THE IMPACT OF THE MEXICAN GOVERNMENT'S BUDGET FOR CRIME AND

VIOLENCE PREVENTION PROGRAMS ON INTENTIONAL HOMICIDES

A Thesis

by

JORGE CARLOS MARTINEZ PALOMARES

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Chair of Committee,	Reid Stevens
Committee member,	Anastasia Shcherbakova
Committee member,	Edwin Price
Head of Department,	Mark L. Waller

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ABSTRACT

In 2013, the administration of President Enrique Peña Nieto launched the National Crime and Violence Prevention fund (PRONAPRED). From 2013 to 2016, Mexico designated around $771,145,021 dollars for crime prevention programs; later in 2017 no money where designated for this purpose. At the end of the Enrique Peña Nieto administration, in 2018, the program was relaunched, but the new budget was about 10 times less. Mass media and academics have heavily criticized the efficiency of the Fund operations and money allocation for crime prevention. The present study is designed to implement quantitative analysis for identifying the impact of the PRONAPRED fund in the intentional total homicides in Mexico. By using a fixed effect estimation for panel data, and controlling for several school variables (elementary, middle and high school), as well as an economic variable, such as the total number of new retail stores opened (used as a proxy variable for economic flow in the areas of interest). We found that the dummy variable for PRONAPRED is significant in each estimation. In other words, the PRONAPRED coefficient shows that municipalities that have received program funding have lower homicide rates as opposed to those not included in the program. Although political shocks, economic crisis and funding for fighting crime directly can be key factors affecting the crime rates, according with the data collected for this study the PRONAPRED fund has contributed in reducing intentional homicides in Mexico.

CONTRIBUTORS AND FUNDING SOURCES

Contributors

This work was supervised by a thesis (or) dissertation committee consisting of Professor Reid Stevens, Professor Anastasia Shcherbakova and Professor Edwin Price of the Department of Agricultural Economics.

The figures 4 and 5 in the section 4 "What went wrong with PRONAPRED" was provided by the Center on Conflict and Development.

All other work conducted for the thesis (or) dissertation was completed by the student independently.

Funding Sources

NOMENCLATURE

CEIEG	State Committee of Statistical and Geographic Information
CIPSVD	Social Crime Commission
CNPD	National Center for Crime Prevention
CNSP	National Council of Public Safety
EZLN	Zapatista Army of National Liberation
FASP	Fondo de Aportaciones para la Seguridad Pública
FE	Fixed Effect
FORTASEG	Programa de Fortalecimiento para la Seguridad
INEGI	National Institute of Statistics and Geography
LGPSVD	General Law for Violence and Crime Prevention
OC	Organized Crime
PAN	National Action Party
PEMEX	Mexican Petroleum
PNPSVD	National Program for the Social Prevention of Violence
PNT	National Transparency Platform
PRONAPRED	National Crime and Violence Prevention fund
SEGOB	Secretariat of the Interior

SEP	Secretary of Public Education
SESNSP	Executive Secretariat of the National Public Security System
SPAyPC	Ministry of Social Prevention
SUMSEMUN	Subsidio para la Seguridad en los Municipios
USAID	United States Agency for International Development

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1. INTRODUCTION

The violence and different types of crime, including homicides, started to arise in many areas in Mexico after a controversial presidential election in July of 2006,[1] where Felipe Calderon Hinojosa, the candidate of PAN (National Action Party), emerged as the winner. In December of 2006, the new administration launched a war against Organized Crime (OC), traditionally known as Cartels.

The strategy of the war included the following three goals: to recover the lost territory in the hands of OC, to reduce the production and the flow of illegal drugs into Mexico, and to finish with gravely detrimental crimes to Mexican society such as extortions and kidnappings, which are crimes typically attributed to OCs (Vilalta, 2013). Since then, Mexico has experimented an unusual wave of insecurity and violence where homicides captured the principal attention of the society.[2] In October 2007, the United States and Mexico announced the Merida Initiative (Iniciativa Merida), a package of U.S assistance for Mexico and Central America that would begin in 2008.

During 2006 to 2012 the strategy of President Felipe Calderon was based mainly in the use of the Army and Marine in the national territory, federal police and bureau of investigation in "coordination" with local police, through joint operation against the drug traffic and production. This strategy was criticized for several sectors of the society for increasing the rate of violence and crime, mostly homicides across the country.

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[1] The official margin of difference between Calderón and López Obrador of the PRD (Party of the Democratic Revolution) was 0.58%. But there were massive irregularities that could affect the final output. (Weisbrot, 2012)

[2] According to Verisk Maplecroft, a risk consultancy firm, Mexico occupy the number three in danger of violence just behind Afghanistan .

This increasing violence generated new ways to approaches the current problem. The exclusive use of the army and police force have showed to be no efficient. Therefore, the government started to implement programs to address crime and violence through community centers and institutional programs like the initiative "Todos Somos Juarez" (We all are Juarez) and "Limpiemos Mexico" (Clean up Mexico). This last one included other programs such as "Escuela Segura" (Safe School), "Salud solo sin Drogas" (Health only without drugs), and "Recuperacion de Espacios Publicos" (Recovery of Public Spaces) (Ramirez de Garay & Diaz Roman, 2017).

Along those lines the Pillar IV of the Merida Initiative (signed in 2007 by the governments of Mexico and the United States) seeks to empower local leaders, civil society representatives, and private sector actors to lead crime prevention and drug demand reduction effort in the communities (Seelke, 2017). In addition, and as a joint effort, the Government of Enrique Peña Nieto launched in 2013 the National Crime and Violence Prevention fund (PRONAPRED). From 2013 to 2016, Mexico designated around of $2,099,712,616.94 billion pesos for crime prevention programs; later in 2017[3] no money where designated for this purpose. At the end of the Enrique Peña Nieto' administration, in 2018, the program was relaunched with less money, $280,853,381.92 million pesos.

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[3] "Alan López, researcher of the Security and Justice Program of Mexico Evaluates, says that they do not know the reasons why the Budget of Expenditures of the Federation for Fiscal Year 2017 did not include an amount of money to finance the subsidy to PRONAPRED" (Vega, 2018)

1.1.   Objectives

Find out if the budget for crime and violence prevention program, PRONAPRED, has helped to diminish the Intentional homicide rates in the different municipios (Municipal subdivisions, regions), that received the monetary aid.

1.2.   Research question

1) Had the budget for crime prevention from PRONAPRED fund contributed to reduction of the intentional homicide rate in the locations in question?

1.3.   Hypothesis

1) Funding from PRONAPRED has contributed to reducing the intentional homicide rate in the municipios that received funding.

The present study is developed in five sections. The first section presents a literature review. The second section provides a briefly story about the crime and violence prevention fund, the trends in homicides relative to the funds spent by the prevention program PRONAPRED and a list of the mistakes made in its design. The third section presents the Methodology and Data description. The fourth section addresses the results of the models and the fifth one presents the conclusions.

2. LITERATURE REVIEW

Studying the impact of social programs from crime prevention projects and other kind of strategies combating violence in any kind of region in Mexico represents a big challenge. This is due to the fact that violence and crime are driven by a multidimensional factors. According to Puyana et al. (2017), around 50% of the intentional homicides between 2010 and 2011 were related to drug trafficking. The homicides were concentrated mostly in the border area in Mexico and east coast. This is explained mainly by the fact that those involved in local drug sales carry guns for attacking or defend oneself from the rivals. (Puyana, et al., 2017)

Jason M. Lindo and Maria Padilla (2016) measure the impact of kingpin strategy. Using a panel data analysis, Fixed Effect method, they estimated the effect of kingpin captures in the homicides rate. They conclude that this strategy (taking down drug lords and important lieutenants), only has effect in the municipality where the Cartel boss was captured, and smaller but significant effect in the neighboring municipalities. Widner et al. (2011), used also a panel model Fixed Effect method, to understand two factors: 1) which crimes are more frequent in the northern area of Mexico and which ones in the rest of the country and, 2) which factors drive to more arrests for different types of crimes. Concluding that region with more arrest is the one closer to the United States, drug related activities are highly related with those crimes.

Brown et al. (2017) using Fixed Effect method to longitudinal data, studied the effect of the Mexican drug war on risk attitudes, to understand how the individual's attitude respond to a changes in the environment. They found that the exposure of violent environment significantly increase risk aversion. Their results, using the Mexican Family Life Survey, show an increase of

1 homicide per 10, 000 people, increase by 1.5% to 5% being risk averse (Brown, Montalva, Thomas Duncan, & Velasquez, 2017).

Fergusson and Horwood (2000), measure, using Fixed Effect regression methods, in what extent the individual between 15 and 21 years old were involved in violent and property crimes, and in what extent they present abuse alcohol symptoms. They found a significant alcohol abuse is associated with increases in violence and property robberies. Phillips and Greenberg (2007) conducted other study that involves Panel data analysis. They compare the estimations obtained by Fixed Effect and Random Effect methods in a data set of homicide rates and a vector of explanatory variables for 400 US counties over 15 years. They conclude that, given the data they used, neither method holds a significant advantage over the other.

