THE EFFECT OF EXPOSURE TO VIOLENCE ON HOUSEHOLD SAVINGS: EVIDENCE FROM DRUG WAR ON MEXICO

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Abstract

In this paper I study the sharp increase in violence experienced in Mexico after 2006, known as "The War on Drugs" and its effects on household savings. Using a standard difference-in differences (DID) model and data from the 2005-06 and 2009-12 waves of the Mexican Family Life Survey, I find that the surge in violence in Mexico after 2006 significantly increased household savings. This result is robust to different specifications and treatment assignments. I explore different ways in which violent crime may affect household savings. Estimations from DID specifications provide evidence that self-employed heads experienced positive and significant increase in their savings in response to increased violence. Furthermore, I show that the effects are more pronounced for head of households with lower education level.

1. Introduction

Since the end of 2006, Mexico has been marked by a significant rise in violent death, with annual homicides increasing from 25,780 to 37,375 (National Public Security System). In total, there were over 50,000 organized crime murders in Mexico from 2006 through 2011(Rios et. al., 2012). The increases are concentrated geographically, with high intensity states surpassed the levels found in war torn countries such as Afghanistan and Iraq[1]. The main reason of these death caused by direct confrontation between military and drug trafficking organizations (DTOs). Furthermore, as arrests and deaths weakened drug trafficking organizations, rival organizations and internal factions fought for control of territory and drug routes (Guerrero 2012b). As the conflict escalated and the need for additional revenue to help in the fight for territorial control grew, non-drug related crimes such as kidnappings, extortions, assault, and car theft, also increased (Molzahn et. Al., 2012; Guerrero-Gutiérrez, 2011). The substantial increase in the rates of homicides as well as the other type of crimes such as kidnappings, extortions, assault, and car theft (Guerrero-Gutiérrez, 2011) has generated a high level of fear within the population. Nationally representative victimization surveys show that the percentage of adults who feel the state in which they live is unsafe rose from 54% in 2004 to 65% in 2009, while the percentage of individuals who feel their work is unsafe rose from 13.7% to 19% (BenYishay et. Al., 2013).

[1] Between 2007 and 2012, for which Iraq and Afghanistan comparative data are available, between 104,794 and 121,613 murders were reported in Mexico, whereas at least 45,346 were killed in Iraq and 27,349 in Afghanistan. During a peak year in Iraq's civil war—in 2006—between 19,000 and 34,500 civilians were killed.Both in relative and absolute terms, the killing rate in Mexico is just astounding, with an inevitably devastating effect on Mexico's society in affected localities.(Vanda Felbab-Brown,2014) https://www.brookings.edu/wp-content/uploads/2016/07/mexico-security-anti-crime-nieto-v1-felbabbrown.pdf

Many studies provide evidence that individuals experiencing increasing levels of violence and/or fear of violence are suffering poorer economic outcomes (Dell, 2011; Robles et al., 2013; Velasquez, 2013; Montoya, 2016; BenYishay et al.,2013), deterioration of mental health (Moya, 2015), increased risk aversion (Nasir et al., 2016; Brown et al.,2015; Callen et. al., 2015; Guiso et. at., 2013; Malmendier et al., 2011), and reduced trust (Nasir et al., 2016).

I contribute to the literature on the costs of violent crime by exploring the impact of the sudden, unanticipated, and geographically heterogeneous surge in drug-related crime in Mexico during the late 2000s on household savings. To my knowledge it is the first empirical test of impact of exposure to violence (i.e. exposure to insecurity) on household savings makes use of a unique set of household and municipal data from Mexico. It is unclear what this relationship will be. On the one hand, an increasing sense of fear, lack of confidence in the police and an increasing probability of being a direct victim of OCGs can induce business owners to close, diminish total income of the household, and decrease the time allocated to labor activities. Previous studies on the effects of violence on labor market outcomes for Mexico found negative effects on labor market outcomes and economic activities (BenYishay and Pearlman (2013); Arias and Esquivel, 2013; Robles et al, 2013; Velásquez, 2014; Dell, 2014; and Enamorado et al, 2014). For example, Enamorado, et al (2014) study the effects of the spike in violent crime on income convergence and find evidence indicating a negative impact of drug-related homicides on income growth in Mexican municipalities over the period from 2005 to 2010. Robles et al (2013) study the effect of drug-trafficking related homicides in Mexico on economic activity (measured using electricity consumption) and unemployment. They find that an increase of 10 homicides per 100,000 inhabitants generates a decrease in the proportion of people working of 2-3 percentage points, an increase in the proportion of unemployed people by about a 0.5 percentage points, a

