’s (1964) Human Capital Theory, which explains immigration as a personal
investment that an immigrant makes in him or herself for the purpose of increasing personal lifetime earnings, it is assumed in the model that the prospective immigrant values money earned in future periods less than money he or she earns in the present period. Therefore, expected future earnings are weighed by a discount factor "\(\beta\)," such that \(\beta\) is exogenously determined and \(0 < \beta < 1\).

If the prospective immigrant does not attempt illegal immigration and chooses to remain in the sending country, he or she knows that with some probability ("\(z\)”) the income he or she earns currently will be the income he or she will continue to earn for an infinite time horizon. The prospective immigrant also knows that with some probability (“\(1-z\)” money from the receiving country will be invested into the economy and will have a per capita share of benefit on his or her earnings in future periods. (The model does not allow for exponential growth of investment in future periods.) The expected utility of a prospective immigrant for remaining in the sending country is represented by the equation in Figure 1. In this equation, \(K/n\) is the current income of the prospective immigrant in the sending country, and it may be thought of as the per capita GDP of the sending country. The basic results of the model would be the same if the prospective immigrant’s income were treated as \(\alpha K/n\) with \(0 < \alpha < 1\), indicating that his or her income is below the national average.

**Figure 1:**

\[
EU_{\text{remain}} = (z(\alpha K/(1-\alpha)n) + (1-z)(\alpha(Bx+K)/(1-\alpha)n)
\]

If the prospective immigrant chooses to attempt illegal immigration, he or she must take into account both the cost of emigrating and the risk involved, in addition to the net increase in
income that would result from a successful attempt. The cost of emigration incorporates all of
the effects of the physical act of emigration on the individual. Leaving family behind is an
emotional cost, distance to travel may be a physical and monetary cost, and having to learn a
new language may be both a monetary and an emotional cost, to name a few examples. Massey
et. al. (1993) discuss the idea of “negative costs” that may occur in instances when the immigrant
derives benefit from the physical act of emigration because the psychological costs of emigration
have negative values. This might occur when any positive psychological costs are outweighed
by the immigrants desire to emigrate. The cost variable (“c”) in the model represents the net
quantified value of all of the emotional, physical, psychological, and monetary costs that impact
an individual as a result of the physical act of emigration. I assume that this value must be
greater than zero.

If an attempt is made, there is a probability of “1-x” that the attempt will fail. In the
event of failure, an immigrant returns to the sending country. I assume that the immigrant only
loses their income for the current period and the cost born, implicitly assuming that the
unsuccessful immigrant will be able to find employment again once sent home. The income lost
is the value of the prospective immigrant’s current income with a probability of “z,” and it is a
value increased by a per capita share of the economic stimuli with a probability of “l-z.” There
is a probability of “x” that the attempt will be successful, however, and the prospective
immigrant will earn the expected income of an illegal immigrant in the receiving country (“U/p”) over an infinite time horizon. He or she will also have to pay the one-time cost of immigration.
The expected utility calculation of a prospective immigrant for attempting illegal immigration is
represented by the equation in Figure 2. For the purposes of this paper, U/p may be thought of as
the annual earnings of a full-time laborer earning the minimum legal wage in the receiving
country. The prospective immigrant’s expected level of income in the receiving country ($U/p$) is always important in its value relative to the level of income he or she earns in the sending country ($K/n$).

I define the point of deterrence for a prospective immigrant as the point at which the expected utility of attempting illegal immigration is equal to the expected utility of remaining in the sending country. It is at this point where the government of the receiving country can most efficiently deter the prospective immigrant from making an attempt. By deterring the prospective immigrant, the receiving country deters the set of prospective immigrants who are at the point of deterrence or who prefer to remain in the sending country under the given conditions. It is important to note that there is not one optimal policy solution that will deter all illegal immigration from a given sending country, because a sending country is made up of a heterogeneous population with variations in their income level, value for the future, and personal costs of emigration. The optimal allocation of funds between economic stimulus and enforcement will vary depending on the total budget and the given conditions of a prospective immigrant. However, by analyzing how the variables in the model influence one another under varying conditions, results arise that have important implications for illegal immigration policy aimed at deterrence.