Greenberg (2014) conducted a time series and a Panel Data analysis with fixed effect method, including a vector of explanatory variables, to study the crime in New York city. The study is focusing principally on how misdemeanor arrests impact felonies crimes, homicide, robbery and aggravated assault. The findings do not show significance or evidence that minor arrest helped to reduce felony crime.

Following the same strategy as Lindo and Padilla (2016), Calderon et. al (2015) used a modern statistic methods to understand if the policy to target senior drug cartel member has an impact on the dynamic of drug-related violence. By combining difference-in-difference with synthetic control group methods they generated a little different outcome. Taking down or killing drug cartel leaders has influenced not only drug related violence, but the homicides in general (that impacts the general population). On the other hand, captures or killing lieutenants seems to increase the violence just in strategic municipalities, or areas related to the drug traffic networking.

Similarly, Javier Osorio (2015) tried to identify what makes a "municipio" in Mexico more violent than others. Applying special econometrics methods to shed some light about the spread of violence he found three main things. First, the intensification of the violence in one municipality has a significant influence in closer municipalities. Second, the significant number of crime organizations in the zone, plus the irruption of the effects of law enforcement are key factors increasing the violence by OC. Third, some factors, commonly believed as structural components to influence the increasing risk of violence, such as "territorial value, gun availability, international drug supply, corruption, education and socioeconomic characteristics play only a limited role" (Osorio, 2015).

Ingram (2018), inquires in the concept of community resilience and if the Merida Initiative has had any effect at all on reducing the violence. By applying also statistic special models, he found that homicides are not randomly distributed across municipios. Homicides also follow a spatial lag effect, suggesting the spread over neighborhood municipios. Educational has a significant impact on homicides rates but just on a local level. Economic inactivity has a negative direct effect, but a strong positive indirect effect from communities.

Another study involving schools comes from Jarrillo et. al (2016). Applying Fixed Effect method in a Panel data. She studied the effect of drug war affecting attendance in elementary and middle school in Mexico. The results show that a prolonged exposure to turf war has significantly negative impact on the achievement of the kids in the school. Localities with higher exposure to bloody battles between cartels and army, showed a change in behavior of students and teachers, leading to lower performance in class. Victimization and fear of crime obstruct the supply and quality of education, increase the teacher turnover, and reduce attendance to class.

Carrasco et al. (2014) conducted a semiparametric difference-in-difference approach to build a control group for the municipalities that have received Joint Interventions at municipal level, trying to understand the impact on the workers income. They found that in the most violent "municipios" there is an increase of low-income workers with respect of the total amount of workers in the area. Following the same line Magaloni et al (2015) evaluated the economic implication of the drug war in Mexico. Using an exogenous variation of the instrumental variable proposed by Carrasco et al. (2014), based on the historical seizure cocaine from Colombia interacted with the distance to the northern border area in Mexico and the electricity consumption per household as a proxy variable for GDP. They found that the increase in homicides related to the drug war has a significant impact in the people owned business (decrease), and in the unemployment rate (increase). They also highlighted that the municipios that face a dramatic increase in violence between 2007 and 2010 faced a reduction in in the crime during 2011.

Magaloni et al (2017) also studied why some Organized Crime groups adopt some kind of extortion in some areas and support some others. Using list experiments, they provided evidence that the extortion is more concentrated in areas with more organized crime groups than in ones that remain under a control of a single one. Edgardo Buscaglia, in his essay "La Paradoja Mexicana de la Delincuencia Organizada" (2012), address the issue that the Government of Mexico only implemented 46% of the measures that are included in the Palermo Convention and just attended to only 23% of the Merida Initiative actions. Therefore the scaling of the crime has more to do with improper implementation of designed policies. He suggested the paradoxical statement that stricter law enforcement results in more corruption and more violent response from the OC groups. Castillo et. al. (2013) estimates the effect that drug traffic has on increasing the violence in Mexico. Using Instrumental Variable regression (IV), they showed that the illegal traffic and the increase

of the violence during Felipe Calderon's administration are related to the success of interventions policies in Colombia since 2006.

3. THE BRIEF HISTORY OF THE CRIME AND VIOLENCE PREVENTION FUND

The strategy of the administration of the President Felipe Calderon was mainly based on the direct confrontation against the Cartels. However, instead of reducing the violence and the homicides, this strategy resulted in even more violence across Mexico. This was the reason why this strategy was widely criticized. According to the Mexican press, the administration of Vicente Fox left a total chaos in the society in general, and led to increase in the organized crime (Ramirez, 2016). On the other hand, it is very likely that Felipe Calderon as well contributed to the escalation of the homicides and crime rates in the country. (Ramirez de Garay & Diaz Roman, 2017). To address the widespread violence across Mexico, other programs came to play. The Government established models that applied interinstitutional approach to crime and violence prevention. This includes programs like "Limpiemos Mexico" (Cleaning Mexico), "Escuela Segura" (School safe) and "Salud solo sin Drogras" (Healthy without drugs).

The violence and crime started to concentrate more in the northern states, close to the border with the United States of America. Ciudad Juarez in Chihuahua, during 2007 and 2011, became the most dangerous city in the world (Paniagua, 2016). Between 2008 and 2013, the administration of Felipe Calderon increased the budget of the Municipal Security (SUBSEMUN) by 25%. This budget was created for the security of the communities, by increasing the amount of funds allocated for police equipment. Since 2012, 20% of the SUMSEMUN budget would be designated to crime prevention programs (Ramirez de Garay & Diaz Roman, 2017). During this period, different local programs were also implemented. The most important one was "Todos Somos Juarez" (We are Juarez).

At the end of the administration of Felipe Calderon, in 2012, the General Law for Violence and Crime Prevention (LGPSVD), got into force. The law defined the crime and violence prevention as the set of public policies, programs and actions aimed at reducing risk factors that favor the generation of violence and crime, as well as combating the different causes and factors that generate it (Hernandez, 2012). In 2007 the Mexican and US Governments signed "Iniciativa Merida" (Merida Initiative) to combat crime and bring stability to civil life.

The Merida Initiative bases its strategy on the following four pillars:

- Pillar I: Disrupting the Operational Capacity of Organized Crime: Decrease the power of Mexican organized crime groups by systematically capturing and prosecuting their leaders, and reducing the profits of the illicit drug trade through the seizure of narcotics, and the brake on money laundering.

- Pillar II: Institutionalizing Reforms to Sustain the Rule of Law and Respect for Human Rights in Mexico: Improve the capacity of Mexican institutions responsible for public security and borders, as well as judicial institutions to maintain the rule of law.

- Pillar III: Creating a "21st Century Border": Facilitate legitimate trade and movement of people while restricting the illicit flow of drugs, people, weapons and cash.

- Pillar IV: Building Strong and Resilient Communities: Strengthen communities/neighborhoods by creating a culture of respect for the laws, decreasing the attraction and power of organizations dedicated to drug trafficking by implementing and creating work programs, involving young people in their communities, expanding social protection networks, and building trust in public institutions within communities. (Los Cuatro pilares de la Cooperacion , 2019).

The Pillar IV reflects the emerging emphasis on broader cultural, social and economic factors underlying violence by empowering local leaders, civil society representatives, and private sector actors to lead crime prevention and drug demand reduction efforts in their communities (Seelke, 2017). The USAID mission in Mexico has helped developing several programs, mostly in bordering areas, to address the crime. Since 2012, USAID/Mexico has allocated $70,087,678 million dollars for crime and violence preventions programs according to Pillar IV of Merida Initiative, see table 1, (USAID from the American People, 2019).

Table 1. USAID/Mexico budget

Activity Title	Amount (TEC/TEA)	Start Date	End Date	Municipio
(CVPP) Crime and Violence Prevention Program	$ 17,533,385.00	2012	2015	NATIONAL/JUAREZ/MONTERREY/ TIJUANA
Music in Human Development for a Culture Free of Violence	$ 200,000.00	2012	2014	JUAREZ_CH
Youth Pathways Mexico /Jovenes con Rumbo	$ 3,128,568.00	2012	2015	TIJUANA/MONTERREY
(EJEMPLAR) Youth Violence Prevention Through Audiovisual Media (EJEMPLAR)	$ 1,500,000.00	2012	2015	MONTERREY
Expanding Children's Development	$ 1,167,521.00	2012	2015	JUAREZ_CH
Developing National Policy to Promote Wellbeing Among Mexico's Youth	$ 1,482,898.00	2012	2015	NATIONAL
Expanding Children's Development	$ 450,000.00	2013	2015	JUAREZ_CH
(ESLV) Experiencia Scout, Listos Para la Vida	$ 2,499,488.00	2013	2015	TIJUANA
CVPP-II (Extension)	$ 4,799,587.00	2015	2016	NATIONAL/JUAREZ/MONTERREY/ TIJUANA
(REDSUMARSE) Initiative 2.0	$ 1,071,445.00	2015	2020	MONTERREY
(DHARTE) Developing Learning Skills Responsibilities to Transform the Environment	$ 1,337,954.00	2015	2018	MONTERREY
(FUNDMEX) Schools Building Peace in Mexico	$ 2,076,807.00	2015	2018	MONTERREY
(FUNDMEX) Schools Building Peace in Mexico	$ 2,076,807.00	2015	2018	TIJUANA
(REINSERTA) Youth without Prison Activity	$ 770,682.00	2015	2018	MEXICO CITY
(JPV) Together to Prevent Violence	$ 24,465,000.00	2015	2020	NATIONAL/JUAREZ/MONTERREY/ TIJUANA/CHIHUAHUA
(YBI PHASE 2) Youth Pathways Initiative Phase II (JcR Alliance 2nd Phase)	$ 3,027,536.00	2016	2019	MONTERREY/Metro-Area/MEXICO CITY/TIJUANA
(CCSJ) Youth in Conflict with the Law	$ 1,000,000.00	2016	2019	CHIHUAHUA/JUAREZ
(SADEC) Broadening the Development of Children	$ 1,500,000.00	2016	2020	CHIHUAHUA/JUAREZ
Total	$ 70,087,678.00			

In 2013 the administration of Enrique Peña Nieto, launched the National Crime Prevention Program Fund (PRONAPRED). This program tried to involve all the federal dependencies with the objective to diminish addictions, transform public spaces, and promote productive projects. In order to accomplish such goal, he not just designated one part of the budget for the 2013 fiscal year, but also did several modifications to several laws that could interfere in the application of the fund. The National Law of victims and Penal Code were modified in order to facilitate the implementation of the Fund. With this actions the administration of Enrique Peña Nieto tried to differentiate from its predecessor.

