THE EFFECT OF VIOLENT CRIME ON FDI: THE CASE OF MEXICO 1998-2006

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By

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Completing this thesis was truly a marathon event, and I would not have been able to complete it without the aid and support of countless people. I must first express my gratitude towards my advisor, Professor Tobias Pfutze who was abundantly helpful and offered invaluable assistance, support and guidance. Deepest gratitude are also due to members of GPPI staff such as Eric Gardner and Jeffrey L. Mayer without whose knowledge and assistance this research would not have been successful.

I am indebted to my many student colleagues and friends for providing a stimulating and enjoyable environment in which to learn and grow.

Last, but most importantly I would also like to thank my family for providing a loving environment for me. Thanks to my parents, brothers and sisters for the support they provided me through my entire life, for giving me confidence and for teaching me that graduate school is not the most important thing in life, but family, friendship, good times and happiness are. In particular, I must acknowledge my wife without whose love, encouragement, and ability to raise my spirits when I was most discouraged, I could never made it this far. Marifer, during these years you were the wind beneath my wings.

Many thanks to all of you,

Federico Madrazo Rojas
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ABSTRACT

Theory and research have revealed important elements of the structure and functioning of Foreign Direct Investments (FDI) in developing countries. The objective of this quantitative study is to shed light on the determinants of FDI in Mexico. Particularly, on the effect that violent crime has on FDI.

The aim is to understand whether and to what extent FDI undertaken by multinational enterprises reacts to an increase on violence in the host country. In order to carry it out this research, I performed an econometric model analysis for the years 1998-2006 based in panel data, created specifically for this purpose.

The idea of this study resides on the perception that violent crime in Mexico has reached a level that could have been affecting multinational enterprises decision on whether to invest or not in Mexico. Among the mayor conclusions I have that FDI is correlated to violent crime, GDP and minimum wages.
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I. INTRODUCTION

The objective of this quantitative research is to examine whether violent crime in Mexico has a negative and significant effect on Foreign Direct Investment (FDI), analyses up to an extent, what happened at the state-level in Mexico with other related hypothesis that have been advanced to measure the variation of FDI activity in developing countries.

Since the economic liberalization of the regimes of many FDI recipient countries in 1980, numerous analyses have addressed and viewed FDI related topics through several theoretical lenses. These analyses have recognized that modeling FDI in developing countries is a complicated task due to the fact that many different variables intervene and affect the decision of multinational enterprises (International Monetary Fund, 1991; Ramírez, 1994; Rothgeb, John. 1991; Habib et al, 2002; Sethi et al, 2003; Foster, 2000; Billington, 1999; Jun et al, 1996).

Many factors shape the decision of entrepreneurs to invest abroad, including resource seeking, market seeking, efficiency seeking and strategic asset seeking. Researchers have proceeded in numerous directions identifying different variables
that might be expected to affect private investments in developing countries. In most cases they have agreed that the location of FDI is driven by culture of host country, market size, market growth, barriers to trade, taxation and regulations, wages, level of education, transportation, infrastructure, physic distance and political stability and domestic conflict (Dunning, 1993; Foster, 2000).

Numerous studies have also concluded that a productive private sector environment contributes to and reinforces the decision to invest abroad, while a poor business environment increases the obstacles to conducting business activity and therefore decreases the prospects for high levels of FDI.

The economic literature on political stability and domestic conflict has also grown rapidly both in theoretical and empirical areas. However, most of this work has been concentrated on the comparison of legal and criminal returns and the role of deterrence of the police and justice departments, and has excluded economic activity. Only few researchers have studied with quantitative techniques the effect of domestic stability and absence of violence on the economic activity (Lederman et al 2002).
Recent surges of political instability and domestic conflict in host developing countries have drawn more attention and have demanded new research on true correlation between private investments, domestic conflict and political stability. According to Moshin and Zurawicki, this area of analysis has recently been important since the very strategies that are promoted by multinational enterprises as means for achieving their own growth may lead in the future to different types of domestic conflict in host countries, if these countries stop receiving the investments they expect.

Furthermore, researches agreed that FDI patterns need to be examined over time since factors favoring multinationals’ initial investment in a country could change promptly and, therefore, move the investments elsewhere. Several strategic considerations could motivate such shifts, such as the increase of competitive intensity at the original location, cost cutting requirements which prompt the search for new low cost production locations, shifts in macroeconomic factors, increases in political conflict at original location or pressure to enter new markets in response to similar moves by rivals (Sethi et al, 2003).
Most of the quantitative papers that have addressed these topics have focused their attention at the country-level because, as Greene, Joshua and Villanueva note, it has been particularly difficult to evaluate the private investment function using state-level data in developing countries due to the fact that data for certain variables are normally either unavailable or inadequate.

