DO CRIMINAL DEPORTATIONS AFFECT HOMICIDE RATES IN CENTRAL AMERICA?

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By

Jonathan Robert Jakubowski, B.S/B.A.

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Jonathan Robert Jakubowski, B.A.

Thesis Advisor: Luis Brunstein, Ph.D.

ABSTRACT

Over the last decade Central America has received the highest number of criminal deportations of any region in the world. At the same time Central America has become one of the most violent regions in the world, with several nations citing homicide rates that are among the world’s highest. Governments in Central America have begun to identify the deportation policy as problematic, and recent descriptive studies across the hemisphere have begun to investigate the relationship between deportations and violence. However, at present very little has been done to measure the relationship empirically.

Using data from multiple sources, this study tests the hypothesis that criminal deportations have a positive effect on homicide rates in Central America. The analysis uses multiple regression analysis to measure the effect of criminal deportations on homicide rates. Several other demographic and national characteristics are also included in the model.

Through the use of empirical research, the evidence of this study suggests that increasing amounts of criminal deportations do indeed increase homicide rates, supporting the claims made in the current body of descriptive research. The results of the model show consistent measures of significance for three independent variables in the general model: criminal deportations, primary education rates, and political stability. These findings suggest that multiple factors play a role in the rising homicide rates across Central America.
As the U.S. Government actively pursues peace and stability in the region, it is in the interests of U.S. policymakers to reverse this dangerous trend. However, unilateral policy changes in and of themselves are not sufficient to curb the rising homicide rates of Central America. A successful policy response will be both multilateral and comprehensive, taking all of the determining factors into account. Criminal deportations, as the focal point of this study seem to play a contributing role in the upward trend of this phenomenon. In response to this issue, both the sending and receiving deportation policies in Central America and the United States should be reviewed and revised.
The research and writing of this thesis is dedicated to all those who lent their support throughout the process. Special thanks to my Savior who is a lamp unto my feet and a light unto my path, to my wife Missy whose support is sustaining, to my advisor Luis Brunstein for his guidance throughout the process, and to Jeff Mayer for his assistance in the writing of the manuscript. Thank you to my family and friends for their love and encouragement. Thank you to my professors, peers and the staff at GPPI who have helped me to grow over the last two years.

Gratefully Yours,
Jonathan Robert Jakubowski
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INTRODUCTION

Few U.S. citizens and politicians understood the implications of the Immigration Reform and Responsibility Act signed by President Clinton in 1996. This bill required U.S. deportation strategy to focus on deporting criminals (Wasem 1997). At a superficial level this made sense; deporting hardened criminals is logical when seen through the short-term lens of national security. Nonetheless, the implications of such a strategy are detrimental to both the nations receiving the criminal deportees and to the long-run national security interests of the United States.

Over the last decade violence in Central America has reached unprecedented levels. Networks of organized crime have flourished throughout the region as drug cartels and gangs have become more powerful than ever (Seelke 2008). In some cases, such as in Guatemala, drug networks have corrupted leaders at the highest levels of government (Brice 2009). From a policy perspective as the United States seeks stability, peace, and democracy in Central America, U.S. leaders must seek a multilateral solution to the rising conflict. Central American nations are insignificant in size relative to the United States, but their proximity to the U.S. border makes them highly relevant to national security issues such as gang violence, drug trafficking, immigration, and regional stability.

Every year since 1997 thousands of criminals have been deported from the United States to Central American nations, but little if any information exists with regard to biographical, criminal, and demographic characteristics of the deportees (Bain et al. 2006). In the meantime the foremost nations receiving these deportees: El Salvador, Guatemala, and Honduras have seen a dramatic increase in violence, including some of the highest homicide rates in the world (Seelke 2008). The governments of Central America, multilateral organizations, and NGO’s
have cited the current criminal deportation strategy as a major cause of the high levels of violence (Seelke 2008). To gauge the evidence of the findings from these descriptive studies, this study will examine the question: have criminal deportations affected homicide rates in Central America?

**BACKGROUND**

Three of Central America’s seven nations, El Salvador, Guatemala, and Honduras also classified as the Northern Triangle, have some of the highest murder rates in the world (Seelke 2008). Moreover, assault, robbery, extortion, and fraud have risen across Central America, leading national governments there to question what contributes to these developments and how to contain them (Negroponte 2009,1). Most analysts have attributed these extremely high levels of violence to the drug trade; however other major factors may be affecting this trend including criminal deportations.

The nations of Central America are afflicted by weak institutions, corruption, and social unrest (Negroponte 2009, 29). These characteristics make these nations breeding grounds for groups that perform illicit activities. The three broad categories of criminal perpetrators in Central America include youth gangs, organized criminal networks, and drug cartels (Negroponte 2009, 11). These networks are becoming transnational in nature, and countries such as Costa Rica and Panama are now at risk of the invasion by this dangerous phenomenon. Central American leaders have identified this development as an imminent threat to the region and one that demands an immediate response (Negroponte 2009, 1).