In the National Development Plan for 2013, Peña Nieto included the violence prevention as a strategy addressing the causes of the same and the treatment of the drivers that conduct to a bad social behavior. It also promotes the inclusion of civil social organizations, citizen participation and academic sector. The Ministry of Social Prevention (SPyPC), was created with the objective of monitoring PRONAPRED and applying the policies on crime prevention. In addition, the lines of the implementation or at least the document that determines the activities the budget from PRONAPRED would be spend on, will be the National Program for the Social Prevention of Violence (PNPSVD).

We can summarize the goals of the PNPSVD in five points: 1) Increase the participation of the citizens and stakeholders in the crime preventions by increasing their capabilities, 2) decreasing the danger of the at- risk population, 3) promote the environment that leads to the conflict-free behavior and coexistence, 4) strengthen the local institutions at all levels (municipal, state and federal), and 5) ensure the horizontal cooperation between institutions (Ramirez de Garay & Diaz Roman, 2017). The Risk Factors internationally taken as common drivers of crime were included in the PNPSVD[4]. The target groups program will be addressing are children, teenagers, women, penitentiary population and immigrants.

The Social Crime Commission (CIPSVD) was created with the aim of coordinating the federal instances. It also Social Crime Commission works with the same target groups and matches with some of the goals of the PNPSVD. The CIPSVD supposedly has to select the municipios that have higher levels of crime and show more drivers of crime.[5]

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[4] Teenage pregnancy, school dropouts, family violence, illegal drugs consumption, low social capital and low citizen participation, impunity environments, deteriorated public spaces, migration and social exclusion.
[5] According to "Mexico Evalua" this criteria is not clear and ambiguous and apparently was changed trough the years.

4. WHAT WENT WRONG WITH PRONAPRED

Despite the effort that the administration of Enrique Peña Nieto put to implement PRONAPRED, several issues raised since the design until its final application. First issue is the inclusion of the international risk factors. According to McAra and Mc Vie (2012), it is very difficult to determinate how the risk factors can cause violence. The evaluation of the crime and violence drivers are conducted through costly methods that involve monitoring a sample of people trough years (McAra & McVie, 2012). In addition, there is the question whether the internationally accepted risk factors can be applied entirely to the context of Mexico. There is no study conducted by any public institution or private consultancy company in Mexico that supports the idea that these Risk Factors in the PNPSVD can fit in Mexican context.

Another vague area was the criteria for the selection of the Municipios for PRONAPRED. There is no consistent methodology that tells how the areas of interest were selected. The private consultancy "Mexico Evalua[6] wrote a report where it tries to understand what guided the selection criteria of the municipios. According to them a group of experts were hired to build a sample of 210 municipalities, with a population of at least 100,000 inhabitants. From the 210 municipalities, a subsample was integrated with 100 possible beneficiary entities. However, "the selection mechanism is not clear (...) [and] the information that has been published is insufficient and does not allow replication of the selection model to verify that the selection of the demarcations actually responds to the problems it seeks to solve" (Mexico Evalua, 2014).

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[6] Mexican think thank which analyze and evaluate the processes of improvement of public policies at the federal, state and local levels through the generation and / or review of evidence and the formulation of recommendations.

There is also a big question about how some of the programs can contribute to crime and violence reduction. Mexico Evalua (Mexico Evaluates), in his report of 2014, expressed doubts about effectiveness of some approved and implemented measures when it comes to the crime prevention, which should be a final goal of those measures. These measures include providing glasses to the population as part of the early intervention program for learning and reducing behavioral problems, or teaching the women of the area how to cook. .

Some legal confusion emerged with all the institution in charge of crime prevention. The LGPSVD in its article 10 designates the National Council of Public Safety (CNSP) as the Institution in charge of proposeing the policies about crime prevention. The National Center for Crime Prevention (CNPD), which depends of the Executive Secretariat of the National Public Security System (SESNSP), in its article 20 has the obligation to propose to the CNSP long term strategies for crime prevention. The LGPSVD also recognized the CNSP, in its article 12, as the body in charge of the crime and violence prevention policies design, thus taking away all legal authorities from SPYPC.

In addition, many irregularities suggesting corruption or at least absence of transparency in using the funds was identified during the application of PRONAPRED. According to Secretariat of the Interior (SEGOB), during 2015 and 2016, not all municipios had the second transfer, so one would assume they have received all the money at once, although that is not clear as well. In addition in 2016 the PRONAPRED funds allocated to Ciudad Juarez misteriously disappeared (Minjares, 2016), and it is not known whether this kind of incident happened in other municipios included in the program.

Thus, although in the beginning it seemed to be a good way of combatting the crime, however, the project did not have proper organization and evaluation plans and lacked good management and monitoring. Despite the flaws in program implementation, it is still important to understand the

effectiveness of PRONAPRED in diminishing violent crime. This analysis will be especially valuable for future programs that might address the same issue. In this paper intentional homicides rate was taken as the proxy for violence and crime in the country.

Intentional homicides statistics, unlike other types of crime, suffer the least form underreporting, because corpses are more difficult to ignore than losses of property or assaults (Fajnzylber, Lederman, & Loayza, 2000). Therefore, observing the impact of the fund on intentional homicides can provide us a with a rather accurate perspective on whether the PRONAPRED has accomplished its goal.

Additionally our model takes into consideration socio-economics variables that may be important drivers for crime prevention activities: schools attendance statistics and number of convenience stores open in a year. Sociologists and criminologists found out that education can help individuals and communities identify and take advantage of opportunities where others may not see them, helping people avoid entering into a cycle of delinquency in the first place (Ingram, 2014). We use several school control indicators to understand the impact the school attendance may have on the homicide rate. Similar logic applies to the number of stores opened in the neighborhood, the last variable is proposed as a proxy to measure economic activities in the target cities.

Communities that are most resilient to homicide appear to be those with strong, local educational attainment nested within broader regions or neighborhoods of municipalities that are economically developed (Ingram, 2014).

4.1. The description of the Intentional Homicides Trend

The general trend of homicides is available since 1990, when INEGI started reporting this data. During the years 1990 to 2016 homicide rates reached the highest pick in 1994 with more than 15,000 homicides reported. Two major events happening during that year were responsible for that: happened; "El error de diciembre" - one severe economic crisis and the emerging of the EZLN - far-left libertarian-socialist political and militant group in Chiapas, the southernmost state of Mexico. Since 2007, when the administration of Felipe Calderon declared the war against the Organized Crime the homicides start to increase consistently reaching a new highest point in 2011 with over 25,000 homicides. After that the decreasing trend is explained by beginning of the administration of Enrique Peña Nieto in 2012 See figure in 7 appendix A.
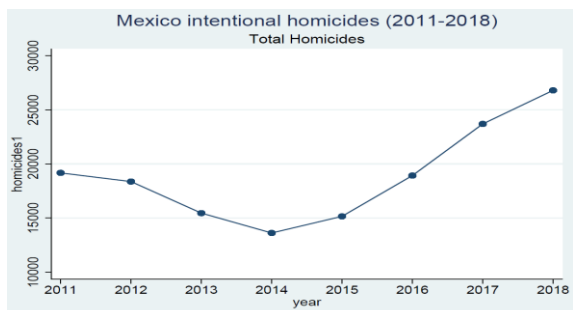
Figure 1. *Total Intentional Homicides in Mexico*
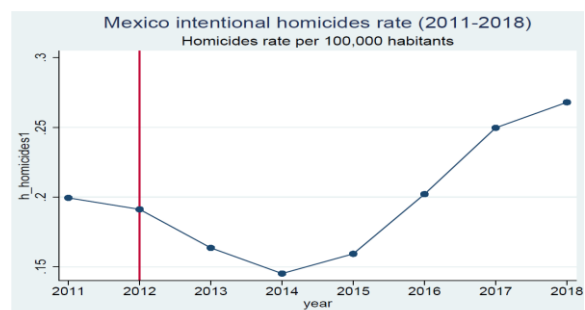
Figure 2. *Intentional Homicides Rate in Mexico*

The figure 1 and 2 show the homicides trend in Mexico during the period 2011 to 2018, by total and by each 100, 000 habitants. The chart in the right has a red line to highlight the moment when the trend started to decrease.