Nevertheless, researchers should pursue research as far as possible using state-level data in developing countries, because the determinants that may shift FDI to other locations affect all multinational enterprise uniformly and simultaneously no matter what the FDI’s original location is, so the reallocation of FDI could happen within the same country. And it might be the case that only those states meeting basic minimum standards will qualify for further evaluation by multinational enterprises.
II. BACKGROUND

The Mexican Revolution of 1910-1917 gave birth to a seemingly powerful state, democratic in appearance but highly authoritarian in nature, in which power was monopolized for decades by the Institutional Revolutionary Party (PRI). According to historians such as Enrique Krauze, after the revolution Mexico became an island of peace, where refugees came from all over the world to escape violence. Since the revolutionary era, however, much have changed.

Felipe Calderón of the Partido Acción Nacional (PAN) was elected President of Mexico in 2006 in an extremely tight race, with a victory margin of less than one percent. As he took office, he declared that “organized crime is out of control” and launched 45,000 army troops against drug trafficking gangs. Since then, according to Reforma newspaper some 10,000 people have died in drug related executions and during 2007 some 17 kidnaps took place everyday. In that year, Mexico occupied second place worldwide in the number of such crimes behind Colombia, according to ICESI, a citizen group that studies security in Mexico and that is sponsored by the Mexican private sector (Information to die for, 2009).
In November 2008, the United States Joint Forces Command approved for public release an assessment that concluded that the two countries most at risk of becoming failed states were Mexico and Pakistan. The assessment argued that drug and arms trafficking in Mexico had overwhelmed the capacity of the state to impose the rule of law.

According to Genaro García Luna, Mexican Minister for Public Safety, the increasingly violence is a sign that the drug gangs are turning on each other in a fight to hang on to a share of a shrinking business. Nevertheless, since December 2006, more than 800 police and soldiers including several senior police officers and the commander of the Federal Police have died.

Eduardo Medina Mora, Mexican Attorney General, argues that despite what has been said about the Mexican situation, Mexico’s murder rate has been relatively low during the last years, 11 homicides per 100,000 people, and that the country will soon restore peace. But while this happens, some questions remain unanswered. What would be the overall effect of this fragile situation on the economy and especially on private investments?
In fact, despite these assessments, Mexico may have reached a level of uncertainty that could threaten the domestic stability, deterring the economic activity and affecting FDI growth. One of the biggest concerns is that if this situation does not stop somehow, drug gangs will continue to expand and diversify into other criminal businesses like extortions and protection rackets just as happened in Columbia a few years ago. Can a country as developed as Mexico lose this battle? Is Mexico already a failed state?

It was not long ago when Mexico was perceived in the international arena as an attractive and solid market due to its strategic location, population size, developed infrastructure, regulatory regime and socio-political climate. For a developing country like Mexico, it is essential to have a clear understanding of all factors that threaten economic activity. To provide such understanding, the present study identifies a number of social, economic and crime variables and measures their effect on the level and location of FDI in Mexico.
III. CONCEPTUAL FRAMEWORK AND HYPOTHESIS

The present study assumes that, for a country like Mexico, it is important to have a complete understanding of the role that domestic conflict have on FDI since it might produces uncertainty in the strategies promoted by domestic and multinational enterprises, affecting the domestic economy. After reviewing and analyzing literature regarding the effect of political instability and domestic violence, the study begins with the following hypothesis:

**Hypothesis:** Violent crime in Mexico has a negative and significant effect on the amount of FDI yearly received.

I expect to observe that any rise in violent crime would reduce FDI. I believe that violence in Mexico has reached a level where enterprises’ decisions on whether to invest or not have been affected and, therefore, they might be shifting their investments to more secure locations. Nevertheless, the aim of this research is to measure if a unit increase in violent crime affects FDI flows in Mexico.
IV. LITERATURE REVIEW

The following materials have been advanced to explain FDI activity in developing countries and have discussed the main difficulties of conducting state-level analysis in the field. These researches have analyzed in detail the variables that are expected to affect multinational enterprises’ decisions on whether to invest in host countries.

Klapper, Amit, Guillen, and Quezada conducted a comprehensive longitudinal study of entrepreneurial activity, *Entrepreneurship and Firm Formation Across Countries*. The authors concluded that disparities in economic growth between advanced and less developed countries can be narrowed by the growth of entrepreneurial activity. They found that variables low barriers to entry, a positive business environment and low levels of corruption are significant and necessary to achieve firm formation.

Because of the importance of governance in the entrepreneurial activity, I also looked at Daniel, Kraay, Aart and Mastruzzi, *Governance Matters V: Aggregate and Individual Governance Indicators for 1996-200*, that provides the latest version of the worldwide governance indicators according to the World Bank. The six dimensions they described were: voice and accountability, political stability and
absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

The cross-country analysis elaborated by Johnson and Koufmann, *Regulatory Discretion and the Unofficial Economy*, reinforced the idea that entrepreneurships are most likely to operate in low-corrupt countries in order to avoid the burdens of bureaucracy and corruption. The authors find that regulations, taxes and governance environments, affect the creation of new firms, the average size of these firms and its dynamism. Their study confirms, at the country-level, what I expect to observe at the state-level regarding governance environment affecting the dynamism of firms.