For the fledgling democracies of Central America, U.S. criminal deportations seem to exacerbate the threat. Articles have begun to investigate criminal deportations as an explanation for the increase in homicides in this region. One such article by Ben Bain, Sam Logan, and Kate
Kairies of the Americas Program, blames criminal deportees for transferring the tactics and organization learned in U.S. prisons to sophisticated crime networks in Central America (Bain et al. 2006). Yet, the policies towards criminal deportees in Central American nations remain in place without any evidence of revision.

Every year since 1997 the number of criminal deportations from the United States to Central America have risen (Department of Homeland Security 2009) and the trend may well continue. As the United States grapples with Immigration Reform, exporting criminals is a non-negotiable in the eyes of many U.S. policymakers. Budgetary pressures and overpopulated prisons demand that U.S. security institutions continue to export criminal aliens (Pupovac 2007). Therefore, it is expected that criminal deportations to Central America will continue to increase, Ceteris Paribus.

Recently, the U.S. Government appropriated $1 million for a Repatriation Notification System, which notifies the host government of the arrival time, criminal history, and gang affiliation of the deportee (Negroponte 2009, 70). However, this appropriation does little else to mitigate the impact of deportation. Diane Negroponte states, “National governments may have a police van to pick up those with an outstanding jail sentence, but the majority of deportees land at airports with minimum, if any knowledge of the city and without knowledge of programs to reintegrate them into society (Negroponte 2009, 71).” In such circumstances, most criminal deportees immediately turn to what they know best, established networks of crime that provide protection and basic resources for survival.

**LITERATURE REVIEW**

At the present time, a gap exists in the literature with regard to the effect of criminal deportations on homicide rates in Central America. Recently articles and descriptive studies
address the effect of criminal deportations on crime in Central America, but there is no multivariate analysis that estimates the magnitude and significance of this relationship. Instead such analyses have focused on economic factors and income inequalities as the primary determinants of homicide rates. In this study I add to these explanations by performing a multivariate analysis of the effect of criminal deportations on homicide rates in Central America.

As noted, recent articles and descriptive studies have identified criminal deportations as a determinant of crime in Central America. Three of these articles contribute to the core of this study. At the forefront, an article by Claire Ribando Seelke describes the growing influence and transnational effect of gangs in Central America. Seelke identifies the rise in criminal deportations as a possible factor in the increased criminal and gang activities. The author also notes the request of Central American officials to improve the deportation system, specifically calling on the United States to provide better information on deportees with criminal records (Seelke 2008).

The second article by Bain et al., identifies criminal deportations as the primary explanation in the growth of criminal networks in Central America. According to these authors, “Criminal deportees bring tactics, organization, and other criminal skills learned in U.S. prisons. These abilities translate into more sophisticated networks that have created a web that spans across Honduras, El Salvador, and Guatemala (Bain et al. 2006).” They cite U.S. deportation policy as the “creator of an expansive criminal network, exporting well connected criminals to nations that lack the ability to monitor and control the illicit activities of these individuals”.

The third descriptive piece at the core of this study is Diana Villiers Negroponte’s “Working Paper on the Merida Initiative and Central America”. Negroponte examines the reasons for growing public insecurity in the Northern Triangle, focusing on weak democratic
institutions, unequal access to justice and low trust in law enforcement officials, private security businesses, and extensive criminal networks as determinants of the extremely high murder rates (Negroponte 2009). She stresses the need for a “shared responsibility” among North and Central American governments to reduce levels of violence, illegal drug consumption, firearm distribution, and illegal crime.

Six multivariate studies also contribute to the foundation for this study. In each of the studies, homicide rates are the dependent variable. Each study also uses different versions of a linear OLS regression model to measure the influence of alternative factors on homicide rates. Each study, however, investigates the effect of a different primary independent variable. Such variation supports the investigation of criminal deportations using a similar model. Overall, the six studies provide a solid foundation for the use of the model specified in this study.

The first study is an empirical analysis performed by Pablo Fajnzylber, Daniel Lederman, and Norman Loayza entitled “Determinants of Crime Rates in Latin America and the World” (Fajnzylber et al. 1998). Using data for the period 1970-1994 for a large sample of countries, the authors estimate several econometric models. Primary factors used to explain crime (measured as homicide rates) include economic variables, criminal inertia, income inequality, education, governance, and drug presence. The study shows that increases in income inequality raise crime rates, deterrence effects are significant, crime tends to be counter-cyclical, and criminal inertia is significant. This analysis provides the initial argument for the use of a regression analysis using homicide rates as the dependent variable in an econometric model.

The second study performed the same authors is “Crime and Victimization: An Economic Perspective” (Fajnzylber et al. 2000). This study, an extension of the first one, uses an empirical model to find the main determinants of violent crime rates measured by homicide rates. The
basic model includes, as explanatory variables, the average and distribution of national income, the growth rate of output, the average educational attainment of the adult population, and the lagged crime rate (to allow for inertia effects). The basic model is extended along five dimensions: deterrence factors, activities related to illegal drugs, demographic issues, income and ethnic polarization, and social capital. By adding several important explanatory variables to the original model, this study adds support for the use of a regression analysis with homicides as a dependent variable.