In 2011, during the last part of Felipe Calderon administration, Ciudad Juarez was the most violent city in Mexico (with 1460 total homicides), followed by Acapulco, Monterrey and Chihuahua City. In 2013 when PRONAPRED started, 81 municipios where included in the program to receive

funding for crime and violence prevention, see table 6 in apendix A. In 2013 the government assigned $2´250,000,000.00 pesos in total to be split between all the municipios included in the PRONAPRED, however, only $2,099,712,616.94 pesos was really spent. By 2017 PRONAPRED was suspended with no officially provided reason. It is also known that in the same year the administration of Enrique Peña Nieto cut the budget for several programs due to the increase of the government debt. In 2018 the program was reopened but with lest budget ($280,853,381.92 pesos). See able 2 and figure 3
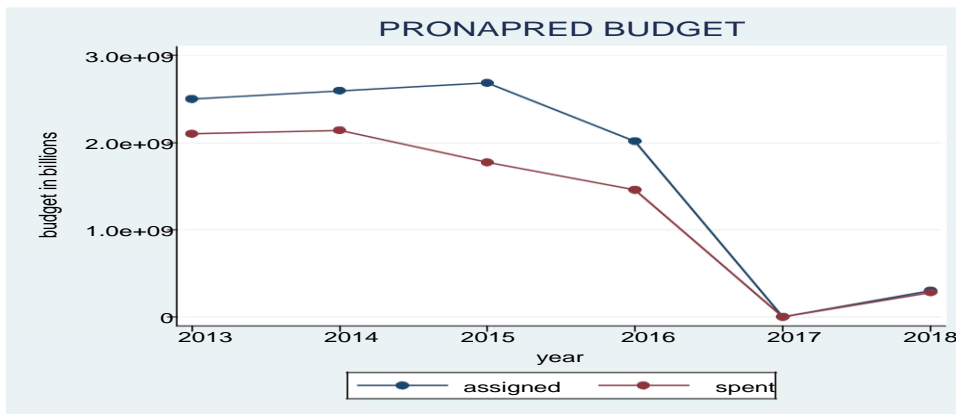
Figure 3. PRONAPRED Budget trend

Año	Asignado	Ejercido
2013	$2,500,000,000.00	$2,099,712,616.94
2014	$2,595,000,000.00	$2,140,225,769.08
2015	$2,683,230,000.00	$1,772,561,869.90
2016	$2,015,311,756.00	$1,458,005,177.66
2018	$300,000,000.00	$280,853,381.92

Table 1. Amount in pesos of the PRONAPRED Fund

From 2011 to 2013 the five most violent municipios at that time where Ciudad Juarez in Chihuahua, Acapulco de Juarez in Guerrero, Monterrey in Nuevo Leon, Tijuana in Baja California and Ecatepec de Morelos in the Estado de Mexico. However when PRONAPRED was

implemented in 2013 the trend of the intentional homicides was decreasing. That does not mean that the fund does not give an extra "speed" to reaching the lowest point in violence in 2014, but we can not infer that the progress was only due to the PRONAPRED activities, since other programs with very similar goals were also implemented during the same period of time. [7]
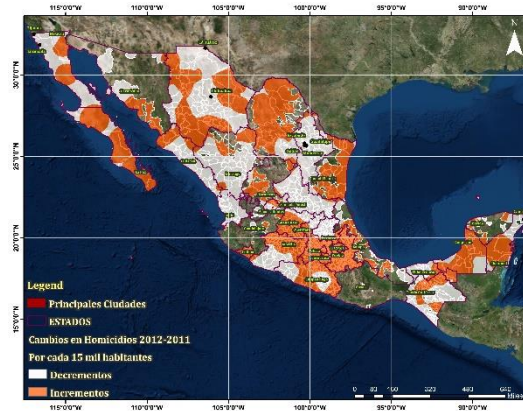
Figure 4. Change in Homicides 2011-2012
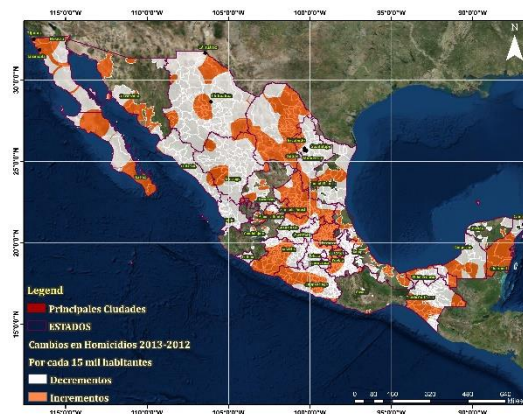
Figure 5. Change in Homicides 2012-2013

For instance, in Ciudad Juarez, the program "Todos Somos Juarez" where implemented since 2010 until the last day of the administration of Felipe Calderon (2012), along with PRONAPRED and

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[7] FASP and SUBSEMUN.

SUMBSEMUN, the total amount of money allocated was $5 ,531,365,220.40 m.n [8] (Panigua

Vazquez & Camargo-Gonzalez, 2017). Despite decline in homicides, in 2016 Juarez could leave

the list of the 50 most dangerous cities in the world, the trend started to increase again. However,

Juarez city deserves an individual analysis; it is interesting to see that the increase in homicides in

Juarez follows the same trend as the rest of the country, despite the numerous programs mentioned

above(see figure 8 in appendix A).
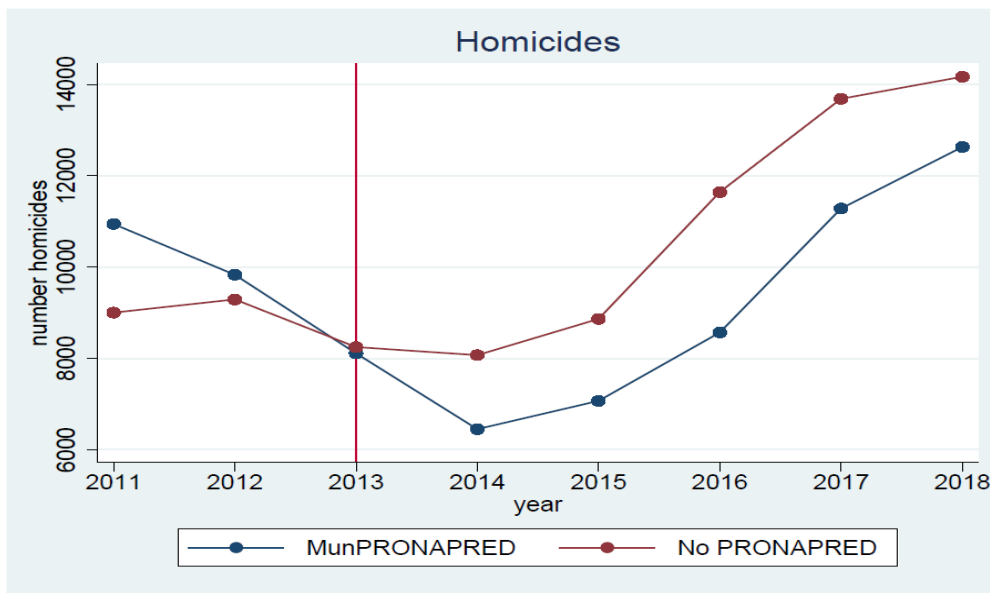
Figure 6. The trend of Homicides in the target and no target "municipios"

One observation is that in 2011, before the funding was applied, the homicides rate in the

municipios treated under PRONAPRED was higher than in the rest of the country. However, in

the following years the intentional homicide rates in these municipios declined significantly.

Although it is true that the PRONAPRED budget was approved and applied in 2013 when the

trend of homicides was decreasing already. In 2014 more municipios where included in the

program (Appendix C).. This process was repeated until 2017; some municipios were included,

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[8] $ 437,954,490.92 dollars

meanwhile others left the program. In 2014, the Enrique Peña Nieto administration faced their most controversial episode: Ayotzinapa. On September 26, local police from de municipio of Iguala in the southern state of Guerrero (one of the most poorest states in Mexico), attacked a group of students from the rural teaching college of Ayotzinapa, leaving six people dead in the place and 43 missing (Speck, 2019). The young students traveled from the town of Ayotzinapa, located in the state of Guerrero to one of the main schools to train rural teachers from Mexico. They intended to take buses to travel to the capital of the country (Mexico City) and participate in the annual commemoration march in honor of 1968 student massacre. During the night of the 26 of September, there was a crossfire between the local police and members of a local drug trafficking group against the buses in which the students were traveling. It is not clear why the buses with students were selected as the target for the attack (Franco , 2018).

Instead of coming up with a rapid response the Enrique Peña Nieto administration spent days trying to find who can take the responsibility for the attack. This followed the arrests of over 100 people in the municipal police. In the beginning the commune statementthat the students were connected with Organized Crime, got quickly denied. During the investigation a several of anomalies started to show up. One of those was the negligence of the federal and local authorities who already knew about the disappearances in real time and failed to act (Speck, 2019).