In their paper *Corruption and Foreign Direct Investment*, Moshin and Zurawicki, expanded the research on the negative effect of corruption. This cross-country study goes beyond what had been examined in the field and concludes that corruption is a serious obstacle for investment and that investors try to avoid corruption because it can create operational inefficiencies.

As mentioned, several authors have addressed the many different implications that political stability has on economic activity. In this regard, Kobrin’s cross-country analysis concludes that political stability positively affects FDI. In his paper
Environmental Determinants of Foreign Direct Manufacturing Investment, Kobrin states that uncertain political situations crowd out investors.

In addition, Khan and Reinhart’s cross-country analysis, *Private Investment and Economic Growth in Developing Countries*, indicates that the rate of private investment is positively correlated with real GDP growth, level of per capita income, and rate of public sector investment, while it is negatively correlated with public debt. This paper expanded the analysis on the variables that are expected to affect private investment decisions.

Finally, I also looked at how other researchers have accounted for the independent variable of interest, violent crime. Lederman, Loayza, and Menendez were helpful. They note that economic literature on political conflict and absence of violence has looked into the antecedents and consequences of crimes and has suggested that the incidence of violent crime in a country can be represented by its rate of homicides. The present study follows this practice, using the homicide rate as its variable for “violent crime”.

According to Arturo Aragón and his paper *Información Confiable: Los Problemas de la Información Estadística*, Mexico does not have at any tier of government a
reliable crime statistic system. He argues that Mexico has different types of crime statistics: real data, hidden data, official data, and apparent and legal data.

In his qualitative research, Aragón mentions that even when victims report to authorities’ crimes committed, the reports are not necessarily reflected in the official data. For a better understanding, he describes the following example: If two robbers inside a public bus rob ten passenger, rape two others and injure another with a bullet, even in the case that all the victims report the incident, the official data will only reflect one of these crimes in its statistics because all of them occurred at the same crime scene. Hence, authorities will include crimes as a whole and not individually. The crime that will be included in the official data will depend on the ministerial police criteria and on the highest penalty for each individual crime.

According to Aragón, an additional problem arises with the official data in Mexico because once the crimes are reported there is no legal way to change the report. Thus, if an injured person died as a consequence of an assault, but after the filling of the report, there would not be a way to modify the official report.

In sum, most researchers agreed that there are a number of variables that are expected to have a positive and significant effect on FDI and some others to have a
negative but significant effect on it. Market growth, GDP growth, per capita income, population density, liberal government policies, infrastructure quality, skilled labor, cultural proximity, low wages and clear regulations have been identified on the first category; while public debt, high wages, corruption, high taxation, political instability and presence of violence, strong labor unions and inefficient regulatory system have been identified on the second category.
V. DATA METHODS

V. I Data Sources

Due to the characteristics of my research question and of the project itself, it was not possible to acquire a dataset with all the variables I would have liked to have, consistent with what I previously discussed and what other studies have used. Therefore, I created my own dataset by collecting all the variables I possibly could directly from different sources. All the data captured was annual and covered the 32 Mexican states between the years 1998-2006.

The sources of the data were: The National Institute of Statistics, Geography and Informatics (INEGI), databases: Sistema de Cuentas Nacionales, Estadísticas Judiciales en Materia Penal, Estadísticas Económicas y Estadísticas de las Finanzas Públicas Estatales y Municipales; Ministry of Economy, Dirección General de Inversión Extranjera; Mexican House of Representatives, Centro de Estudios de las Finanzas Publicas (CEFP); A-regional; International Transparency–Mexico; Center of Economic and Studies of the Private Sector (SIEM); Sistema Nacional de Seguridad Pública (SNSP) and Instituto Ciudadano de Estudios Sobre la Inseguridad (ICECI).
The dataset created served my purposes in a better way than any other individual dataset would have served, because as estimated there is not a complete dataset that contains all the variables I wanted to use to account for state-level FDI. However, even by following this approach, it was not possible to collect data on all of the variables used in previous studies. As expected, I found that data for certain variables were not available.

V. II Variable Descriptions

The following variables are the ones that I successfully integrated to the dataset used, and are the ones that I expect would better help me explain the research question.

FDI: Foreign Direct Investment received by states per year.

Unit: Per capita in US dollars

Period: 1998-2006

Note: Dependent variable in all econometric models.

Note: This variable does not capture the exact location of the FDI. Location was assigned according to the place (states) where multinational enterprises paid taxes.
**Homicides:** Total number of homicides registered by states and reported to INEGI per year.

Unit: Number of homicides per 100,000 people

Period: 1998-2006

Note: Independent variable of interest that reflects the incidence of violent crimes.