“Spatial Analysis of Socioeconomic Determinants of Homicide in Brazil” authored by Albuquerque et al., is the third multivariate analysis that informs this study (Albuquerque et al. 2005). This analysis uses homicide rates among males aged 15 to 49 years old as the dependent variable. Explanatory variables include living conditions, per capita family income, the Theil inequality index, the Gini index, average income of the head of the family, a poverty index, the rate of illiteracy, and demographic density. The variables used in this model further strengthen the argument for the use of different independent variables that explain variation in the dependent variable, homicide rates.

The fourth study by Daniel Lederman, Norman Loayza, and Ana María Menéndez, is entitled “Violent Crime: Does Social Capital Matter?” emphasizes social capital as an explanation for violent crime (Lederman et al. 2002). The authors conclude that nations without effective social networks are more likely to show increased homicide rates. The results show that increased social capital, measured by trust in community members, has the effect of reducing the incidence of violent crimes. This study enriches the present one by introducing a new independent variable (social capital) to explain the variation in the dependent variable of homicide rates.
The fifth study appears in a joint report by the United Nations Office on Drugs and Crime (UNODC) and the Latin America and the Caribbean Region of the World Bank (UNODC of the World Bank 2007). In this study, a simple OLS model is applied to isolate the variables driving crime rates. Five variables are used: a lagged dependent variable, growth rate, average income, income inequality, and a Caribbean dummy. The study adds further support to the methodological decision underlying the present research – in particular, the decision to use an OLS model.

The sixth study, by Julio Cole and Andrés Marroquín Gramajo, uses regression analysis to explore the cross-country variation in homicide rates for a large sample of countries (Cole and Gramajo 2009). Using an OLS regression, this study uses regional variables and traditional socio-economic, cultural, and institutional variables to explore the cross-country variation in homicide rates. Cole and Gramajo cite many of the studies cited above to support their use of an OLS regression to measure regional variation in homicide rates. Their approach lends further insight to the approach used here – i.e., the use of a linear OLS model with homicide rates as the dependent variable.

Evidence provided through the current framework strengthens the argument that a linear OLS model measuring homicide rates as a dependent variable is valid. However, none of the studies cited above uses criminal deportations from the United States as an explanatory variable. The model proposed by this study fills this gap in the existing literature by using criminal deportations as an explanatory variable.

**CONCEPTUAL FRAMEWORK AND HYPOTHESIS**

The hypothesis for this study is that criminal deportations have a positive effect on homicide rates in Central America. The study estimates an empirical model with *homicide rates*
as the dependent variable and *criminal deportations* as the main independent variable. Other independent variables include: *primary education rates, unemployment, GDP per capita*, and *political stability*.

<table>
<thead>
<tr>
<th>Conceptual Variables</th>
<th>Empirical Variables</th>
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<tbody>
<tr>
<td>Homicide Rates</td>
<td>Annual Homicide Rates</td>
</tr>
<tr>
<td>Criminal Deportations</td>
<td>Annual Criminal Deportations</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>Primary Education Entrance Rates</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Unemployment Rates</td>
</tr>
<tr>
<td>Individual Income</td>
<td>GDP/Capita</td>
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<tr>
<td>Government Capacity</td>
<td>Political Stability</td>
</tr>
</tbody>
</table>

**DATA**

DATA for this study represent the populations of the seven nations of Central America-Belize, Costa Rica, El Salvador, Honduras, Guatemala, Nicaragua, and Panama - for the seven year period from 1999 to 2006. At the present time no single data source can provide for all the variables of this study during the targeted years in the targeted region. Therefore, the study uses multiple data sources. Additionally, due to limited sources of data, a major challenge in the data research was identifying proxy variables. Variables that were used in other empirical models such as income inequality were omitted due to insufficient data. Notwithstanding the lack of data, however, the basic empirical model is strongly supported in the literature. Appendix One contains the definitions for the calculation of each variable in the general model.
Data for the dependent variable, *homicide rates*, come from the Central American Observatory of Violence (OCAVI), which uses annual national data from each of the seven countries (Observatorio Centroamericano sobre Violencia 2007). OCAVI defines this variable as homicide occurring when the criminal intentionally seeks a result of death for the victim (OCAVI 2007).

The main independent variable in the model is *criminal deportations* as reported by the U.S. Department of Homeland Security (DHS). DHS records the number of deportations to other countries on an annual basis (Department of Homeland Security 2007). The term “criminal deportee” specifically refers to persons removed based on a criminal charge or those with a criminal conviction (Department of Homeland Security 2007). The decision to use *criminal deportations* in the model is supported by descriptive research, which defines deportation as the primary explanatory factor in the rise of violence in Central America (Bain et al. 2006). According to the hypothesis of the present study, an increase in criminal deportations generates an increase in homicide rates throughout Central America.