After this episode, the approval of the President fell sharply. In 2015, the federal government started to slash and eventually eliminated some crime prevention support programs that were a burden on the state budget (in 2017 the PRONAPRED fund was suspended). Internationally the oil prices plummeted, forcing Mexican Petroleum (PEMEX) s cut their jobs across Mexico (Stargardter, 2018). Needless to say that many industries were affected as well, since Mexico lost revenues received from oil export, one of the largest categories of trade. The homicides rate, which

reached its lowest point a couple of years ago, started to hike, hitting again the 2011 level and even

and surpassing it.

5. DATA DESCRIPTION

Data for homicides was sourced from SESNSP and National Institute of Statistics and Geography (INEGI). Both sources take into consideration intentional homicides by month and by municipality. Observations from 1990 to 2010 where gathered from INEGI, while those from 2011 to 2018 were obtained from SESNSP.

The number of new retail stores opened (a proxy variable measuring economics and confidence flow in the area), was gathered from INEGI within the scope of the retail store census from 2011 to 2018. The database lists retail stores by number of employees in increments and categorizes by state and municipality. The year of 2015 was interpolated since the census data was showing a very big hike for that one year, which was more likely caused by issues in data collection and reporting, since no significant differences were observed in the policies and tax regulations that could cause the hike. Stores from "0 to 5" and "6 to 10" employees were aggregated to represent small family-run corner stores and convenience shops. This stores represent more than 92% of the total number of retail stores opened for the period mentioned above. This proxy variable only considers new businesses. We eliminated duplicate businesses, that have records of multiple registrations. These duplicates were identified by using geographic coordinates and physical addresses provided in the census.

The school database was provided by Secretary of Public Education (SEP), through National Transparency Platform (PNT). The database considers school years from 2010 to 2017 by state and municipal level. Three levels of education are including: primaria (elementary school), secundaria (middle school), and preparatoria (high school). Indicators such as drop-out rate, gender ratio, and student to teacher ratio were built for each education level. It is important to point

out that no distinction of private school and public school were done. Since the "municipals" are the unit of interest within this study, the corresponding type of schools were aggregated to that level.

The observations for high school were provided in two different databases. One database was exclusively for "bachillerato general", a subtype of high school intended to prepare students for college, from 2010 to 2013. The second database used is the list of "educación media superior" or vocational secondary education institutions where all subtypes of high schools were included from 2013 to 2017. After reviewing the data, we noticed that the second database includes the first database, therefore, in 2013 we face an increasing population for high school level. However, it was determined that the data can be combined, since the study is using ratios and proportions rather than the absolute values of student population.

The dropout rates were built using total enrollment for each year per school and the total number of students enrolled in the following year per school. By using lag variables, groups of students were tracked through each grade level. The difference between the following year enrollment and the lag variable was divided by the total enrollment for that school. This dropout rate per school and by year was aggregated at the municipal level.

Gender ratios were derived from total enrollment of boys by school divided by total enrollment of girls by school for each year, ratios were aggregated by municipality. Student to teacher ratios followed the same logic in which total student enrollments by school is divided by total faculty in each school and aggregated by municipality.

For the population database we considered the years from 2011 to 2018. The observations were gathered from two sources. From INEGI we used "La Encuesta Nacional de Población y Vivienda"

and "Censo Nacional de Población y Vivienda". From the State Committee of Statistical and Geographic Information (CEIEG), we used "Conteos Estatales de Población y Vivienda". The dummy indicator variable for PRONAPRED was collected from SEGOB, through the PNT. The variable reflects the location (municipios/states) and starting day (dates when the money was deposited to the specific municipio) from 2013 to 2016 and 2018.

5.1.   Data Limitations

We aware that each analysis or study face several limitations. The most common one is always the lack of data. This study faced the same problem especially in trying to get data for long periods at municipio level. We know that information that is more detailed would allow us to get more accurate results. However official data on social and economic indicators in Mexico is not reported at the municipal level. Another issue is absence of data for some years for different cities. However, a substantial effort was made in finding observations that can be significant for a crime prevention analysis.

6.   RESEARCH METHODOLOGY

In order to assess whether the budget for crime and violence prevention in the communities in question had some effect on reduction of the intentional homicide rate, we have used the Fixed Effects regression (FE) method to estimate such effect using panel data. The FE is a regression estimation method for controlling for omitted variables in panel data when the omitted variables vary across entities (cities), but do not change over time. It can be used when there are two or more time observations for each city (Stock & Watson, 2011).

6.1.   Tests for Fixed Effect method for Panel Data

The two most commonly used statistical tools for the panel data analysis are Fixed Effect and Random Effect methods. In addition the data needs to be tested for the absence of the autocorrelation between the variables. In order to know which method is more appropriate to use the following tests were performed: The Hausman specification test and The Wooldridge test for autocorrelation in panel data.

6.2.   Random Effects Regression vs. Fixed Effects Regression

In order to know with method is better for the current analysis we performed The Hausman specification test (1978). This test is commonly used to determine which panel data method is

more appropriate to use (see appendix B). Fixed Effect method is frequently used to explore the relationship between predictor and outcome variables within entity and to analyze the impact of variables that vary over time. On the other hand, in Random Effect method, the variation across entities is assumed unrelated with the independent variables. For the present characteristics of the databases using for this study we cannot assume the observations are independent across time. Unobserved factors that affect a city's total crime in one year can affect the city's total crime four years later. The Fixed Effect estimator is more robust to selection bias problems than the Random Effects estimator because if the intercepts incorporate selection characteristics they are controlled for the Fixed Effect method (Kennedy, 2003). For these reasons and based on the output of the test performed on this study, we use the Fixed Effect method for panel data regression.

6.3.   Test for Autocorrelation in Panel Data

Because serial correlation in linear panel-data models biases the standard errors and causes the results to be less efficient, a test discussed by Wooldridge (2002) was performed using STATA built-in test (Drukker, 2003). The test for serial correlation and Wooldridge test for autocorrelation in panel data (V. Wiggins and B.Poi, using STATA 15), accounts for similarity of values separated from each other by a given time lag. The result of the test show that there is no first-order autocorrelation in the model.

7. THE MODEL

The Fixed Effect estimator has separate intercepts, one for each city. These intercepts can be represented by a set of binary (or indicator) variables. These binary variables absorb the influences of all omitted variables that differ from one entity to the next, but are constant over time (Stock & Watson, 2011).

In order to estimate the impact of the crime and violence prevention in the intentional homicide rate in cities in question since 1990 we propose the following general model.

$$Y_{it} = \gamma D_{it} + \lambda_t + \alpha_i + u_{it}$$

Where Y_{it} is the intentional homicide rate, $i = 1,..,n$, and $t = 1990,\ldots,2018$,. Fixed effects for each municipality are given by α_i. D_{it} is the indicator variable for the start of PRONAPRED funding by location and time, where $i = 1,..,n$ and $t = 1990,\ldots,2018$, and λ_t is the time fixed effect.

To evaluate the general model above, two robustness models will be estimated.

$$Y_{it} = \beta_0 + \gamma_i D_{it} + \beta_i X_{it} + \alpha_i + \lambda_t + u_{it}$$

Where Y_{it} is the homicide rate, $i = 1,..,n$, and $t = 2010,\ldots,2018$, for all the variables. β_i is the unknown coefficient for the different socioeconomics indicators, X_i is the set of socio-economic indicators that stand for number of convenience stores open, school enrollment and school dropouts, α_i is the entity fixed effect, λ_t is the time fixed effect, and u_{it} is the error term.

For the second robustness check, we are going to estimate a "Before and After" comparison model for two years, 2017 and 2018. This check will be done when data for each city are obtained for 2

time periods, i.e., where it is possible to compare values of the dependent variable in the second

period to values in the first period (Stock & Watson, 2011).

8. RESULTS

First, we estimated the general model with the homicides rate trend from 1990 to 2018.

Table 2. Impact of PRONAPRED on Homicide Rate (per 100,00 habitants)

	(1)
pron_dummy	0.007***
	(0.000)
_cons	0.000***
	(0.000)
Obs.	63307
R-squared	0.059

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

We use the parameter γ as the parameter of PRONAPRED fund, following this pron_dummy =1 if the muncipios receive PRONAPRED and pron_dummy =0 if the municpio does not receive it. We aware that this formulation has little to offer. Nevertheless, we can have some conclusion for the current results. If we observe the general trend of total homicides, the big spikes were generated in transition periods. The coefficient suggests that being part of the PRONAPRED fund, will increase the homicide rate by 0.007. It seems counterintuitive, due to the fact that we would expect a negative coefficient, which simply would imply that if the city received PRONAPRED funding for decreasing the crime and violence, the homicides rates would have to decline. However, we need to make several observations. First, between 34% and 57% of all homicides in Mexico from 2006-2017 held characteristics of being committed by Organized Crime (Calderon, Rodriguez Ferreira, & Shirk, 2018). However PRONAPRED goal is not precisely addressing this specific type of homicides, but the homicides in general. Second, the

average age of the victims of the Organized Crime style murders is 33 years old, which seems to contradict the common acceptance "that organized crime violence involves uneducated, unemployed, and disaffected youth" (Calderon, Rodriguez Ferreira, & Shirk, 2018). Finally the strategy followed by Felipe Calderon administration, generated internal fights between "Cartels" for the control of the territories and inside the organizations for the lead of the crime groups, which in turn pushes up the homicide rates.