decrease in the proportion of people owning a business by about .4 percentage points, and a decrease in the proportion self-employed by about 0.5 percentage points. Additionally, an increase of 1 homicide per 100,000 inhabitants decreases municipal income by 1.2%. Also, Arias and Esquivel (2013) find that drug-related violence increase unemployment, 10 additional homicides per 100,000 inhabitants lead to an increase of a half percentage point in the unemployment rate. Dell (2014) shows that homicide rates and diversion of drug traffic had negative impacts on informal sector earnings and female labor force participation. The reduction in the earnings or labor maker opportunities, especially, for the income earners may leads household to reduce their savings to smooth consumption. On the other hands, individuals concerned about negative shocks from violence may increase labor force participation and labor force activity in order to build up a larger savings buffer. For example, Fernandez, Iba´n˜ez and Pen˜a (2014) find that labor markets are a risk mitigation mechanism for household facing violent conflict in rural Colombia. Meanwhile,

Basu and Pearlman (2018) find that violence leads to increases in income for men. Furthermore, Brown and Vela´squez (2017) find that young adults with a self-employed parent in Mexico are more likely to leave school and start working in response to increased violence.

The MxFLS is ideally suited to address the question of this paper. One important feature of the survey is that the first follow-up was conducted between 2005 and 2006, a period of low level of violence, and the second follow-up was conducted between 2009 and 2012, during years of elevated violence. Thus, this sharp and sudden increase in rates of homicides experienced in Mexico after 2006 that began right after the former Mexican President Felipe Calderón declared a “War on Drugs” provide us with a clear start to the ‘treatment’. Furthermore, the location and levels of violence were not determined by individual or local characteristics (Brown 2015;

Velásquez 2015). This exogenous spatial and temporal variation in the levels of violence allows for the identification of treatment effects from changes in the local homicide rate.

Using a difference-in-differences (DiD) approach and controlling for household characteristics, municipality characteristics, municipality and states fixed effect, I find that the surge in violence in Mexico after 2006 significantly increased household savings. This result is robust to different specifications and treatment assignments. Moreover, I test whether an increase in violence is associated with changes in labor market outcomes and assets. The results provide evidence that self-employed heads experienced positive and significant increase in their savings in response to increased violence. However, there are no change in labor force participation and activity from exposure to local violence. I am also interested in addressing how similar or different are household savings by income, education level and area of residence (urban vs rural). The heterogeneity effect results reveal that the overall effects are driven by head with lower education level while there are no significant differences by gender and region of residence.

The remainder of the paper is organized as follows: In the next section, I provide the essential background information on the violent conflicts in Mexico. Section 3 describes the data, provide descriptive statistics, and explains the standard difference-in-differences methodology. In Section 4, I present the main findings, mechanisms, robustness checks, and results on heterogeneity effect. Finally, I conclude in Section 5.

2. Drug Violence in Mexico

After 2007, there has been a dramatic increase in the level of violence in Mexico. The number of homicides per 100,000 inhabitants almost tripled between 2007 and 2011 from 8,867 in 2007 to 27,199 in 2011. Figure1 displays yearly homicide rates from 2000-2011. The number of

intentional homicides documented by Mexico's National Institute of Statistics, Geography, and Information (INEGI) had been stable and declining until 2007 and escalated quickly afterward.