Increased individual income is commonly associated with a reduction in the potential to commit crime. In the majority of multivariate studies referenced in the literature review, *GDP per capita* is used to capture the effects of individual income. This statistic is reported by Heston, Summers, and Aten in the Penn World Table Version 6.3. The specific measure that is cited in the present study is Real GDP per Capita derived from growth rates of domestic consumption (Penn World Tables 2009). The reference year for this measure is 2005, and the numbers are conversions of per capita GDP’s of countries converted at Purchasing Power Parities (PPP) and growth rates of per capita GDP (Aten, Heston, and Summers 2009). PPP enables an accurate measure of the local cost of living by adjusting for income as if it were all
spent locally (Adler 2010). It is widely assumed that increased wealth reduces the probability of participating in crime. Butchart and Engstrom, for example, find that gains in wealth decrease homicides (Butchart and Engstrom 2002). This study assumes that wealth and income affect behavior in similar ways. Therefore, it is expected that increasing GDP per capita will have a negative effect on homicide rates.

Unemployment rate data are taken from the U.S. Central Intelligence Agency World Factbook. The unemployment rate measures the share of the labor force that is without jobs (Central Intelligence Agency 2009). According to Fajnzylber, Lederman, and Loayza, “The unemployment rate is an economic-activity variable commonly used in the theoretical and U.S. empirical literatures (Fajnzylber et al. 2002)”. The common argument is that unemployment leads to fewer economic resources and greater amounts of idle time. The unemployment rate is commonly viewed as a measure of income opportunities in the labor market (Fajnzylber et al. 1998, 4). Therefore it is expected that rises in the unemployment rate will increase homicide rates in Central America.

Primary completion rate is the percentage of students completing the last year of primary school. This statistic is taken from the Millennium Development Goals Indicators and the Nation Master Statistics databases; UNESCO is the original source of the data. Primary completion rate as defined by UNESCO is the total number of new entrants in the last grade of primary education, regardless of age, expressed as percentage of the total population of the theoretical entrance age to the last grade of primary (UNESCO Institute for Statistics 2009). According to Laurie Cameron of the Education Policy and Data Center, “because it measures both the coverage of the education system and the educational attainment of students, the primary
completion rate is a more accurate indicator of human capital formation and the quality and efficiency of the school system than are gross and net enrollment ratios (Cameron 2005).”

Fajnzylber, Lederman, and Loayza suggest that educational effects on crime are mixed. On one hand, the literature suggests that with gains in education, individuals are less likely to participate in criminal behavior due to increased economic opportunity (Fajnzylber et al. 2000). However, other studies have found a positive correlation between education and crime. Isaac Ehrlich suggests, “several explanations for this puzzling empirical finding: education may raise productivity in illegal activities to a greater extent than in legal ones; higher average levels of education may be associated with less underreporting of crimes and with wealthier potential victims; and higher average levels of education may go hand in hand with more pronounced educational inequities (Ehrlich 1975, 319-35).”

Political stability data are taken from the World Bank Development Indicators and reported by the Inter-American Development Bank, Data Website. According to the website:

Political Stability combines in an aggregate index many of the available indicators related to political stability, including those related to presence of violent conflict, the extent of ethnic tensions, the likelihood of dramatic changes in institutions or unconstitutional changes in governments, etc. This aggregation of numerous indicators from many different sources is done through an unobserved components model. For each country, all of the indicators available for that country are considered, but this means that implicit definition and content of the indicator (number and nature of the indicators that go into determining the indicator value) vary across countries. The indicators considered in the index include some which are based on surveys and others which are polls of experts. The index ranges from 2.5 and -2.5. A value of 0 indicates the average of the world sample.

Political stability captures the impact of the government capacity on homicides and has been used in studies that capture the effects of political institutions on violence (Cole and Gramajo 2009, 7). Increasing political stability reflects improved security and institutional infrastructure,
a strong rule of law, and measurable consequences for perpetrators of crime (Cole and Gramajo 2009, 7). Consequently increased political stability is predicted to decrease homicides.

Overall the use of an OLS model for the six variables in the empirical model provides for a robust study of the hypothesis in question (See Table 2). When controlling for the variables that impact the number of homicides in Central America, the effect of the main independent variable, criminal deportations, on homicide rates is isolated. The evidence of a significant relationship supports the hypothesis and suggests amended policy approaches to the laws that are relevant to criminal deportations.