Table 3 Impact of the PRONAPRED fund on Total Homicides

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
PRONAPRED	-24.984***	-24.965***	-24.966***	-25.002***	-24.999***	-24.960***	-24.959***	-30.706***	-30.715***	-30.356***	-36.109***
	(1.343)	(1.343)	(1.343)	(1.344)	(1.347)	(1.349)	(1.349)	(1.660)	(1.661)	(1.662)	(3.428)
DropoutElem		-6.638	-6.616	-5.926	-6.505	-6.488	-6.491	-9.941	-9.847	-9.360	-130.722**
		(5.468)	(5.468)	(5.548)	(6.092)	(6.093)	(6.093)	(9.043)	(9.052)	(9.044)	(65.340)
StuTeachElem			-0.498	-0.517	-0.512	-0.526	-0.529	-0.363	-0.322	-0.332	0.224
			(1.624)	(1.624)	(1.664)	(1.665)	(1.665)	(2.283)	(2.288)	(2.286)	(11.152)
ElemBoysGirls				-0.108	-0.107	-0.109	-0.109	-0.033	-0.028	-0.040	1.177
				(0.146)	(0.147)	(0.147)	(0.147)	(0.186)	(0.187)	(0.187)	(0.819)
DropoutMidd					-0.406	-0.068	-0.070	-1.558	-1.684	-1.378	-1.294
					(4.427)	(4.456)	(4.456)	(7.966)	(7.992)	(7.985)	(66.444)
StuTeachMidd						-0.074	-0.073	-0.065	-0.064	-0.073	-1.288
						(0.111)	(0.111)	(0.138)	(0.138)	(0.138)	(0.789)
MiddBoyGirls							0.120	0.332	0.324	0.093	1.041
							(0.831)	(1.244)	(1.245)	(1.245)	(6.744)
DropoutHigh								-0.786	-0.749	-0.559	4.810
								(2.507)	(2.528)	(2.526)	(9.862)
StuTeachHigh									-0.010	-0.009	-0.071
									(0.012)	(0.012)	(0.068)
HighBoysGirls										-2.599***	-4.284***
										(0.662)	(1.541)
Stores											0.232***
											(0.037)
_cons	11.243***	11.165***	11.732***	13.935***	13.974***	15.240***	15.102***	13.747**	13.786**	17.288***	26.426
	(0.165)	(0.177)	(1.856)	(3.520)	(3.569)	(4.046)	(4.157)	(5.457)	(5.464)	(5.531)	(25.854)
Obs.	11864	11864	11864	11864	11782	11782	11782	9399	9392	9392	2890
R-squared	0.035	0.035	0.035	0.035	0.035	0.036	0.036	0.045	0.045	0.047	0.072

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

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Because the first general regression model covers more years of homicides (from 1990-2018), but does not have any controls for the variable of interest (PRONAPRED fund), we estimated the second model, adding more controls to the estimation and narrowing the years. The second model consists of several estimations for 11 variables. It adds one more control variable in each next estimation. Therefore, in the column 11 of the table 4, we have a complete model with the variable of interest and all the control variables proposed for this analysis.

In the column 1, we estimated the effect of the dummy variable PRONAPRED on the homicide rate. According with our results, being part of the PRONAPRED funding reduces number of total homicides by. In the second column, we add the first control variable: dropouts for Elementary School. The main intention of adding control variable in each estimation is to hold constant factors that, if neglected, could lead the estimation of the variable of interest to suffer from omitted variables (Stock & Watson, 2011).

The variable of interest, in the second estimation remains at the same level of significance. Here we control for the class size in elementary school. The elementary school represents the formative years, and the teachers can be a major influencing factor in child moral development. Some funding by PRONAPRED eventually improved school performance (Mexico Evalua, 2014). The results of our model show that inclusion of this new variable does not substantially change any conclusions about homicide rate in the municipios that receive PRONAPRED versus those that do not receive.

The third control variable is the boys to girl's ratio in elementary school. This variable is indirect indicator of dropouts by gender. Higher numbers indicate more boys than girls are enrolled in the school. A higher proportion of girls in each class lowers the level of classroom disruption and violence, and seems to improve inter-student and teacher-student relationships (Lavy & Schlosser,

2011). It also has a positive and significant effect on the academic achievements of girls and boys. As this ratio increases we observe small decline in the variable of interest It is worth to mention that this variable has high significance.

For column 4, 5 and 6, we add middle schools indicators also as control variables. So we have middle school dropouts, student teacher ratio and the proportion of boys to girls. None of this variables is significant so the inclusion if these new control variables does not change the total homicides depending on the inclusion of the municipio in the PRONAPRED.

The next three control variables added are indicators for High School. In the column 10, the boys to girls ratio is significant and it shows that the increase in ratio of boys to girls by one unit will decrease the total homicides by 2.59. The average age in high school is 17. This age represents a high risk of joining a local gang and/or becoming a local drug dealer. So the coefficient shows that if the high school age boys stay at school the intentional homicides do decrease..

The last column show the inclusion of all the control variables. The last raw accounts for new open retail stores. This variable was proposed as a proxy for economic activity. The addition of the store variable increases the effect of the coefficient of PRONAPRED, keeping the significance of the indicator. However, surprisingly the sign of the stores' coefficient is positive. One possible explanation is considering extortion as a cause of the homicides. This activity is highly related with Organized Crime that can result in homicide and robbery in stores. We also think that a positive coefficient indicates that despite the crime in the neighborhood, the people keep open stores because that is the primary source of their income. So on one hand one could rather argue that the increasing number of small stores is an indicator of absence of employment elsewhere. In any case, more studies need to be conducted on this topic.

The other surprising outcome is the coefficient of dropouts in elementary schools become significant. Apparently, an increase in dropouts increases the total homicides by 130. A number of recent studies have examined the relationship between schools and violence in Mexico. However, they analyze the implications of crime and violence on outcome performance among other indicators (Orraca Romano, 2015). Therefore, we might face a reverse causality. According to Katz (2006) reverse causality is the notion that association between X and Y is really because Y causes X, but not the other way around. Therefore, homicides are causing kids leave school. Following Katz, sometimes identifying this issue is a matter of common sense. However, for the current regression is more important to explore the role of dropouts as a control variable, rather than an explicative one. (Katz, 2006).

Table 4. Impact of PRONAPRED on the Differences in Homicides (Ht-Ht-1).

	(1)
PRONAPRED	-32.274***
	(2.684)
_cons	0.929***
	(0.319)
Obs.	14257
R-squared	0.012

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

In the above table, we estimated an "error correction" term, interpreted as reflecting disequilibrium responses. The terminology can be explained as follows: if the error in Y grows to quickly, the last term becomes bigger, and since its coefficient is negative ($\beta < 1$ for stationarity), ΔY is reduced, correcting this error. The coefficient of the dummy variable is significant and shows the difference in homicides between the municipios with PRONAPRED and the municipios with no PRONAPRED.

	(1)
	(Ht-Ht-1)
pd13	-54.542***
	(4.829)
pd14	-52.157***
	(4.371)
pd15	-22.814***
	(4.229)
pd16	-14.301***
	(4.156)
pd18	-23.256***
	(5.651)
_cons	0.948***
	(0.318)
Obs.	14257
R-squared	0.019

Standard errors are in parenthesis
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

In addition, we estimated an interaction term on the difference in homicides. This interaction term allows the year effect on the Municipios PRONAPRED. Depending on the year, the coefficient is diminishing. This can be related with the diminishing of the budget of the fund. However, in 2018 the fund was re-launched with wade less amount of money than before, nevertheless the coefficient still significant. So, it may be other factors that we are not taking account that are highly related with the trend of the homicides.

9. CONCLUSIONS

Generalized opinion among journalist and academics in Mexico states that PRONAPRED does not work despite it being a good alternative to the military strategy. Two main academic studies citied above agree that PRONAPRED is just good intentions with no impact. We cannot deny the veracity of those studies, given the fact that there existed several problems and failures during the implementation of the program. However, with the present model, given the data for the years we noticed two significant facts. First, the PRONAPRED variable is significant in each regression estimated for the most robust model with 10 control variables. Second, according to the figure 6, the municipios with PRONAPRED are better off than the ones that were not included in the project. However, it is fair to mention that this study does not take in consideration other programs for crime prevention such as the FASP and SUMSEMUN/FORTASEG, that are not crime and violence prevention programs per se, but they designate a sizable percentage of their budget for crime prevention.