The sharp increase in homicides experienced in Mexico after 2006 began right after the former Mexican President Felipe Calderón declared a "War on Drugs" and launched a military offensive (massive crackdown) against drug trafficking organizations (DTOs). Calderón's strategy intensely focused on direct confrontation with organized Crime Groups (OCGs) (Castillo et. Al., 2013; Molzahn et. Al., 2012)

When the military succeeded in capturing or killing a high-ranking cartel member, this would regularly result in intense fighting within the group to fill the power vacuum and eventually the fracturing of the original OCG into several new crime organizations. Overall, the number of cartels operating in Mexico grew from six in 2006 to sixteen by 2011(Guerrero-Gutiérrez, 2011). This fragmentation of the "cartels" increased confrontations between OCGs, as they sought to guarantee their territorial control. Furthermore, these crime groups operating in a limited space and competing over finite profits has amplified violence among these groups

Once the outbreak happened, violence not only escalated over time, but also spread throughout the country, reaching areas that previously had no strategic value for drug-trafficking and were thus unaffected by the cartels (Guerrero-Gutiérrez, 2011). For example, only 48 municipalities reported 12 or more homicides in 2007. By 2010, this level of homicides occurred in 148 municipalities (Velásquez 2015).

The spatial spread of violence suffered in Mexico is shown in the Maps contained in Figure 2. These maps show the municipality homicide rate per 100,000 inhabitants for 2002, 2005,2007,

and 2009. Maps 1 and 2 show the geographical dispersion of violence before Calderón took office. The levels of homicides were relatively low and concentrated in only a few places. However, Maps 3 ,4, and 5 show the geographical dispersion of the homicide rate from 2007 to 2010. The first year of Calderón's term, 2007 was a relatively stable year in terms of violence, even though his military strategy was already being implemented. 2009 map shows a dramatic increase in violence as well as its spread. Thus, along with the temporal variation in violence, I am able to exploit the large degree of heterogeneity in the geographic distribution of violent crime exposure across municipalities.

The level of violence not only changes, but also the nature of crime. As the conflict escalated and the need for additional revenue to help in the fight for territorial control grew, non-drug related crimes such as kidnappings, extortions, assault, and car theft, also increased (Molzahn et. Al., 2012; Guerrero-Gutiérrez, 2011). Even executions became more frequently targeted at civilians, particularly at authorities, reporters, and those not paying transit or extortion fees. The visibility of violence become one useful tool to spread fear and to reduce the willingness for citizens to mobilize or cooperate with the police or rival cartels (Ríos et. Al., 2011).

3. Data

This study combines two different datasets, the INEGI monthly homicide data at the municipal level with rich Mexican Family Life Survey (MxFLS) to examine how changes in homicides affect household savings.

The Mexican National Institute for Statistics and Geography (INEGI by its name in Spanish, Instituto Nacional de Estadística y Geografía) provides information on all official numbers of intentional homicides. Using homicides at the municipal level as the measure of violence in my

study has several advantages. First, homicides are a form of crime which are generally both violent and visible. Additionally, it is the most accurate and best proxy for the crime environment in Mexico. However, this data captures only registered homicides which may cause the INEGI homicides to underestimate the actual level of violence. Velasquez (2015) addressed this concern by comparing the INEGI data with the National Public Security System (SNSP), which was collected under the direction of President Felipe Calderón, about homicides related to organized crimes and finds similar trends. Furthermore, homicides have been consistently reported at the municipality level and are available from 1990 to 2011, which allows analysis to include both the pre-escalation and escalation periods and thus fully exploit the panel nature of the MxFLS. Lastly, Mexican citizens living in municipalities in which the INEGI reported higher homicide rate increases were significantly more likely to report feeling less safe than 5 years ago and more scared of being attacked (Nasir et al, 2017 ; Brown, 2015) which allowed me to examine the effects of indirect exposure to criminal violence on savings.

The Mexican Family Life Survey (MxFLS) is a rich longitudinal survey that is representative of the Mexican population in 2002 at the national, urban, rural, and regional levels. The MxFLS collects information on a wide range of socioeconomic and demographic indicators on individuals and households across three waves. During the 2002 baseline survey, MxFLS1 collects information on a sample of approximately 8,400 households among 150 urban and rural communities and 16 states throughout Mexico. The second wave, MxFLS2, was conducted in 2005-2006 and the third wave, MxFLS3, was conducted in 2009-2012. One particularly valuable aspect of the MxFLS, for the purposes of this study, is the fact that the timing of the survey waves provides a useful snap shot of Mexico before and during the major rise in conflict. The first follow-up was conducted between 2005 and 2006, a period of the pre-violence, and the

second follow-up was performed from 2009 to 2012, during times of extremely elevated violence, peak violence period. Therefore, our analysis focuses on the MxFLS2 and MxFLS3.