**Kidnapping:** Total number of kidnapping registered by states and reported to SNSP per year.

Unit: Number of kidnaps per 100,000 people

Period: 1998-2006

**Efficiency of the Judiciary System:** This proxy variable was calculated by subtracting probably delinquency (total number of people per state that were reported by victims and did not received a condemnatory sentence) to sentenced delinquency (total number of people per state that received a condemnatory sentence and were reported to SNSP) per year.

Unit: Number of no condemnatory sentences per 100,000 people

Period: 1998-2006

**Population Density:** Refers to the total number of inhabitants per square kilometer per year.

Unit: Inhabitants per square kilometer

Period: 1998-2006
Strikes: Refers to the number of strikes that were reported to the Ministry of Labor per year.
Unit: Number of strikes per 100,000 people
Period: 1998-2006

Infant Mortality: Total number of infant deaths according to states and reported to INEGI per year.
Unit: Number of deaths per 100,000 people
Period: 1998-2006
Note: This variable and schooling are intended to reflect human capital.

Schooling: Average level of education per state per year according to a-regional.
Unit: Years of education
Period: 1998-2006
Note: This variable and infant mortality are intended to reflect human capital.
Note: This variable considers only people who are at least 15 years old.

Public Debt: Total amount of public registered by states at the end of each year.
Unit: Mexican pesos per capita
Period: 1998-2006
**Public Infrastructure:** Total amount of public money invested by states in the creation of public infrastructure per year.

Unit: Mexican pesos per capita

Period: 1998-2006

**Minimum Wage:** Authorized minimum wage according to Federal Legislation.

Unit: Mexican pesos

Period: 1998-2006

Note: For Chihuahua, Guerrero, Jalisco, Mexico, Nuevo León, Sonora, Tamaulipas and Veracruz that had more than one authorized minimum wage per state, I averaged the minimum wages.

**Real GDP:** Real Gross Domestic Product.

Unit: Millions of Mexican pesos (base year 1993)

Period: 1998-2006

**Per Capita Income:** Average income that refers to the amount that each individual received yearly.

Unit: Mexican pesos (base year 1993)

Period: 1998-2006
Corruption Index: Perceived level of corruption as determined by random opinion surveys that asked about the provision of 35 public services.

Unit: Corruption Index (0-100). Where 0 indicates no corruption in services provided and 100 indicates corruption in all the services provided.

Period: 2001-2007

Note: These surveys were conducted by every other year, so in order to get data for 2002, 2004 and 2006 I averaged the previous and the following year.

Number of Enterprises: Total number of legally registered and operating firms per year.

Unit: Number of enterprises per 100,000 people

Period: 2001-2006

Days to Open a Business: Average time that it took enterprises to open a new business according to random surveys.

Unit: Days

Period: 2000-2005

Bribes: Amount of money paid by enterprises to Mexican officials in order to open a new business.

Unit: Mexican pesos

Period: 2001-2005
VI. ANALYSIS PLAN

It was helpful to observe on previous country-level related work that entrepreneurial activity requires some necessary conditions in order to subsist. It made us infer that similar requirements for entrepreneurial activity are desirable at state-level.

In order to address research question and find whether or not violent crime has a negative and significant effect on FDI, I first lagged by one year all the independent variables on the assumption that FDI decisions are likely to be based on information of the previous year. Then I created a correlation matrix in order to identify and test my initial assumption with regard the correlation sign and significance of all the control variables with the dependent variable, FDI.

Second, I ran a basic model for the period 1998-2006 that regresses FDI on lag-homicide in order to confirm my previous assumption and to observe the correlation sign and significance; and then added all the independent variables of interest that had observations for the period of attention in order to observe significance, sign and magnitude of coefficients.
Third, I excluded from the model all the variables that in the previous step were insignificant and observed the magnitude and sign of the remaining variables. Finally, for the benefit of future research, I discussed the significance and sign of those control variables that I could not incorporate to my unrestricted model due to unavailability of data for the full sample. The idea of doing this, is to provide some insight about the impact that these variables could have at the state-level. I described what I was able to observe in Mexico during the period 2002-2004.

Because my data are panel data, I use as the correct or appropriate specification a Fix Effects model, in order to sweep out alpha and observe the changes over time and across states. Nevertheless, in the results section of this study I also included the results from a Pooled Ordinary Least Square (OLS) model, in order to compare results of the models regarding the sign, significance and magnitude of all coefficients.

Even when I expected to observe more significant variables in the unrestricted version of the Pooled OLS model than in the unrestricted version of the Fixed Effects model, I only took into consideration for the restricted model those variables
that were significant in the Fixed Effects model because, as mentioned, I believe this is the appropriate model to follow.

VI.I Description of Model

Advantages of using a **Fixed Effects Model**:

\[ y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \ldots + \beta_k X_{it} + \alpha_i + \alpha_t + u_{it} \]

The main advantage of using a Fixed Effects model is that it allows me to examine the unobserved factors affecting the dependent variable. These consist of two types: Those that are constant and those that vary over time. Letting \( i \) denote the cross sectional unit (states), \( t \) denotes the time period, \( \alpha_i \) captures all unobserved unit constant factors that affect \( y_{it} \), and \( \alpha_t \) captures all unobserved time constant factors that affect \( y_{it} \).