<table>
<thead>
<tr>
<th>Table 2</th>
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<tbody>
<tr>
<td>Regression Model</td>
</tr>
</tbody>
</table>

\[
\text{Homicide Rates} = B_0 + B_1 (\text{criminal deportations}) - B_2 (\text{gdp per capita}) + B_3 (\text{unemployment rate}) + B_4 (\text{primary education rate}) + B_5 (\text{political stability}) + \mu
\]

**ANALYSIS PLAN**

This study uses country level data to analyze the effects of criminal deportations on the entire region of Central America. National crime trends in Central America are measured with time series data. The model estimates the regional trends of homicides following the U.S. decision to focus deportations on criminals. This study uses a minimum number of variables in order to create a parsimonious model; which tends to be robust and lends itself to a rich analytical interpretation (Assimakopoulos et al. 2007). Such a model enables the most effective investigation of the underlying hypothetical relationship between criminal deportations and homicide rates in Central America.
Ordinary least squares (OLS) is used as the method of analysis. Several other studies in the related literature also use OLS to measure the impact of variables on homicide rates. The primary empirical model used by Cole and Gramajo, for example, is an OLS model and provides justification for the use of OLS in this study. In OLS, each slope estimate measures the partial effect of the corresponding independent variable on the dependent variable, holding all other independent variables fixed (Wooldridge 2003, 74). The OLS model is the best application to measure the effects of each variable while maintaining a parsimonious model.

Two variables in the analysis are lacking data points: primary education rates and political stability. Primary education is missing a total of three data points for the nation of Honduras during the years 1999, 2002, and 2003. This represents 5.36% of the total observations. Political stability is missing two data points for each nation during the years of 1999 and 2001. This represents 14 total missing data points or 25% of the total observations. Table 3 shows the descriptive statistics for each of the variables in the model including the before and after affects of data imputation on the variables in question.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homicide Rates</td>
<td>56</td>
<td>24.46</td>
<td>15.25</td>
<td>6.34</td>
<td>55.89</td>
</tr>
<tr>
<td>Criminal Deportations</td>
<td>56</td>
<td>1004.43</td>
<td>1189.43</td>
<td>56</td>
<td>5591</td>
</tr>
<tr>
<td>GDP per Capita</td>
<td>56</td>
<td>6012.44</td>
<td>2720.82</td>
<td>2014.03</td>
<td>11353.15</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>56</td>
<td>12.22</td>
<td>7.10</td>
<td>5.2</td>
<td>29</td>
</tr>
<tr>
<td>Primary Education</td>
<td>53</td>
<td>84.75</td>
<td>12.95</td>
<td>53</td>
<td>103.6</td>
</tr>
<tr>
<td>Primary Education*</td>
<td>56</td>
<td>84.49</td>
<td>12.81</td>
<td>53</td>
<td>103.6</td>
</tr>
<tr>
<td>Political Stability</td>
<td>42</td>
<td>.015</td>
<td>.553</td>
<td>-.91</td>
<td>1.06</td>
</tr>
<tr>
<td>Political Stability*</td>
<td>56</td>
<td>-.002</td>
<td>.509</td>
<td>-.91</td>
<td>1.06</td>
</tr>
</tbody>
</table>

*The descriptive statistics for these variables were created through data imputation.
Due to the small size of the overall sample, 56 observations, it is important that each observation be accounted for in the regression model. The missing data points of the two independent variables require data imputation. Data imputation for this study is performed in Stata, the data analysis and statistical software that is used to run the specifications for this study. Carpenter and Kenward have found that an OLS regression analysis will be valid with use of the proper imputation methods (Carpenter and Kenward 2004). The method of multiple imputation is currently the only practical, generally applicable, approach for substantial datasets (Carpenter and Kenward 2004). According to UCLA Academic Technology Services:

The idea of multiple imputation is to create multiple imputed data sets for a data set with missing values. By using the command “impute” the missing values are filled in through the organization of cases by patterns of missing data. The analysis of a statistical model is then done on each of the multiple data sets. The multiple analyses are then combined to yield a set of results (UCLA Academic Technology Services 2010).

Use of this method of imputation is supported by the fact that the variables in question represent neither the dependent variable nor the independent variable. Therefore, the imputation will not compromise the underlying relationship in question.

Overall, the measurement of political stability and primary education rates are consistent from year to year. For variables that move incrementally from one year to the next data imputation is justified because of the consistency in the estimates of the variable (Kraay 2010). Furthermore, primary education rates contain only three missing observations. With such a small number of observations, data manipulation will have a diminutive impact on the overall model in question. For all of the above reasons, the use of data imputation does not blemish the overall results of the study.
In total six OLS regressions are computed, each regression excluding a different variable to control for multicollinearity. This is followed by an analysis of the results, with special focus on the variable of criminal deportations.

**DATA LIMITATIONS**

Limitations of the proposed data set begin with the accuracy of the homicide statistic. It is widely held that crime statistics are subject to bias, especially in Central America (United Nations Office of Drugs and Crime 2007). The homicide statistic for this study is subject to bias as it is measured by different police institutions and other government bodies and then gathered by the Central American Observatory of Violence (OCAVI) in the seven Central American countries. Inaccuracies stem from the motivation of these bodies to report lower homicide statistics in order to appear as effective prosecutors of the law. However, the bias created via this inaccuracy goes against the theoretical relationship in the hypothesis. Therefore, the presence of such bias strengthens any finding of a positive effect of criminal deportations on homicide rates.