The minimum amount of money necessary to successfully deter illegal immigration ($B$) is highly responsive to the conditions in which the money is being spent. There is a critical value

\[
EU_{\text{attempt}} = (1-x)(z(-K/n - c) + (1-z)(-(Bx+K)/n - c)) + (x)((U/(1-_)p) -c)
\]

Figure 2:
of B (B*) above which the probability of success for the prospective immigrant no longer matters at all, because the prospective immigrant will always stay at home. Therefore, if the government of the receiving nation spends enough money, it no longer matters how it is distributed between aid and enforcement. The receiving government will not always spend B*, because, by the definition of B, its budget is selected to deter illegal immigration with optimal efficiency. If the receiving country’s government allocates a budget of less than B*, then there is only a probabilistic chance that the prospective immigrant will be deterred. The receiving nation takes a risk by allocating a budget of less than B*, and it is under this condition that the choice of allocation between enforcement and economic stimulus becomes important.

Determining the optimal allocation of economic stimulus and enforcement is the goal of the receiving nation’s government in this theory. I represent the tradeoff between these policy options with the variable x. This variable represents the percentage of the total immigration budget that is being spent on economic stimulus provided to the sending country. Because this portion of B is taken away from enforcement, x also reflects the probability that a prospective immigrant will be successful if an attempt is made. “1-x” then represents the proportion of the budget (B) that is being spent on enforcement, and therefore the probability that an attempt will be unsuccessful. If the level of enforcement is above a critical value (1- x*), the prospective immigrant will not become an immigrant under any conditions because the probability of success is too low for immigration to be attractive.

As the level of enforcement decreases, the minimum budget needed to deter illegal immigration increases, provided x is not too small (\( \partial B / \partial (1-x) < 0 \)). Therefore, economic stimulus is less efficient than domestic enforcement under many conditions. This is because spending on enforcement is perfectly effective while spending on aid is dependent on the size of
the budget and the level of corruption in the sending country. As the budget required to deter illegal immigration shrinks, the per capita share of the economic stimulus that benefits the prospective immigrant \((xB/n)\) diminishes. Therefore, the effectiveness of aid in boosting the income of the prospective immigrant decreases as the size of the budget decreases \((\partial x/\partial B > 0)\).

In addition, because the money provided for economic stimulus must go through the government of the sending country, aid is less effective for deterring immigration from highly corrupt nations \((\partial z/\partial x < 0)\). More aid is required to deter a prospective immigrant in a corrupt sending country than is required to deter a prospective immigrant in a sending country that is not corrupt because less of the aid that is provided for economic stimulus in highly corrupt nations reaches a prospective immigrant. As the level of corruption in the sending country increases, the value of \(x^*\), which is the value of \(x\) below which the prospective immigrant will never attempt immigration, decreases \((\partial x^*/\partial z < 0)\). Although this difference is small, it shows that aid to corrupt countries will be less effective in deterring prospective immigrants than aid to countries that are not corrupt. In sum, the tradeoff between enforcement and economic aid is very weakly responsive to corruption, with enforcement rising slightly as corruption increases \((\partial (1-x)/\partial z > 0)\). This result can be used, for instance, to predict how Spain will distribute aid for the purpose of deterring illegal immigration from North African countries. The 2002 Corruption Perceptions Index (CPI), compiled by Transparency International, ranks the corruption level of countries ranging from low corruption at ten to high corruption at zero. The CPI score for Morocco was 3.7, while Tunisia was rated as less corrupt with a score of 4.8 (Lambsdorff 2003 p. 54-55). According to the results of this model, Spain will allocate a relatively larger proportion of its budget on aid to Tunisia for the purpose of deterring illegal immigration, because more of the aid
given to Tunisia will benefit a prospective immigrant. It will spend a smaller proportion of its budget on aid to Morocco, because it will be relatively less effective.

The results of the model also indicate that a receiving country will have to spend more money overall, and not simply adjust the allocation between economic stimulus and enforcement, in order to deter illegal immigration from a corrupt sending country ($\partial B/\partial z > 0$). The minimum amount of money that can be allocated by the government of the receiving country to deter illegal immigration goes up steeply with the level of corruption in response to the need for higher amounts of aid and enforcement. The budget does not need to be particularly responsive to the level of corruption in the sending country, however, unless the level of corruption is high. As the total budget allocated to deterring illegal immigration increases, corruption has a diminishing amount of influence on deterrence. Above a certain budget size, corruption no longer has any effect. Figure 3 shows how varying the corruption level of Mexico from zero to one will influence the US budget aimed at deterring a prospective immigrant living in Mexico from making an attempt. The US budget remains relatively constant until corruption reaches a high level, where the size of the minimum budget needed for deterrence increases at a rapidly increasing rate.