3.1. The violence and the average treatment effect

Despite the violence escalating dramatically, the homicide rate per 100,000 inhabitants almost increases threefold between 2007 and 2011 from roughly 8.1 to 23.5 homicides per 100,000 inhabitants (Molzahn et. Al., 2012). No household members in our sample died due to a violent incident outside of their household (Nasir et. al.,2016). Consequently, the significant increase in the homicide rate increased the potential of being a victim and, most likely, the perceived insecurity. Therefore, similar to Nasir et al (2017), I interpret my treatment as the indirect effect of violence.

The MxFLS data allowed us to explore the standard difference in differences (DID) strategy, since I have information for the pre-violence and peak-violence periods. Moreover, as noticed earlier in the maps, there was variation in homicides across time and municipalities. Thus, following Nasir, Rockmore, and Tan (2016), our treatment assignment will be the median homicide rate of municipalities in 2009 (10.107 per 100,000 inhabitants). The year of 2009 seems appropriate since the surge of violence started by the end of 2007 and I need some time to see the change of our interest outcome. The treated group is the household which lives in municipalities with a homicide rate above the median while the household which lives in municipalities with a homicide rate below the median was assigned as the control group. In the robustness check, I change our treatment assignment by using the 75th percentile of homicide rate (18.9 per 100,000 inhabitants) across the sample municipalities.

3.2. Household Saving

MxFLS provides detailed information about the Mexican's credit and savings habits. I focus the analysis households level. The final sample from the first follow up survey consists of 7,967 households in 102 Mexican municipalities.

MxFLS asked each individual aged 18 year and above if he/she has any savings, total amount of savings, and where they keep their savings if they have saved. I construct two measures for household savings:

- Any savings: a binary variable equal 1 if at least one member of the household has any savings, zero otherwise
- Total amount of savings: the log of total amount of savings for household who save

3.3. Empirical Methodology

I now examine whether changes on households' savings over time were correlated to the escalation of homicide. To do so, I exploit the variation over time and across municipalities of violence to compute difference-in-difference (DID) estimates.

In the basic setting, outcomes are observed for two groups for two-time periods. One of groups is exposed to a treatment in the second period but not in the first period. The second group is not exposed to the treatment during either period. I employ standard DID to compare outcomes before and after a violence change for a group affected by the change (Treatment Group) to a group not affected by the change (Control Group). The econometric specification to compute the DID estimate consists of the following:

$$y_{hmt} = \beta_0 + \beta_1 year_t + \beta_2 D_m + \tau\,(year * D)_{mt} + \delta X_{hmt} + Z_i + \varepsilon_{hmt}$$

The treatment effect on the treated at the time of the treatment is defined by

$$ATET = \tau(T = 1, D = 1, X = x)$$

$$= E(Y_i^1 - Y_i^0 \setminus T = 1, D = 1, X = x)$$

$$= E(Y_i^1 \setminus T = 1, D = 1, X = x) - E(Y_i^0 \setminus T = 1, D = 1, X = x)$$

Where Y_i^1 and Y_i^0 denote the potential savings of household i with and without treatment, respectively. The treatment variable, denoted by *D*, is binary, i.e., $d \in \{0,1\}$. D denotes whether household i lived in a municipality which experiences "severe violence" or not; if D=1 the household is in the treatment group, and D=0 the household is in the control group. As I discussed earlier, I define "severe violence" as exposure to a level of violence above the median level of violence across municipalities. For robustness, I also consider the case where only the exposure to violence in the top quartile is defined as "severe". I have measurements of the various variables at most in two-time periods, T, $t \in \{0,1\}$. Period zero indicates a time period before the treatment (pre-treatment period), and period one indicates a time period after the treatment took place (post-treatment period). X is a vector of controls of household demographics and household characteristics that are the following variables: head's age, head's education, head's employment, head's income, household size, number of children living in household, and household ownership of various assets (house, car, washing machine and domestic appliances). I also control for time-varying municipality characteristics such as Gini index, food poverty index, percent rural population, (log) public expenditures, (log) public safety expenditures, (log) median income, and literacy rate.[2] Moreover, I include a set of municipalities, state, and interview year fixed effects that control for all the unobserved variation municipalities, state, and interview year that are fixed over time. I cluster standard errors at the municipality