Another data limitation concerns the probable underreporting of unemployment data (Central Intelligence Agency 2009). In Central America it is much more difficult than in more developed regions to identify the members of society who desire to work, but are unemployed. Also, informal employment is a common practice in Latin American nations (Huitfeldt, Jütting, and Sida, 2009). These factors may bias estimates of the relationship between unemployment rates and homicide rates.

**CAVEATS**

Four problems are common with macroeconomic data as it is used in this study: heteroskedasticity, multicollinearity, omitted variable bias, and serial correlation. Omitted
variable bias is a primary weakness of panel data regressions over a period of time is (Princeton University 2007). When looking at country level determinants of the homicide rate, many variables have the potential to explain behavior. Given the limited availability of data for this region, the general model is restricted.

Due to the lack of data, the model is limited in its investigation. Future research with greater amounts of data has the potential to investigate other variables in this model. Nevertheless, the large majority of studies cited in the framework are also restricted, making use of only several variables in their models. Therefore, with support from the literature, the variables of the model are adequate indicators for this the purposes of this study.

Fixed effects models are commonly employed with panel data to solve for omitted variable bias and serial correlation (Wooldridge 2003, 439). However due to a small sample size this method is not optimal for this study. Fixed effects works best when there are relatively fewer cases and more time periods, as each dummy variable removes one degree of freedom from the model (Princeton University 2007). With seven countries over a period of eight years, the model loses too many degrees of freedom to enable an accurate study of the main relationship under investigation.

Given a high amount of correlation between criminal deportations and the dummy variables for the seven Central American nations in the study (See Appendix Two), use of the fixed effects model would take away all significance from criminal deportations. To maintain focus on the purpose of this study and its hypothesis, use of the fixed effects model was not used. Moreover, several basic models used in the literature employ the use of OLS (Cole and Gramajo 2009). It is important to maintain the basic model proposed in the literature which strengthens the argument against the use of the fixed effects model.

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Multicollinearity is another issue of concern. There are indeed several instances where multicollinearity appears to be an issue in the model used in the present study (See Table 4). To solve for this issue, the data analysis includes six separate regressions, excluding one variable in each regression. In each regression the magnitude and significance of criminal deportations is analyzed. The issue of multicollinearity is most prevalent with one variable: Political Stability. As a result, special attention is given to the regression that excludes this variable.

| Table 4 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Homicide Rate   | Primary Education | Criminal Deportations | GDP/Capita   | Unemployment | Political Stability |
| Hom Rate         | 1               | -0.0345           | 0.7592               | -0.342       | 0.1658       | -0.508           |
| Prim Ed          | 1               | 1                | -0.2015              | 0.6053       | 0.0516       | 0.6318           |
| Crim Dep         | 1               | 1                | 1                   | -0.4177      | -0.198       | -0.545           |
| GDP              | 1               | 1                | 1                   | 1            | -0.4966      | 0.7562           |
| Unemp            | 1               | 1                | 1                   | 1            | 1            | -0.3079          |
| Pol Stab         | 1               | 1                | 1                   | 1            | 1            | 1                |

Heteroskedasticity is easily solved in Stata by using the hc3 command. In each OLS regression, I used this command as a safeguard in preventing this common time-series data problem. Serial correlation remains as a possible issue in the models estimated for this study. However, while the presence of serial correlation is a possibility, it is not likely in this specific data set. Serial correlation is common in panel data sets with only a few countries over a large number of years or with high numbers of countries over a few years (Moon and Phillips 1999).
Future studies using fixed effects models expanding upon the findings of this study will be able to investigate this issue in depth.

RESULTS AND ANALYSIS

Table 5 contains a summary of six regressions with *homicide rates* as the dependent variable. The six models are differentiated by the combination of independent variables used in each model. As discussed in the Data Analysis section, the different model specifications were estimated to solve for the issue of multicollinearity. The general model, which includes all of the variables in the study, is estimated in Model 1.

The F statistic in each model is highly significant, suggesting that each model specification is appropriate. There is also a moderately high adjusted r-squared across the board with only one value dropping below .5943. The combination of a highly significant model with moderately high r-square values suggests that the use of the overall model is appropriate for the goals of this study.

Descriptive literature reviewed above implies a positive relationship between *criminal deportations* and *homicide rates*. Consistent with the literature, the variable *criminal deportations* is both significant and positive in the five regressions in which it is included. Notwithstanding the high levels of correlation between several variables in the matrix (Table 4), the criminal deportation variable is consistently robust.

In addition to its significance, the criminal deportation variable is also a strong predictor of the *homicide rates* variable. The magnitude of this variable ranged between .0078 and .0093 which means that for every 1000 criminal deportations, the homicide rate increases between 7.8 and 9.3 homicides per 1000 people. This is a significant effect when considering that the mean
number of deportations in one year is over 1000 and the mean homicide rate is slightly over 24 homicides per 1000 people. Such evidence suggests that the hypothesis of this study is valid.