**Fixed Effects Model** used in the present study:

\[
\text{FDI}_{it} = \beta_0 + \beta_1 \text{homicides}_{i,t-1} + \beta_2 \text{kidnaps}_{i,t-1} + \beta_3 \text{judi} - \text{efficiency}_{i,t-1} + \\
\beta_4 \text{population} + \beta_5 \text{strikes}_{i,t-1} + \beta_6 \text{infant mortality}_{i,t-1} + \beta_7 \text{schooling}_{i,t-1} + \\
\beta_8 \text{public} + \beta_9 \text{public infrastructure}_{i,t-1} + \beta_{10} \text{minimum wage}_{i,t-1} + \beta_{11} \text{GDP}_{i,t-1} + \\
\beta_{12} \text{per capita income}_{i,t-1} + \alpha_i \text{year 1998} + \alpha_i \text{year 1999} + \alpha_i \text{year 2000} + \\
\alpha_i \text{year 2001} + \alpha_i \text{year 2002} + \alpha_i \text{year 2003} + \alpha_i \text{year 2004} + \alpha_i \text{year 2005} + \alpha_t + u_{it}
\]

Where \( \text{FDI}_{it} \) denote foreign direct investment of \( i \) (32 Mexican states) during year \( t \) (1998-2006) and \( \alpha_i \) represents each individual state.
VII. RESULTS AND ANALYSIS

VII.I Descriptive Statistics

Table 1 presents the descriptive statistics of the variables previously listed in the data section but lagged by one year. As mentioned, FDI decisions are likely to be based on information on the previous year. The data used in this analysis are annual and cover the 32 Mexican states between the years 1998-2006.

As shown in table 1, the number of observations is not constant across all variables. It varies from 160 to 288 observations. The dependent variable FDI and the independent variables, lag-homicides, lag-public infrastructure, lag-minimum wage, lag-GDP, lag-kidnaps, lag-efficiency of the judiciary system, lag- population density, lag-strikes, lag- infant mortality and lag-schooling all have 288 observations.

The observed mean for FDI is 120 USD per capita with a minimum value of -35 USD and a maximum of 2,530 USD. For lag-homicides (the independent variable of interest), the observed mean is 7.44 homicides per 100,000 people with a maximum of 16.97 and a minimum of 1.
Furthermore, I was able to identify with the aid of a correlation matrix, that variables lag-homicide, lag-infrastructure, lag-minimum wage, lag-enterprises, lag-GDP, lag-per capita income, lag-population density, lag-schooling, lag-infant mortality, lag-corruption index and lag-bribes were statistically significant and correlated with FDI.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI</td>
<td>288</td>
<td>-34.97</td>
<td>2,529.63</td>
<td>120.41</td>
<td>264.17</td>
</tr>
<tr>
<td>Lag-Public Debt</td>
<td>278</td>
<td>1.92</td>
<td>736.42</td>
<td>114.95</td>
<td>129.67</td>
</tr>
<tr>
<td>Lag-Public Infrastructure</td>
<td>288</td>
<td>9.24</td>
<td>1,814.30</td>
<td>415.76</td>
<td>311.67</td>
</tr>
<tr>
<td>Lag-Minimum Wage</td>
<td>288</td>
<td>22.5</td>
<td>46.8</td>
<td>35.45</td>
<td>7</td>
</tr>
<tr>
<td>Lag-Number of Enterprises</td>
<td>160</td>
<td>56.80</td>
<td>3,105.79</td>
<td>670.99</td>
<td>576.78</td>
</tr>
<tr>
<td>Lag-GDP</td>
<td>288</td>
<td>6,978.64</td>
<td>328,647</td>
<td>45,553.01</td>
<td>57,740.7</td>
</tr>
<tr>
<td>Lag-Per Capita GDP</td>
<td>288</td>
<td>5,875.84</td>
<td>38,090.85</td>
<td>14,375.8</td>
<td>6,632.49</td>
</tr>
<tr>
<td>Lag-Bribes</td>
<td>160</td>
<td>0</td>
<td>104,333</td>
<td>6,849.54</td>
<td>11,686.58</td>
</tr>
<tr>
<td>Lag-Days to Open a Business</td>
<td>224</td>
<td>17</td>
<td>143</td>
<td>48.57</td>
<td>19.20</td>
</tr>
<tr>
<td><strong>Crime Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag-Homicides</td>
<td>288</td>
<td>1.08</td>
<td>16.97</td>
<td>7.44</td>
<td>3.04</td>
</tr>
<tr>
<td>Lag-Kidnaps</td>
<td>288</td>
<td>0</td>
<td>17.61</td>
<td>3.68</td>
<td>1.22</td>
</tr>
<tr>
<td>Lag-Efficiency Judiciary System</td>
<td>288</td>
<td>-55.98</td>
<td>250.80</td>
<td>62.57</td>
<td>43.83</td>
</tr>
<tr>
<td><strong>Social Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag-Population Density</td>
<td>288</td>
<td>5.34</td>
<td>5,718.63</td>
<td>265.89</td>
<td>977.25</td>
</tr>
<tr>
<td>Lag-Strikes</td>
<td>288</td>
<td>0</td>
<td>6.14</td>
<td>.321</td>
<td>.856</td>
</tr>
<tr>
<td>Lag-Infant Mortality</td>
<td>288</td>
<td>6.70</td>
<td>87.34</td>
<td>34.62</td>
<td>13.91</td>
</tr>
<tr>
<td>Lag-Schooling</td>
<td>288</td>
<td>4.15</td>
<td>10.05</td>
<td>6.90</td>
<td>1.11</td>
</tr>
<tr>
<td>Lag-Corruption Index</td>
<td>160</td>
<td>2</td>
<td>22.6</td>
<td>7.72</td>
<td>3.48</td>
</tr>
</tbody>
</table>
VII.II  Models for Foreign Direct Investment