[2] I download the data from Enamorado et al (2016) at the following link: http://www.sciencedirect.com/science/article/pii/S0304387815001364

level to account for correlation between different observations within a municipality. The ATET expression highlights the counter-factual nature of a causal effect. The first term is the average savings in the population of severe violence. The second term is the average savings of all other populations.

As noted earlier, the increase in violence was not uniform across municipalities nor time which raise the concern whether this violence heterogeneity reflects underlying trends in other municipalities characteristics. For example, the increase in violence may be picking up the effect of some other municipality trend on household savings. The surge of violence is exogenous because of the sudden and unanticipated violence. Moreover, Brown (2015) uses the first wave of MxFLS that covers the period of pre-escalation trends for 135 baseline municipalities to predict each municipality's homicides in 2009. He concludes that the pre-escalation trends in municipality characteristics are not related to future level of homicide rates, confirming the exogeneity of rise in violence.

The empirical estimation may be biased due to endogeneity of migration. For example, households with higher earnings may be migrating in response to increase in homicides. In consideration of endogenous migration, I utilize an "intent-to-treat" approach, where the municipality of residence in the second wave of the MxFLS (MxFLS2) determines a household's exposure to violence.

4. Results

my classification of treatment and control groups is based on the median homicide rate across municipalities. The households from municipalities with higher than median (10.619) homicide rate in year 2009 were placed in the treated group, whereas all other households placed in the

control group. Table 1 presents descriptive statistics for the analysis sample in the pre-treatment period except for the outcome variables which I present in the summary statistics of pre- and post- treatments. The first column reports information on the treated group. Information of all other households is shown in column two. The binary variables for household savings turn out to be lower for the treated group and significantly different. The characteristics of household and the head of household for the two groups are very similar, though, the mean of head education is significantly different between two groups (i.e. p-value=0.0000). Concerning household wealth/assets, there are no significant differences between two the groups except for owning furniture, large and domestic appliances, and financial assets. Furthermore, there are significant differences in municipality characteristics between treated and control groups (i.e. p-value=0.0000).

For the baseline specification, I used two measures of household savings. The dummy variable reflects whether a household has savings or not and the total amount of savings if the household has positive savings. I started my analysis by showing the time and cross-sectional differences between the unconditional mean of the treatment and comparison groups (see Table 2). When I looked at mean of household savings in the pre- treatment period, I noted that household savings was 0.20 and 0.28 for treated and comparison groups respectively. The difference in the pre-treatment mean between the treated and comparison group was negative, implying that the treated group exhibited less household savings on average than the comparison group. Furthermore, the differences of the mean household savings for the treated group before and after the escalation of violence was positive (0.107), which suggests that escalation in violence increases the household savings. However, a simple before and after comparison ignores the effect of possible confounders and trend, thus I cannot attribute this increase solely to the change

in violence. Therefore, I used DID strategy which extracts the common trends and leaves us with the causal effect of escalation in violence on the household savings. The treated group subsequently observed a net increase of 11 percentage point in household savings in the post-treatment period. Table 3 presents the results of standard DID. Column (1) includes household and head characteristics such that head's age, head's education, head's employment, head's income, household size, number of children living in household, and household assets as well as interview year fixed effects. Column (2) adds municipality characteristics. Column (3) and column (4) add municipality and state fixed effects respectively to household characteristics and interview year fixed effects. The coefficient, the average treatment effect on the treated (ATET), for exposure to violence at the municipal level is highly significant. Exposure to violence increases the household savings between 6 and 8 percentage points across the specifications. The results suggest that households which experienced severe violence are more likely to save than those which are not living in severe violence.