Two other variables in Table 5 were also consistently significant: primary education and political stability. While these variables are highly correlated, they maintain significance when
either variable is left out of the model. This suggests that their inclusion in the overall model is important when determining causal factors for homicide rates in Central America. The negative correlation between political stability and homicide rates is consistent with multivariate studies in the literature framework. Political stability as measured through improved security and institutional infrastructure and a strong rule of law are suggested to deter crime in many studies (Lederman et al. 2002).

Also consistent with the empirical literature that suggests education is positively correlated with homicide rates, the primary education variable is positive in each model. As Ehlrich suggests and as is noted in the Data section there are several possible reasons for the positive correlation. The two most likely reasons in the case of Central America are the low quality of education provided and the increase in levels of inequality. Central America lags behind many other regions in the world in its quality of primary education (UNESCO 2008). With low levels of quality, gains in primary education are limited in their long-term societal impact. Secondly, levels of inequality in Central America are consistently among the highest in all of the world (Hammill 2007). When combining these factors it is plausible to suggest that increasing primary education rates are positively correlated to increasing homicide rates.

Nonetheless, these variables are relatively weak predictors of homicide rates in each model. The magnitude of the primary education variable ranges between .3400 and .7314. A one standard deviation change in primary education rates of 12.81 units increases homicide rates between 4.36 and 9.37 homicides per 1000 people. However, a one standard deviation change is uncommon over a one year time period and much more likely over a decade. Political stability’s effect ranges between -6.546 and -23.87 homicides per 1000 people. Similar to the primary education variable, political stability is very stable with only minor changes in its magnitude
over a short period of years. A one standard deviation change in political stability of .509, homicide rates decreased between 3.33 and 12.15 homicides per 1000 people.

Two variables, GDP per capita and unemployment rate, lack significance in every model estimated in Table 5. Furthermore, the signs of these variables change in the different models. The lack of significance and weak predictive values are consistent for each variable in every model. This suggests that individual income and unemployment rates have minimal impact on homicide rates in Central America.

**POLICY IMPLICATIONS**

Given the statistical evidence in this study that criminal deportations increase violence in receiving countries; maintaining the status quo could threaten the stability of the Americas. Central American nations have often been overlooked in U.S. foreign policy, but their proximity to the U.S. border makes them a potential national security issue. Networks of organized crime have flourished throughout the region as drug cartels and gangs have become more powerful than ever (Seelke 2008). The addition of criminal deportees into the existing network of criminal organizations complicates the challenge of fighting specific criminal groups such as gangs or drug cartels. Central American and U.S. leaders must seek a comprehensive solution to the problem.

The lack of infrastructure to rehabilitate and reintegrate criminals into society narrows the options of these individuals upon their return to their home countries. Often times criminal deportees have very little knowledge of their country and a lack of community relationships to provide a safety net upon their arrival. These factors force these individuals into a survival mentality eventually funneling them into the aforementioned networks of criminal organizations. Until the incentive structure changes in the lives of criminal deportees, they will be at-risk to the
influence of criminal groups. Moreover, limited government budgets and technical capacity prevent governments in these countries from tracking the location of these deportees upon their arrival (Negroponte 2009). A comprehensive solution will involve the collective action among public, private, and nonprofit groups to manage this overwhelming situation.

National governments and multilateral organizations are beginning to understand the grave threat of ever growing criminal network, yet few policy options have been offered in response. This study reveals the existence of a positive effect of criminal deportations on homicide rates in Central America. Accordingly, this study supports the claims of the descriptive literature which suggests that criminal deportations have a positive effect on homicide rates. With support from descriptive and empirical evidence, I recommend that the Central American and United States Governments review the current sending and receiving deportation strategies.

In addition to policies that are focused on criminal deportations, the statistical evidence of this study also points to two other variables of significance: political stability and primary education rate. Government capacity as represented by the political stability variable is not easily amended. Rather, this factor requires the comprehensive effort of bilateral and multilateral donors, NGO’s, and government will to be changed.

Weak democratic infrastructure is endemic to most Central American nations. In this regard, the efforts of the Millennium Challenge Corporation (MCC) have found success at governmental reform through multi-million dollar compacts with El Salvador, Honduras, and Nicaragua. In each country successes at grassroots levels of society have begun to improve government capacity. Recent controversial political events in Honduras and Nicaragua have demonstrated that a need still remains. Nonetheless, greater bilateral and multilateral
intervention in Central America has the potential to improve the governing capacity of these nations and in turn mitigating levels of violence across the region.

The case of education in the region is more ambiguous. Notwithstanding the empirical arguments correlating education with higher homicide rates, however, the international community is united in its belief that better education is essential to long-term stability and peace in the region. Education has been cited as the key to break the cycle of violence in the lives of youth (Green 2007). Yet, reformers face a great challenge in Central America, as several nations have some of the lowest numbers with regard to universal completion of primary education (UNESCO 2008).