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Figure 7 Mexico Total Homicides from 1990 to 2018
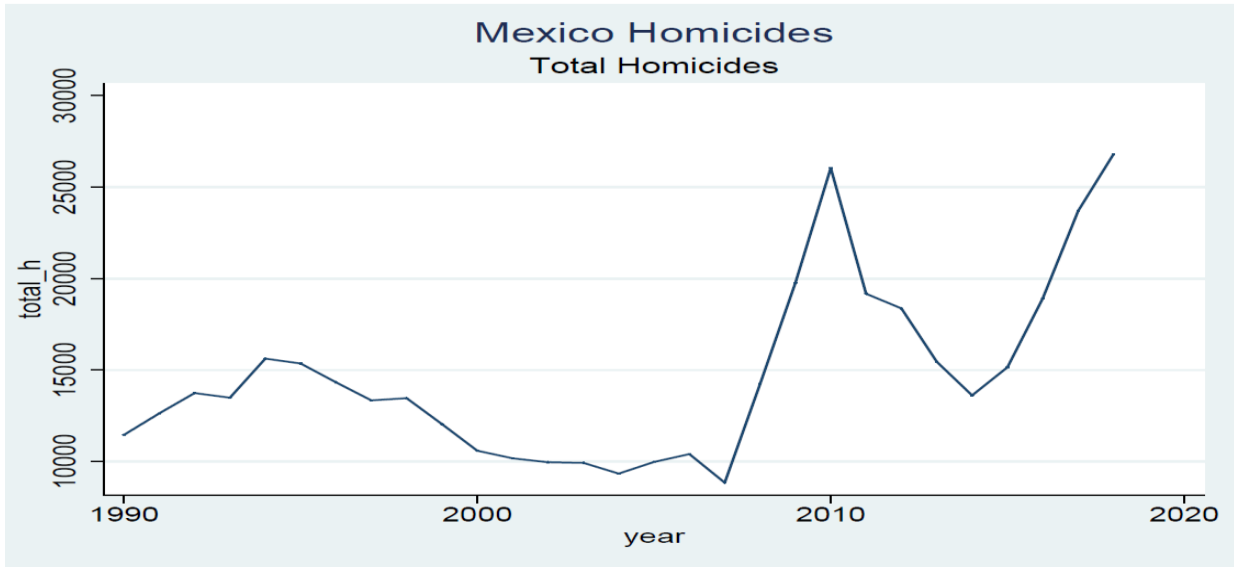
Figure 8 Intentional Homicides Rates for Ciudad Juarez
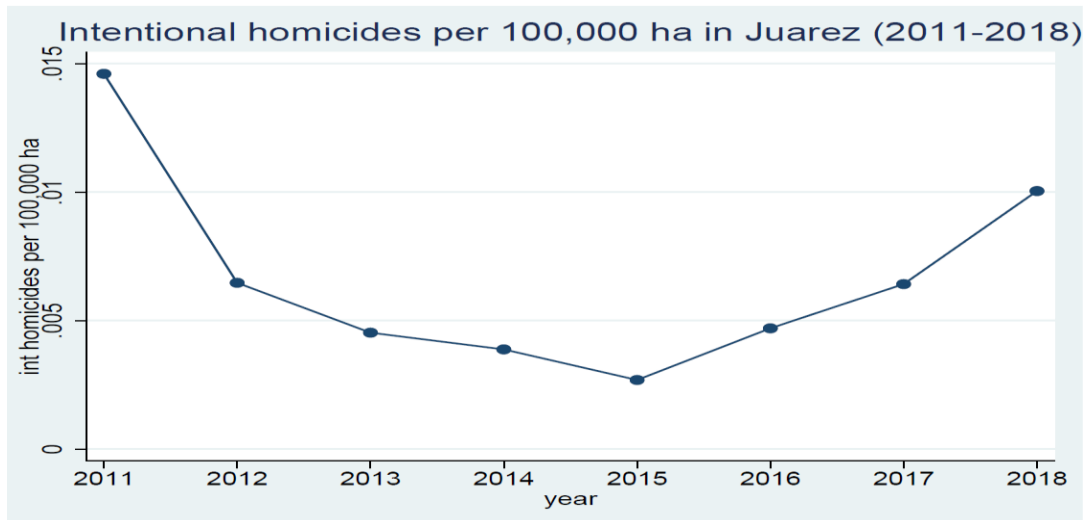
Hausman (1978) specification test

	Coef.
Chi-square test value	392.418
P-value	0

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 345) = 14.700

Prob > F = 0.0001

Summary Description Statistics

	N	Mean	St.Dev	min	max
Homicides	11864	10.491	41.128	0	1618
PRONAPRED	19651	.02	.14	0	1
DropoutElem	19651	-.012	.057	-4.52	.816
ElemBoysGirls	19651	1.138	.195	.308	7
StuTeachElem	19651	19.761	5.704	2.8	391
DropoutMidd	16892	-.043	.066	-3.364	.607
StuTeachMidd	16892	15.818	4.436	1	66.38
MiddBoyGirls	16890	1.126	.28	0	12.079
DropoutHigh	12621	-.12	.097	-2.4	.667
StuTeachHigh	12610	22.271	20.156	1.4	496
HighBoysGirls	12621	1.071	.399	.122	18.567
Stores	3903	15.198	37.367	1	555

APPENDIX C

Table 6 Variables Description

Variable	Description	Value Definition
Homicides	Total number of intentional homicides per year	Number
Homicides Rate	Intentional homicide, rate per 100,000 population	Ratio
Stores	Total number of new convenience stores opened per year	Number
PRONAPRED	Dummy variable of the crime and violence prevention fund	Yes/No
DropoutElem	Total number of drop-outs from primary schools per year in a given municipal	Ratio
StuTeachElem	Proportion of students to teachers in elementary school per year in a given municipal	Ratio
ElemBoysGirls	Proportion of boys to girls enrolled in primary school per year in a given municipal	Ratio
DropoutMidd	Total number of drop-outs from middle school per year in a given municipal	Number
StuTeachMidd	Proportion of students to teachers in middle school per year in a given municipal	Ratio
MiddBoyGirls	Proportion of boys to girls enrolled in middle school per year in a given municipal	Ratio
DropoutHigh	Total number of drop-outs from high schools per year in a given municipal	Number
StuTeachHigh	Proportion of students to teachers in high school per year in a given municipal	Ratio
HighBoysGirls	Proportion of boys to girls enrolled in high school per year in a given municipal	Ratio