The results of the impact of exposure to violence on total amount of savings (in log) for households whose save present in Table 4 and Table 5. The positive difference in unconditional means (Table 4) between the treated and control groups suggests that exposure to violence increases household savings by 0.513 in the post-treatment period. The ATET is insignificant, though has the expected sings.

4.1. Robustness Check

In the previous analysis I used the median homicide rate as the treatment assignment. However, this threshold is arbitrary and maybe the results will be different if I change the definition of our treatment variable. Therefore, in this section I conduct the robustness check and use the third quartile (75th percentile) homicide rates as a threshold for treatment assignment. I present the

corresponding estimation results in Table 5 and Table 6. Table 5 presents the simple difference in the unconditional means for the two groups. As in the baseline case, I observe that the treated group has less savings than the comparison group in the pre-treatment period. Subsequently, the treated group observes a net increase of 9 percentage points in household savings in the post-treatment period. In comparison groups in our earlier coding, this represents a roughly 2 percentage point decrease in the unconditional treatment effect. Table 6 shows the standard DID results. The estimated coefficients remain positive and significant for all specifications, except Model 2 is insignificant. Though, I lose some significance (becomes significant at 10 % level); see column 1 and column 3. The estimated coefficients are slightly smaller to the corresponding baseline findings.

I again conduct the robustness analyses by exposing the treated group to "severe" violence (i.e. 75th percentile homicide rates) for the second definition which is the total household savings. The results for unconditional mean and standard DID are presented in Table 7 and Table 8. It is evident from these tables that almost all the results are robust to this "severe" treatment assignment. They are similar in terms of sign, significance and magnitude to the results obtained for median homicide rates.

The results of the robustness check for the two measures of household savings show that varying the definition of the treatment variables does not affect the results. More broadly, the similarity between the estimated coefficients, despite the change in the treatment threshold, suggests that the effects are broadly constant across a large range of homicide values.

4.2. Possible Mechanisms

In this section I consider two possible mechanism in which violence crime may affect household savings. First, I test whether an increase in violence is associated with changes in labor market outcome such as hours worked, employment, self- employed, and formal work. There are considerable evidences that increased local homicide rate may alter labor force participation and shift in labor force activity as show earlier. I present the results of homicide rate in labor outcome in Table 9 controlling for household and head characteristic (Model 1) and municipality fixed effect (Model 2). Panel A and Panel B show the results of the median and 75th percentile homicide rates at municipality level respectively. The results show there is no change in hours worked and employment. I find that an increase in homicides have positive effect on self-employed head, though it is insignificant except for self-employed who live in high violence municipalities (i.e. above 75th percentile).

Another mechanism worth considering is whether households accumulate more assets in response to increased violence. I compute DID estimates on nine different outcomes such as owning house, bike, car, large furniture and domestic appliances. Table 10 and Table 11 show the effect of violence on assets for the household which lives in municipalities with a homicide rate above median and 75th percentile homicide rates respectively. The results show no change in assets ownership.

4.3. Heterogeneity Effect

Now I consider whether the effect may vary based on head characteristics. I specifically consider three dimensions: gender, education, and place of residence.

Household Savings by Gender

There are several reasons to think that there might be differences in household savings between men and women when they are exposed to violence. First, there are evidences from previous studies that male and female headed households have different capabilities to manage risk and cope with shocks. For example, results from Ethiopia and Bangladesh studies show that female headed households are more likely to report experiencing a reduction in living standards or asset holdings as a result of the 2007–2008 food price increase. Second, men and women may have different levels of expected exposure to crime which may affect their labor participation differently. Velásquez (2014) and Dell (2014) find heterogeneous labor market effects by gender and occupation. They present evidences that increases in the homicide rates increases the probability that self-employed women leave the labor market and reduce their hours worked. By contrast, these studies find that violence does not appear to affect the labor market participation of self-employed men but does negatively affect their hourly and total earnings. In addition, the psychological reaction to a rise of violence might differ between men and women. I present the results by gender in Table A1 in the Appendix. For each model, I present my earlier results (Table 2) in the first column and the result for just men and just women in second and third columns. I also report the results for both treatment median homicide rate and 75th percentile in panel A and panel B respectively. I find no significant differences between the genders.