**Figure 3: The Effect of the Level of Corruption in Mexico on Total US Spending Aimed at Deterring Illegal Immigration**
The disparity in income levels of the sending and the receiving nations is more influential than the level of corruption in determining the optimal allocation of spending on deterring illegal immigration. It is less expensive for a wealthy receiving country to deter illegal immigration from middle-income sending countries than from poor sending countries. Therefore, as a sending nation experiences economic growth, the minimum amount of money needed to deter illegal emigration from that country is expected to decrease ($\frac{\partial B}{\partial ((U/p) - (K/n))} > 0$). It would be interesting to empirically test this result by looking at whether or not the total amount of money spent by the United States on deterring illegal immigration from Mexico has decreased as a result of growth in the Mexican economy spurred by the North American Free Trade Agreement (NAFTA), established in 1995.

There is a critical value of $K/n$ ($K/n^*$) above which the prospective immigrant will stay no matter what the probability of success. Therefore, if a person is rich enough even if he has certainty of success, he will not attempt illegal immigration. There is much empirical evidence for this finding. For example, Norway does not give foreign aid or focus its domestic enforcement efforts to deter illegal immigration from Denmark. The Danes have a high standard of living at home, relative to that expected in Norway, and therefore do not see illegal immigration to Norway as an attractive option. Because the Danes are already happy to remain at home, Norway does not allocate funds to deterring illegal immigration from Denmark. The value of $(K/n)^*$ is highly influenced by how much the prospective immigrant values the future. As a prospective immigrant’s value of the future rises, the wealthier he or she must be in order to choose not to become an immigrant no matter the chance of successful entry ($\frac{\partial (K/n)^*}{\partial } > 0$).

There is also a critical value of $U/p$ ($(U/p)^*$) below which the immigrant will always stay no matter the value of $B$, holding all else constant. This simply says that if the expected income
in the receiving country is too low, then the receiving country is no longer attractive to the prospective immigrant and its government does not need to allocate money for deterrence. 

((U/p)*) is highly dependent on the size of the prospective immigrant’s current income (K/n). This result predicts, for example, that Mexico does not spend money to deter illegal immigration from the United States because the expected income available in Mexico is, on average, less than the income earned by US citizens at home. Therefore, US citizens find illegal immigration to Mexico undesirable. However, Mexico will spend money on deterring illegal immigration from Guatemala because prospective immigrants in Guatemala earn less at home than they expect to earn in Mexico, and therefore they view illegal immigration to Mexico as an attractive option.

The lower the chance of successful entry into the receiving nation, the greater the expected income in the receiving country has to be for the prospective immigrant to make an attempt (\(\partial x/\partial (U/p) < 0\)). As the chances of success improve, the prospective immigrant must earn higher levels of income in the sending country in order to stay, holding all else constant (\(\partial x/\partial (K/n) > 0\)). As the income gap between the sending country and receiving country narrows, this model predicts that the receiving country will shift spending from enforcement to aid, holding all other factors constant (\(\partial((U/p)-(K/n))/\partial x < 0\)). This is because middle-income countries are closer to the level of income in the sending country above which the prospective immigrant will never immigrate under any conditions ((K/n)*). Therefore, it is more beneficial politically for the government of the receiving country to give aid to middle-income nations than to poor nations.

This finding goes against the intuitive logic of giving foreign aid to those living in the worst conditions; however, it can be better understood by considering the budget constraint of the receiving country. The receiving country can only spend the minimum amount required to
deter illegal immigration. Prospective immigrants living in the poorest sending countries are worse off at home relative to the receiving country, and so they are the most desperate to attempt illegal immigration. If the cost of boosting the prospective immigrant’s income to a level at which he or she is happy to stay at home is too high, the receiving country has an incentive to spend a greater proportion of its budget on enforcement. A higher level of enforcement will deter illegal immigration by reducing the probability of successful entry. In other words, the receiving country realizes it can’t make them happier at home, so it focuses on just trying to keep them out. For this reason, the poorest sending countries will receive the smallest proportions of aid.

The larger the gap between the income level in the sending country and that expected in the receiving country, the greater the minimum value of the cost of emigration that will successfully deter a prospective immigrant from making an attempt ($\frac{\partial c}{\partial \left(\frac{U}{p}-(K/n)\right)} > 0$). For example, if the sending country has no corruption ($z = 0$), any immigration attempt is certain to be successful ($x = 1$), and the prospective immigrant values income in the future half as much as income received in the first period ($_ = .5$), then a prospective immigrant will be deterred if his or her current income in the sending nation is greater than or equal to the difference between the income expected in the receiving country and the cost of emigration. Therefore, if the cost of immigration is zero under the same conditions, the immigrant will be deterred only if he or she earns an income of equal or greater value in the sending country than that expected in the receiving country.