Table 2 includes the econometric results for the basic model that regresses FDI on lag-homicide for the period 1998-2006, with asterisk identifying statistical significance. As mentioned, these estimates were generated with both a Fixed Effects and a Pooled OLS model. As expected, the econometric results confirm my assumption that lag-homicides have a negative and significant correlation with FDI.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Simple Model Pooled OLS</th>
<th>Simple Model Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lag-Homicides</td>
<td>-4.09 (-1.96)**</td>
<td>-3.18 (-2.02)**</td>
</tr>
<tr>
<td>2. Year 1998</td>
<td>-58.08 (-1.19)</td>
<td>-54.35 (2.11)**</td>
</tr>
<tr>
<td>3. Year 1999</td>
<td>-15.06 (-.31)</td>
<td>-11.60 (-.45)</td>
</tr>
<tr>
<td>4. Year 2000</td>
<td>4.93 (.10)</td>
<td>8.95 (.35)</td>
</tr>
<tr>
<td>5. Year 2001</td>
<td>41.57 (.85)</td>
<td>45.39 (1.76)*</td>
</tr>
<tr>
<td>6. Year 2002</td>
<td>14.10 (.29)</td>
<td>18.30 (.71)</td>
</tr>
<tr>
<td>7. Year 2003</td>
<td>-21.10 (-.43)</td>
<td>-16.82 (-.65)</td>
</tr>
<tr>
<td>8. Year 2004</td>
<td>9.89 (.20)</td>
<td>14.4 (.55)</td>
</tr>
<tr>
<td>9. Year 2005</td>
<td>30.15 (.62)</td>
<td>34.23 (1.32)</td>
</tr>
<tr>
<td>10. Year 2006</td>
<td>Dropped</td>
<td>Dropped</td>
</tr>
<tr>
<td>Constant</td>
<td>154.41 (4.88)**</td>
<td>143.60 (7.20)**</td>
</tr>
</tbody>
</table>

$t$ values are in parenthesis. Significance level *≤0.10; **≤0.05, ***≤0.01
Table 3 presents the econometric results of interest that were estimated from panel data, with asterisk identifying statistical significance. The unrestricted model includes all independent variables that were available in dataset for the period of attention and the restricted model includes only those control variables that were statistically significant in the unrestricted model according to the Fixed Effects results.

Column 1 presents the Pooled OLS results for the unrestricted model. Variables lag-population density, lag-public infrastructure, lag-minimum wage, and lag-per capita income were statistically significant. However, lag-public infrastructure did not present the expected direction. The rest of the variables, including lag-homicide, were individually and jointly insignificant contrasting to the basic model. This model presented a R-squared of .77.

Column 2 presents the Fixed Effects results for the unrestricted model. The independent variable of interest lag-homicides was statistically significant at alpha .05 and presents a negative coefficient of 12.63 so it corroborates my initial hypothesis. As expected, lag–GDP and lag-minimum wage were statistically significant at all conventional levels and presents positive estimates coefficients and
the rest of the variables were individually and jointly insignificant. The overall model was statistically significant at alpha .01, F= 5.16.

Column 3 presents the Polled OLS results for the restricted model and as projected only lag-minimum wage and lag-GDP were statistically significant. Hence, the Pooled OLS results do not have similar estimates coefficients than the Fixed Effects results. This is not completely surprising, because as discussed, the Pooled OLS model is not the ideal model to follow due to the characteristics of the data used. Nevertheless, the Pooled OLS restricted model presented a R-squared of .64.