Household Savings by Education

The second dimension for which I check heterogeneity in the effect of violence on savings is education level. Education might be correlated with exposure via types of employment and might be correlated with access to information regarding homicides. In Mexico, 9 years of schooling has been made compulsory. I therefore use this level of education as the threshold to see if those with more than 9 years of education behave differently from those who have not attained this

basic level of education. The results reported in Table A2 panel A suggest that household savings for those headed by individuals with low education level are positive, big in magnitude, and significant compare to counterpart household heads when they exposure to violence. The results provide some evidence that the results may driven by the low education heads.

Household Savings by Region of Residence

It well-documented that the Mexican drug war had a greater effect in more urban municipalities than rural (Velásquez, 2014). It is thus possible that the type and severity of the crimes also differ between rural and urban areas. For example, it could be the case that, even at the same homicide rate level, more extortions or kidnappings take place in urban areas, or the homicides in urban areas may be more violent. To evaluate whether the results vary between these areas, I stratify the sample by the urban/rural status of the municipality of residence in MxFLS2. Table A3 in the appendix reports the results of household savings by region of residence. The results suggest that there are no significant differences based on the region of residence (i.e. urban vs rural).

Conclusion

Using a DID model and data from the 2005-06 and 2009-12 waves of the Mexican Family Life Survey MxFLS, we estimate the effect of a plausibly exogenous change in municipality homicide rates on household savings. Exposure to violence at the municipality level in Mexico results in households save more, increase the household saving between 4 and 8 percentage points across all the specifications. The results are robust to different treatment assignments. However, there is no significant change in total savings. I explore several pathways by which the violence exposure is impacting the household savings. I find positive and significate effect on self-employed head but no change in labor force participation and accumulate assets. I examine whether the effect of violence crime may vary based on head and household characteristics considering three dimensions: region of residence, head's gender, and head's education. There are some evidences that the results are driven by head with lower education level.