Only poorer prospective immigrants will attempt illegal immigration as the cost of emigration rises ($\frac{\partial (K/n)}{\partial c} < 0$). This is because the poorest individuals are the worst off in the sending country and, therefore, they view immigration as attractive under the largest set of
conditions. A very poor prospective immigrant will still emigrate even if the cost of emigration exceeds his or her income. Therefore, the prospective immigrant is not budget constrained by his or her current income in the sending country. Instead, the prospective immigrant’s decision is constrained by the income that he or she expects to earn in the receiving country. The more that a prospective immigrant will have to pay in the first period in the physical act of immigration, the higher his expected income will have to be for an attempt to occur \( \frac{\partial (U/p)}{\partial c} > 0 \). This result predicts, for example, that illegal immigration to the United States will be relatively more attractive to a prospective immigrant in Mexico than to a prospective immigrant with the same characteristics in South Africa. Although Mexico has a slightly higher per capita GDP than South Africa, the attractiveness of the expected income in the United States is offset for the prospective immigrant in South Africa by the higher cost of emigration. Because prospective immigrants in Mexico do not face as high a cost of emigration, they will immigrate under a larger set of conditions.

The cost of emigration is only paid in the first period of the model, and so it hits harder for those who discount the future highly. Individuals who value the future highly will see paying the cost of emigration as a small obstacle relative to the net increase in income that they will receive in the future if an attempt is successful, and so increasing cost will not be very effective in deterring these individuals from attempting illegal immigration. Individuals who do not value the future will consider any depletion of the money in their pockets today as a higher cost because the loss is not offset by expected future rewards. Therefore, increasing cost is very effective in deterring immigration attempts by prospective immigrants who discount the future.

At the margin, higher cost of emigration keeps out immigrants with higher skill levels who are earning higher levels of income in the sending country. This selection effect may have
economic and social consequences in the receiving country. Borjas (1999) proposes that the economy of a modern receiving country as a whole does not benefit from unskilled labor as much as it would from skilled labor. Borjas argues that selecting skilled immigrants could substantially increase the economic benefit of immigration for a receiving nation because these workers can better contribute to growth and productivity of modern industries. However, the results of this model show that high costs of immigration and other deterrence measures deter skilled immigrants so that only the most desperate, unskilled immigrants attempt illegal immigration. The economic benefit of these individuals is less than that of skilled laborers for the nation as a whole, and their cost to society is greater because these individuals often rely on the social services provided by the receiving nation. Therefore, an influx of unskilled immigrants may be an economic burden to a receiving country. In addition, unskilled immigrants may also contribute to growing inequality within the receiving country as the wealthy benefit from falling prices due to cheap labor and the poor face growing competition and falling wages.

In this model, I assume that deterring illegal immigration at optimal efficiency is the most beneficial outcome for the receiving country. Therefore, the model presented in this paper does not account for the influence of predicted negative consequences on the policy decision of the receiving nation’s government. Under my assumption, the influence that an adjustment in cost of emigration will have on the minimum budget necessary to deter illegal immigration and on the allocation of funds between aid and enforcement is insignificant. A next step in this research might be to broaden the model presented in this paper to consider the endogenous negative consequences of policy choices, in order to test whether or not the receiving government’s optimal policy decision will be affected. It may be that the most efficient and effective policy
solution aimed at deterring illegal immigration will not be the solution with the least negative long term social and economic effects. Although purely speculative, this idea introduces the importance of considering the economic and social consequences of a policy prior to its implementation, and the complexities that may arise as a result.

A final influential factor in determining the set of conditions under which a prospective immigrant will attempt illegal immigration to the receiving country is the value that the prospective immigrant places on the future \( \_ \). It requires more money to prevent immigration for a prospective immigrant who values the future highly, than for one who discounts the future highly \( (\partial B/\partial \_ > 0) \). This is because an individual who values the future highly will attempt illegal immigration with a lower probability of success \( (\partial x/\partial \_ < 0) \), and so more enforcement is needed to deter these individuals. Below a certain probability of success, however, the prospective immigrant’s value for the future no longer matters because he or she will never become an immigrant.