APPENDIX D

Table 7 Municipios PRONAPRED

MUNICIPIOS PRONAPRED 2013-2016, 2018

CLAVE	ENTIDAD	2013 CLAVE	2013 MUNICIPIO	2014 CLAVE	2014 MUNICIPIO	2015 CLAVE	2015 MUNICIPIO	2016 CLAVE	2016 MUNICIPIO	2018 CLAVE	2018 MUNICIPIO
01	Aguascalientes	001	Aguascalientes	001	Aguascalientes	001	Aguascalientes	001	Aguascalientes	001	Aguascalientes
										005	Jesús María
02	Baja California	002	Mexicali	002	Mexicali	002	Mexicali	002	Mexicali	002	Mexicali
		004	Tijuana	004	Tijuana	004	Tijuana	004	Tijuana	004	Tijuana
03	Baja California Sur	003	La Paz	003	La Paz	003	La Paz	003	La Paz	008	La Paz
										003	Los Cabos
04	Campeche	002	Campeche	002	Campeche	002	Campeche	002	Campeche	003	Carmen
		003	Carmen	003	Carmen	003	Carmen	003	Carmen	002	Campeche
05	Coahuila de Zaragoza	017	Matamoros	017	Matamoros	017	Matamoros	017	Matamoros		
		030	Saltillo	030	Saltillo	030	Saltillo	030	Saltillo	030	Saltillo
		035	Torreón	035	Torreón	035	Torreón	035	Torreón	035	Torreón
						002	Acuña	002	Acuña		
06	Colima	002	Colima	002	Colima	002	Colima	002	Colima		
		007	Manzanillo	007	Manzanillo	007	Manzanillo	007	Manzanillo	007	Manzanillo
				009	Tecomán	009	Tecomán	009	Tecomán	009	Tecomán
07	Chiapas	089	Tapachula	089	Tapachula	089	Tapachula	089	Tapachula	089	Tapachula
		101	Tuxtla Gutiérrez	101	Tuxtla Gutiérrez	101	Tuxtla Gutiérrez	101	Tuxtla Gutiérrez	101	Tuxtla Gutiérrez
								019	Comitán de Domínguez		
08	Chihuahua	019	Chihuahua	019	Chihuahua	019	Chihuahua	019	Chihuahua	019	Chihuahua
				029	Guadalupe y Calvo	029	Guadalupe y Calvo	029	Guadalupe y Calvo		
				032	Hidalgo del Parral	032	Hidalgo del Parral	032	Hidalgo del Parral		
		037	Juárez	037	Juárez	037	Juárez	037	Juárez	037	Juárez
09	Ciudad de México			010	Álvaro Obregón	010	Álvaro Obregón	010	Álvaro Obregón		
				015	Cuauhtémoc	015	Cuauhtémoc	015	Cuauhtémoc		
		005	Gustavo A. Madero	005	Gustavo A. Madero	005	Gustavo A. Madero	005	Gustavo A. Madero	005	Gustavo A. Madero
		007	Iztapalapa	007	Iztapalapa	007	Iztapalapa	007	Iztapalapa	007	Iztapalapa
				017	Venustiano Carranza	017	Venustiano Carranza	017	Venustiano Carranza		
10	Durango	005	Durango	005	Durango	005	Durango	005	Durango	005	Durango
		007	Gómez Palacio	007	Gómez Palacio	007	Gómez Palacio	007	Gómez Palacio	007	Gómez Palacio
		012	Lerdo	012	Lerdo	012	Lerdo	012	Lerdo		
11	Guanajuato	007	Celaya	007	Celaya	007	Celaya	007	Celaya	007	Celaya
				015	Guanajuato	015	Guanajuato	015	Guanajuato		
		020	León	020	León	020	León	020	León	020	León
								033	San Luis de la Paz		
12	Guerrero	001	Acapulco de Juárez	001	Acapulco de Juárez	001	Acapulco de Juárez	001	Acapulco de Juárez	001	Acapulco de Juárez
		029	Chilpancingo de los Bravo	029	Chilpancingo de los Bravo	029	Chilpancingo de los Bravo	029	Chilpancingo de los Bravo	029	Chilpancingo de los Bravo
		038	Zihuatanejo de Azueta	038	Zihuatanejo de Azueta	038	Zihuatanejo de Azueta	038	Zihuatanejo de Azueta		
						035	Iguala de la Independencia	035	Iguala de la Independencia		
						017	Cocula	017	Cocula		
						028	Chilapa de Álvarez	028	Chilapa de Álvarez		
						021	Coyuca de Benítez				
13	Hidalgo	048	Pachuca de Soto	048	Pachuca de Soto	048	Pachuca de Soto	048	Pachuca de Soto	048	Pachuca de Soto
		077	Tulancingo de Bravo	077	Tulancingo de Bravo	077	Tulancingo de Bravo	077	Tulancingo de Bravo	077	Tulancingo de Bravo
				076	Tula de Allende	076	Tula de Allende				
14	Jalisco	039	Guadalajara	039	Guadalajara	039	Guadalajara	039	Guadalajara	039	Guadalajara
		070	El Salto	070	El Salto	070	El Salto	070	El Salto		
		097	Tlajomulco de Zúñiga	097	Tlajomulco de Zúñiga	097	Tlajomulco de Zúñiga	097	Tlajomulco de Zúñiga		
		098	San Pedro Tlaquepaque	098	San Pedro Tlaquepaque	098	San Pedro Tlaquepaque	098	San Pedro Tlaquepaque		
		101	Tonalá	101	Tonalá	101	Tonalá	101	Tonalá		
		120	Zapopan	120	Zapopan	120	Zapopan	120	Zapopan	120	Zapopan
15	México	033	Ecatepec de Morelos	033	Ecatepec de Morelos	033	Ecatepec de Morelos	033	Ecatepec de Morelos	033	Ecatepec de Morelos
		058	Nezahualcóyotl	058	Nezahualcóyotl	058	Nezahualcóyotl	058	Nezahualcóyotl		
		106	Toluca	106	Toluca	106	Toluca	106	Toluca	106	Toluca
						054	Metepec	054	Metepec		
						025	Chalco	025	Chalco		
16	Michoacán de Ocampo			006	Apatzingán	006	Apatzingán	006	Apatzingán		
				052	Lázaro Cárdenas	052	Lázaro Cárdenas	052	Lázaro Cárdenas		
		053	Morelia	053	Morelia	053	Morelia	053	Morelia	053	Morelia
		102	Uruapan	102	Uruapan	102	Uruapan	102	Uruapan	102	Uruapan
								108	Zamora		
17	Morelos	006	Cuautla	006	Cuautla	006	Cuautla	006	Cuautla	006	Cuautla
		007	Cuernavaca	007	Cuernavaca	007	Cuernavaca	007	Cuernavaca		
		011	Jiutepec	011	Jiutepec	011	Jiutepec	011	Jiutepec		
		018	Temixco	018	Temixco	018	Temixco	018	Temixco	018	Temixco
18	Nayarit	017	Tepic	017	Tepic	017	Tepic	017	Tepic	017	Tepic
										020	Bahía de Banderas
19	Nuevo León	006	Apodaca	006	Apodaca	006	Apodaca	006	Apodaca		
		009	Cadereyta Jiménez	009	Cadereyta Jiménez	009	Cadereyta Jiménez	009	Cadereyta Jiménez		
		021	General Escobedo	021	General Escobedo	021	General Escobedo	021	General Escobedo		
		018	García	018	García	018	García	018	García		
		026	Guadalupe	026	Guadalupe	026	Guadalupe	026	Guadalupe		
		031	Juárez	031	Juárez	031	Juárez	031	Juárez	031	Juárez
		039	Monterrey	039	Monterrey	039	Monterrey	039	Monterrey	039	Monterrey
		040	Páras	040	Páras						
		046	San Nicolás de los Garza	046	San Nicolás de los Garza	046	San Nicolás de los Garza	046	San Nicolás de los Garza		
		019	San Pedro Garza García	019	San Pedro Garza García	019	San Pedro Garza García	019	San Pedro Garza García		
		048	Santa Catarina	048	Santa Catarina	048	Santa Catarina	048	Santa Catarina		
		049	Santiago	049	Santiago	049	Santiago	049	Santiago		
20	Oaxaca	067	Oaxáca de Juárez	067	Oaxáca de Juárez	067	Oaxáca de Juárez	067	Oaxáca de Juárez	067	Oaxáca de Juárez
				157	San Jacinto Amilpas	157	San Jacinto Amilpas				
		184	San Juan Bautista Tuxtepec	184	San Juan Bautista Tuxtepec	184	San Juan Bautista Tuxtepec	184	San Juan Bautista Tuxtepec	184	San Juan Bautista Tuxtepec
				390	Santa Lucía del Camino	390	Santa Lucía del Camino				
21	Puebla	114	Puebla	114	Puebla	114	Puebla	114	Puebla	114	Puebla
		156	Tehuacán	156	Tehuacán	156	Tehuacán	156	Tehuacán	156	Tehuacán
								019	Atlixco		
22	Querétaro	006	Corregidora	006	Corregidora	006	Corregidora	006	Corregidora		
		011	El Marqués	011	El Marqués	011	El Marqués	011	El Marqués		
		008	Huimilpan	008	Huimilpan	008	Huimilpan	008	Huimilpan		
		014	Querétaro	014	Querétaro	014	Querétaro	014	Querétaro		
						---	Proyecto Metropolitano	---	Proyecto Metropolitano		
23	Quintana Roo	005	Benito Juárez	005	Benito Juárez	005	Benito Juárez	005	Benito Juárez	005	Benito Juárez
		004	Othón P. Blanco	004	Othón P. Blanco	004	Othón P. Blanco	004	Othón P. Blanco		
				008	Solidaridad	008	Solidaridad			008	Solidaridad
24	San Luis Potosí	013	Ciudad Valles	013	Ciudad Valles	013	Ciudad Valles	013	Ciudad Valles	013	Ciudad Valles
		028	San Luis Potosí	028	San Luis Potosí	028	San Luis Potosí	028	San Luis Potosí	028	San Luis Potosí
25	Sinaloa	001	Ahome	001	Ahome	001	Ahome	001	Ahome	006	Culiacán
		006	Culiacán	006	Culiacán	006	Culiacán	006	Culiacán	001	Ahome
				015	Salvador Alvarado	015	Salvador Alvarado				
26	Sonora	018	Cajeme	018	Cajeme	018	Cajeme	018	Cajeme	030	Hermosillo
		030	Hermosillo	030	Hermosillo	030	Hermosillo	030	Hermosillo	018	Cajeme
				055	San Luis Río Colorado	055	San Luis Río Colorado				
								029	Guaymas		
27	Tabasco	004	Centro	004	Centro	004	Centro	004	Centro	004	Centro
				002	Cárdenas	002	Cárdenas				
								006	Cunduacán	006	Cunduacán
28	Tamaulipas	027	Nuevo Laredo	027	Nuevo Laredo	027	Nuevo Laredo	027	Nuevo Laredo	027	Nuevo Laredo
		041	Victoria	041	Victoria	041	Victoria	041	Victoria		
				032	Reynosa	032	Reynosa	032	Reynosa	032	Reynosa
						038	Tampico				
						022	Matamoros				
						033	Río Bravo				
29	Tlaxcala	006	Calpulalpan	006	Calpulalpan	006	Calpulalpan			013	Huamantla
		033	Tlaxcala	033	Tlaxcala	033	Tlaxcala	033	Tlaxcala	033	Tlaxcala
30	Veracruz de Ignacio de la Llave	028	Boca del Río	028	Boca del Río	028	Boca del Río	028	Boca del Río		
		193	Veracruz	193	Veracruz	193	Veracruz	193	Veracruz	193	Veracruz
		087	Xalapa	087	Xalapa	087	Xalapa	087	Xalapa	087	Xalapa
								108	Minatitlán		
31	Yucatán	050	Mérida	050	Mérida	050	Mérida	050	Mérida		
32	Zacatecas	010	Fresnillo	010	Fresnillo	010	Fresnillo	010	Fresnillo	010	Fresnillo
		017	Guadalupe	017	Guadalupe	017	Guadalupe	017	Guadalupe	017	Guadalupe
		056	Zacatecas	056	Zacatecas	056	Zacatecas	056	Zacatecas		

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