In the last column, I present the restricted Fixed Effects results. As expected, the estimated coefficient of the variable of interest, lag-homicides, remained negative and statistically significant at alpha .05. Variables lag-minimum wage, lag–GDP and years 1998-2005 also remained significant and with positive estimates coefficients. The overall model became even more significant than the unrestricted model, F=9.12.
## Table 3
Regression Results Unrestricted & Restricted Model (1998-2006)

Dependent Variable: Foreign Direct Investment

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Unrestricted Pooled OLS</th>
<th>Unrestricted Fixed Effect</th>
<th>Restricted Pooled OLS</th>
<th>Restricted Fixed Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lag-Homicides</td>
<td>-1.92 (-1.54)</td>
<td>-12.63 (-2.02)**</td>
<td>-3.88 (-1.64)*</td>
<td>-12.51 (-2.18)**</td>
</tr>
<tr>
<td>2. Lag-Kidnaps</td>
<td>8.41 (1.16)</td>
<td>.073 (.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Lag-Judiciary</td>
<td>-.117 (-.50)</td>
<td>.244 (.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>.091 (4.74)**</td>
<td>-1.24 (-1.07)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Lag-Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Lag-Strikes</td>
<td>10.35 (1.01)</td>
<td>32.66 (1.17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Lag-Infant</td>
<td>1.00 (1.29)</td>
<td>1.99 (1.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Lag Schooling</td>
<td>4.38 (.46)</td>
<td>-6.75 (-.49)</td>
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<tr>
<td>8. Lag-Public</td>
<td>-.077 (-1.05)</td>
<td>.007 (.08)</td>
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<tr>
<td>Debt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Lag-Public</td>
<td>-.080 (-2.29)**</td>
<td>-.035 (-.92)</td>
<td></td>
<td></td>
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<tr>
<td>Infrastructure</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10. Lag-Minimum</td>
<td>41.97 (5.06)**</td>
<td>72.01 (2.44)**</td>
<td>53.96 (5.93)**</td>
<td>83.67 (3.15)**</td>
</tr>
<tr>
<td>Wage</td>
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<tr>
<td>11. Lag-GPD</td>
<td>.0005 (1.29)</td>
<td>.019 (6.06)**</td>
<td>.003 (14.01)**</td>
<td>.017 (8.60)**</td>
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<tr>
<td>12. Lag-Per</td>
<td>.016 (7.77)**</td>
<td>.007 (.43)</td>
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<tr>
<td>Capita Income</td>
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<tr>
<td>13. Year 1998</td>
<td>785.91 (4.25)**</td>
<td>1612.94 (2.54)**</td>
<td>1106.32 (5.60)**</td>
<td>1901.67 (3.35)**</td>
</tr>
<tr>
<td>14. Year 1999</td>
<td>676.14 (4.42)**</td>
<td>1349.78 (2.59)**</td>
<td>931.87 (5.70)**</td>
<td>1588.17 (3.42)**</td>
</tr>
<tr>
<td>15. Year 2000</td>
<td>554.06 (4.47)**</td>
<td>1098.16 (2.62)**</td>
<td>767.09 (5.76)**</td>
<td>1289.30 (3.45)**</td>
</tr>
<tr>
<td>16. Year 2001</td>
<td>463.50 (4.63)**</td>
<td>867.69 (2.66)**</td>
<td>624.68 (5.84)**</td>
<td>1017.20 (3.50)**</td>
</tr>
<tr>
<td>17. Year 2002</td>
<td>314.83 (4.15)**</td>
<td>622.7301 (2.62)**</td>
<td>438.24 (5.34)**</td>
<td>734.4 (3.48)**</td>
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<tr>
<td>18. Year 2003</td>
<td>180.30 (3.02)**</td>
<td>412.54 (2.43)**</td>
<td>277.49 (4.29)**</td>
<td>498.38 (3.32)**</td>
</tr>
<tr>
<td>Independent Variables</td>
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<td>Unrestricted Fixed Effect</td>
<td>Restricted Pooled OLS</td>
<td>Restricted Fixed Effect</td>
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<tr>
<td>------------------------</td>
<td>------------------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td><strong>19. Year 2004</strong></td>
<td>149.20 (3.17)***</td>
<td>304.24 (2.67)***</td>
<td>206.49 (3.94)***</td>
<td>357.00 (3.53)**</td>
</tr>
<tr>
<td><strong>20. Year 2005</strong></td>
<td>86.68 (2.23)**</td>
<td>175.18 (2.84)***</td>
<td>120.39 (2.71)***</td>
<td>196.73 (3.50)***</td>
</tr>
<tr>
<td><strong>21. Year 2006</strong></td>
<td>Dropped</td>
<td>Dropped</td>
<td>Dropped</td>
<td>Dropped</td>
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<tr>
<td><strong>Constant</strong></td>
<td>-2024.62 (-5.60)***</td>
<td>-3734.53 (-2.64)***</td>
<td>-2445.58 (-6.18)***</td>
<td>-4369.47 (-3.64)**</td>
</tr>
</tbody>
</table>