This result can also be understood as saying that more patient prospective immigrants respond to a smaller amount of economic stimulus by being deterred while less patient individuals require a larger stimulus. The income of a prospective immigrant is increased in all future periods by a per capita share of the proportion of the money invested into the economy of the sending country. Therefore, a small per capita benefit from foreign aid in each period will accumulate into a large utility for someone who places a high value on the income earned in the future. However, an individual that does not value money earned in the future will see the same stimulus as providing less utility because only what is earned in the current period is of importance. Therefore, aid is relatively more effective than enforcement for deterring prospective immigrants who discount the future highly than prospective immigrants who value
the future highly ($\partial / \partial x < 0$). This helps offset the negative selection effect on cost of emigration because those who place a higher value on the future are probably more entrepreneurial.

If the prospective immigrant discounts the future highly enough, he or she will not attempt illegal immigration even with certainty of success. This is because there is a critical value of delta ($\_\_\*$) below which the immigrant will always stay, no matter the probability of successful entry. However, this value of delta in reality will never be above .5, and will probably never even be above .3. The value of $\_\_\*$ is highly dependent on the cost of emigration because these individuals value the current period highly and it is in this period that the cost of emigration is born. As the cost of emigration approaches zero, $\_\_\*$ also approaches zero. This result lends support to the earlier finding that increasing the cost of emigration is an effective means of deterring prospective immigrants who discount the future highly.

The results generated by my model support a set of predictions about how policy makers in a receiving government allocate funding to deter illegal immigration under various conditions. First, the model predicts that enforcement will be a more efficient policy option than economic stimulus under many conditions. Therefore, it is expected that receiving countries with less money available for a budget aimed at deterring illegal immigration will spend a greater portion of their budgets on enforcement than on stimulus for a sending nation’s economy. In addition, receiving nations will need a greater level of enforcement and/or a larger total budget to deter the illegal immigration of young, entrepreneurial individuals. There is a level of enforcement large enough that it will deter all illegal immigration. Therefore, policies that improve the effectiveness and efficiency of domestic enforcement in the receiving nation should be pursued in receiving countries to improve their capability.
If a sending country reduces its corruption level sufficiently, a receiving country will shift its policy from enforcement to aid, and reduce the overall budget when possible. This result could be tested empirically, for example, by looking to see whether the United States has increased its provision of economic stimuli to the Mexican economy while reducing funding for border control and other enforcement measures since the reduction of corruption resulting from the removal of the Partido Revolucionario Institucional (PRI) from power in 2000, after over seventy years of control. Overall, corruption has a smaller effect in the model than wealth disparity and a prospective immigrant’s value of the future. It would be interesting to see whether the influence of corruption increases if the model is adjusted to account for economic growth generated by investment of the economic stimulus into the economy of the sending country.

The results also predict that by reducing the income gap between the sending country and the receiving country, illegal immigration will be attractive under fewer conditions. If the gap is small enough, a budget for deterring illegal immigration in the receiving nation will no longer be necessary. Ironically, though reducing the gap is a clear long-term solution, the results of this model show that foreign aid will be given to middle-income countries more often than to the poorest countries. Middle-income countries are closest to the income gap indifference point \(((K/n)*)\), and so they may most easily be tipped into the non-immigration category. A wealthy receiving country will use domestic enforcement to deter illegal immigration from a poor sending country until its economy grows to a level high enough for aid to be effective. Unfortunately, the absence of aid may make achieving a narrowed income gap difficult. Beyond the point at which aid may be effective, the sending country will receive increasing levels of
economic stimulus until it reaches an income level at which deterrence is no longer necessary because emigration from that country is no longer attractive to prospective immigrants.

Finally, the model predicts that increasing the cost of emigration is an effective way of deterring prospective immigrants who do not attach much value to the future, for example the elderly or non-entrepreneurial individuals. However, the impact of high cost of emigration on deterrence may be offset for non-entrepreneurial individuals, because these individuals will tend to hold low-skill level jobs and earn low levels of income. If the income disparity is large, the influence of cost of emigration on deterrence is no longer significant. Aid given to increase the cost of emigration within the sending country might be a policy implemented to deter prospective immigrants with a low value of the future in sending countries with moderate-income levels. Governments of corrupt nations have an incentive to maintain a large population from which rent payments can be collected, because they are not politically accountable to the majority of their population. Therefore, I hypothesize that corrupt governments will always restrict emigration by increasing the cost of exit from their own borders, and it is unnecessary for a receiving country to offer incentives to a highly corrupt government for this purpose. It would be interesting to empirically test whether or not corrupt governments restrict emigration to support or negate this hypothesis.
Works Cited