An appropriate response to the problem of homicide rates in Central America must be holistic. Unilateral and piecemeal policy changes in and of themselves are not sufficient. Rather, action must be taken in unilateral, bilateral, and multilateral settings across the Americas. Of all of the international actors, the United States may have the most to gain from stability in these Central American nations, as it would stifle the transnational nature of criminal organizations and the migratory patterns that lead to increased crime within U.S. borders.

While specific policy recommendations fall outside of the scope of this paper, there are several comprehensive strategies identified in the literature framework on crime and immigration policy. These include: Cohen and Rubio and their identification of four solutions that target youth violence in Latin America (Cohen and Rubio 2007); The Washington Office of Latin America (WOLA) identification of seven lessons for community based programs (WOLA 2008); and Negroponte’s review of several successful domestic and regional strategies in the Northern Triangle and suggestion of a role for the U.S. Government in Central America (Negroponte 2009). As stated by Negroponte, “The high number of deportation undermines the capacity of
the states in Central America to care for their youth. To the extent that we add a further burden on these states, we should find a way to ease the transition of deportees into their countries (Negroponte 2009, 71).”

**CONCLUSION**

Over the last decade Central America has been plagued by a host of social problems, creating an environment that magnifies the potential for crime among at-risk members of society. By adding thousands of criminals to this environment, U.S. immigration policy aggravates these existing problems and increases threats to the United States itself. Central American and U.S. leaders must immediately address this dangerous problem. The implications of maintaining the same policies could be detrimental to peace and security across the region. With U.S. immigration reform looming, regional leaders must take this opportunity to point out the long-term benefits of a reformed U.S. criminal deportation strategy across the region.

In addition, notwithstanding the need to reform regional criminal deportation strategies, two other major factors complicate the rising homicide rates. The significant effects of both political stability and primary education rates in this study suggest that these factors are also highly related to homicide rates in Central America. Regional leaders must address these problems with multifaceted policies and projects across the region.

Long-term reductions in homicide rates require a large investment from multiple countries. In addition to the factors investigated in this study there are many other potential factors playing a causal role in the rising homicide rates. Central American countries do not have the ability to respond unilaterally to this complex set of issues. Neighboring nations seeking regional stability must step in to assist.
For centuries, the United States has taken a lead role in assisting the nations of the Western hemisphere. With regional stability at risk due to rising homicide rates in Central America, the U.S. Government needs once again to stand up as a leader in defense of democracy and security. Leadership shown through collaboration with Central American nations in the area of criminal deportation policy will prove to be an investment with long-term returns.
### APPENDICES

#### Appendix One

<table>
<thead>
<tr>
<th>Basic Variable Definitions</th>
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<tbody>
<tr>
<td><strong>homicide rate:</strong> Intentional homicide Rates for every 100,000 persons registered in each of the Central American countries for the period of 1999 – 2006. Data Source: OCAVI, 2007.</td>
</tr>
<tr>
<td><strong>criminal deportations:</strong> Number of aliens removed by criminal status and region and country of nationality. Data Source: Department of Homeland Security, 2007.</td>
</tr>
<tr>
<td><strong>gdp per capita:</strong> Real GDP per Capita derived from growth rates of domestic absorption measured as a conversion of per capita GDP using 2005 as the reference year. Data Source: Penn World Tables, 2009.</td>
</tr>
<tr>
<td><strong>Unemployment Rate:</strong> The unemployment rate is measured per 100 persons. This statistic measures the share of the labor force that is without jobs and substantial underemployment might be noted. Data Source: Central Intelligence Agency, 2009.</td>
</tr>
<tr>
<td><strong>Primary Completion Rate:</strong> This is calculated by taking the total number of students in the last grade of primary school, minus the number of repeaters in that grade, divided by the total number of children of official graduation age. Data Source: Millennium Development Goals Indicators and Nation Master Statistics, 2009.</td>
</tr>
<tr>
<td><strong>Political Stability:</strong> This is combined in an aggregate index. The index ranges from 2.5 and -2.5. A value of 0 indicates the average of the world sample. Data Source: Inter American Development Bank, 2009.</td>
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</tbody>
</table>
### Appendix Two

Correlation Matrix by Country for Homicide Rates and Criminal Deportations

<table>
<thead>
<tr>
<th>Correlation Matrix</th>
<th>Homicide Rate</th>
<th>Criminal Deportations</th>
</tr>
</thead>
<tbody>
<tr>
<td>country1</td>
<td>0.0423</td>
<td>-0.3064</td>
</tr>
<tr>
<td>country2</td>
<td>-0.4747</td>
<td>-0.3235</td>
</tr>
<tr>
<td>country3</td>
<td>0.4302</td>
<td>-0.4813</td>
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<tr>
<td>country4</td>
<td>0.2307</td>
<td>0.244</td>
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<tr>
<td>country5</td>
<td>0.5012</td>
<td>0.4432</td>
</tr>
<tr>
<td>country6</td>
<td>-0.3585</td>
<td>-0.231</td>
</tr>
<tr>
<td>country7</td>
<td>-0.3712</td>
<td>-0.3077</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY


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