**F-Test:**

H₀: β₂ = β₃ = β₅ = β₆ = β₇ = β₈ = β₁₁ = 0
H₀: β₂ = β₃ = β₄ = β₅ = β₆ = β₇ = β₈ = β₉ = β₁₂ = 0

<table>
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<tr>
<th>Number of Observations</th>
<th>278</th>
<th>278</th>
<th>288</th>
<th>288</th>
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<tr>
<td>Number of Groups</td>
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<tr>
<td>R-Squared</td>
<td>.77</td>
<td>-</td>
<td>.64</td>
<td>-</td>
</tr>
<tr>
<td>F Overall Model</td>
<td>42.02***</td>
<td>5.16***</td>
<td>43.95***</td>
<td>9.12***</td>
</tr>
</tbody>
</table>

Values are in parenthesis. Significance level *≤0.10, **≤0.05, ***≤0.01.
The Fixed Effects model confirms my initial hypothesis that violent crime, represented by the murder rate, in the states of Mexico had a negative and significant effect on the amount of FDI received yearly at state-level during 1998-2006. The unrestricted model shows that, all else equal, a one unit increase in murders per 100,000 people led, on average, to a decrease of 12.63 dollars per capita; while the restricted model shows, all else equal, that a one unit increase on murders per 100,000 people led to a decrease of 12.51 dollars per capita. Therefore, I can say with at least 95 percent confidence that violent crime in Mexico had a negative and significant effect on the amount of FDI received during the years 1998-2006.

In the hypothetical case that Mexico would have had a murder rate of 0 murders per 100,000 people, instead of the average murder rate that it had (7.44 murders per 100,000 people) during the period 1998-2006, Mexico would have received around 94 extra dollars each year per capita from FDI or would have received around 9,396,720 extra dollars each year in FDI for any given city of 100,000 inhabitants. The maximum amount of extra dollars that would have been received during this
time frame in a city size of 100,000 would be 214,331,110 dollars or 214 dollars per capita, and the minimum amount of extra dollars that would have received in a city size of 100,000 would be 13,640,440 or 13.64 dollars per capita.

All else equal, and according to the population reported by Mexico's National Population Council, if Mexico would have had a murder rate of 0, a state with a population size comparable to Colima’s, would have received on average about 1,180,591,266 extra dollars in FDI each year and a state with a population size comparable to Estado de México’s, would have received on average about 2,878,276,969 extra dollars each year in FDI.

Therefore, because of the negative effect that violent crime had on FDI, I can say all else equal that during 1998 (with an estimated population of 95,000,000) Mexico as a hole lost about 8,926,884,000 dollars in FDI and that during 2006 (with an estimated population of 104,000,000) Mexico lost on average about 9,772,588,800 extra dollars in FDI.

It seems pretty absurd to consider that a country like Mexico could have a murder rate of 0. However, it definitely does not seem absurd that Mexico could have a murder rate as low as Canada or United States (US). Therefore, I estimated what
would have happened if Mexico had had in 2006 the estimated murder rate that Canada had, 1.9 per 100,000 people or the estimated murders rate that US had, 5.6 per 100,000 people according to the Canadian National Statistic Agency and to the Federal Bureau of Investigations respectively.

All else equal, if Mexico would have had the Canadian or the US murder rate in 2006 it would have received around 7,276,900,800 or 2,416,876,800 extra dollars in FDI respectively.

In the same sense, I can say that if, in 2006, a state with a population size comparable to Colima’s, (573,070) or to Estado de México’s (14,189,657 ) would have had either one of these other countries murder rate instead of the average murder rate that Mexico had, these states would have received on average around 40,097,822 or 13,317,688 extra dollars in FDI for Colima or around 992,853,138 or 329,767,629 extra dollars in FDI for Estado de México respectively.

As mentioned, according to INEGI (data base Estadísticas Judiciales en Materia Penal) the average annual murder rate in Mexico for the period 1998-2006 was 7.44 murders per 100,000 people. Medina Mora (Calderón’s Attorney General) disputes this statistic claiming that the average murder rate has been about 11 per 100,000
people in the last few years. So no matter the legitimate concern about the reliability of the homicide data in Mexico and what the “real murder rate” in Mexico is, I can conclude that even if using the “official data” the incidence of violence represented by Mexico’s homicide rate has had a negative and significant effect on the amount invested yearly in Mexico by multinational enterprises. Mexico is losing the opportunity to receive billions of dollars each year from foreign investments.

At last, the present study suggests opportunities for future research. As observed in the econometric models used, I was unable to include for this research the variables lag-bribes, lag-days to open a business, lag-corruption index and lag-number of enterprises. However, I was able to include these 4 variables in the Fixed Effects restricted model, but for years 2002-2004. Lag-bribes was statistically significant at alpha .05 and lag-days to open a business was significant at alpha .10 while the other two variables were individually insignificant but jointly significant. Therefore, as suggested by the classic literature, future researchers in the field should try to incorporate these variables into their models.
IX. REFERENCES