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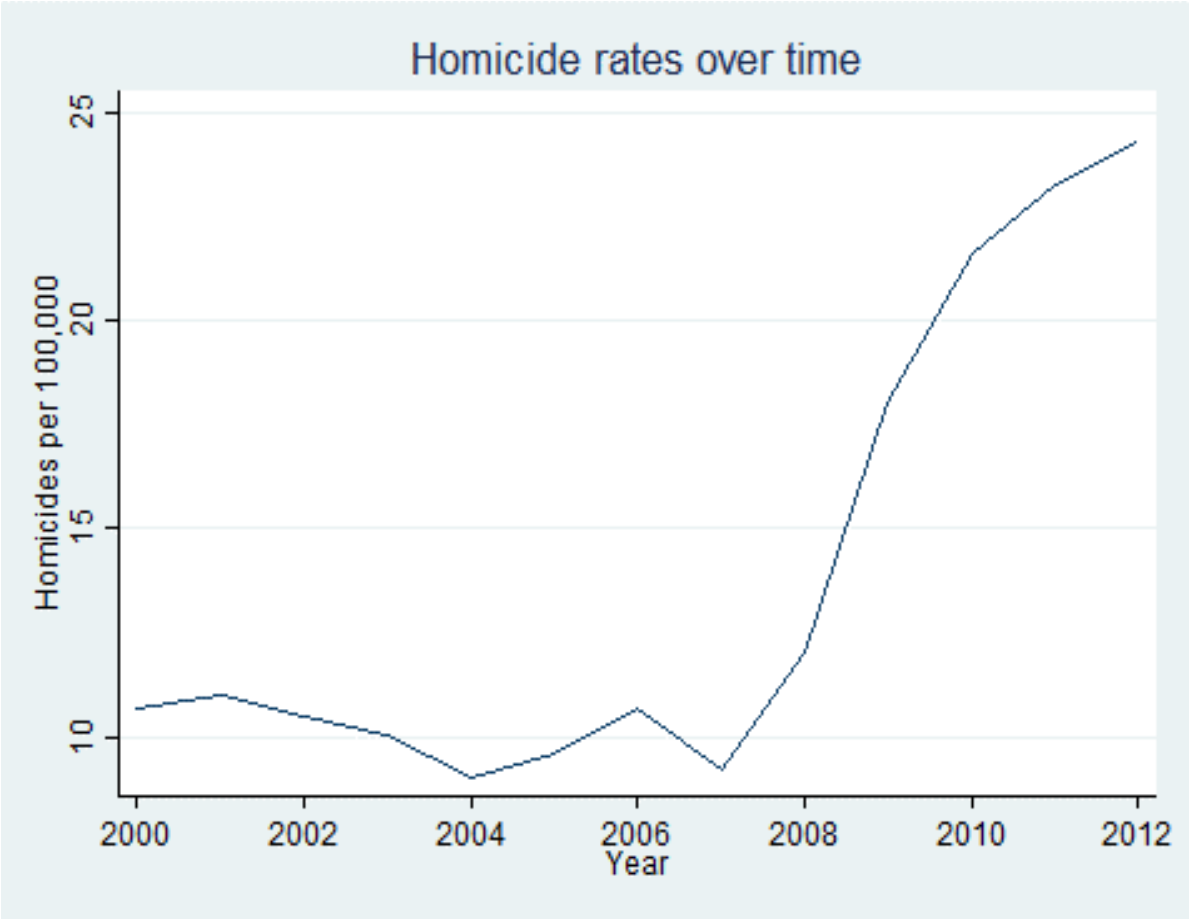
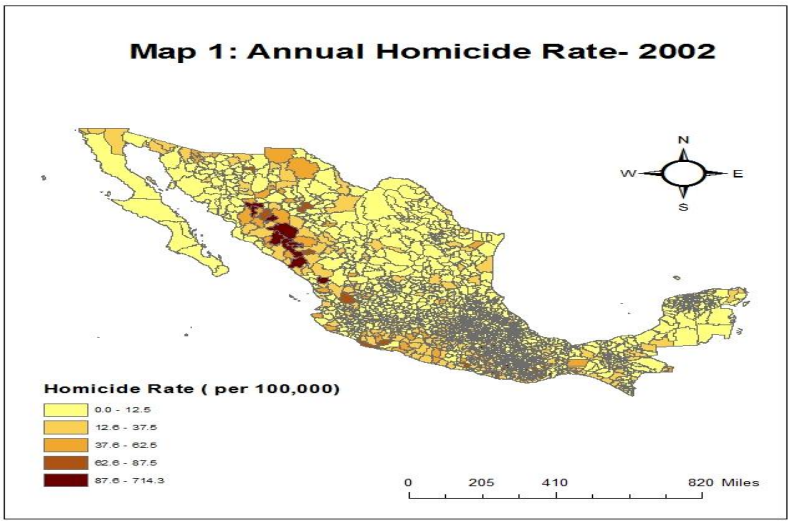
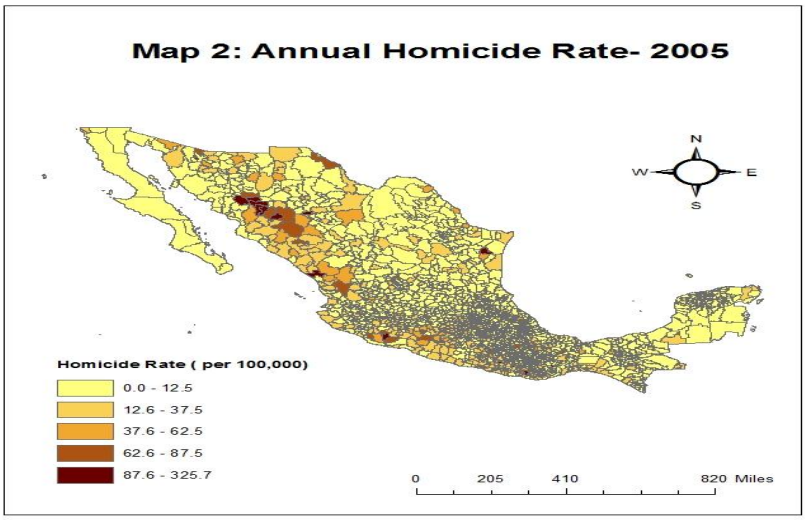
Figure 1: Homicide Rate Over Time

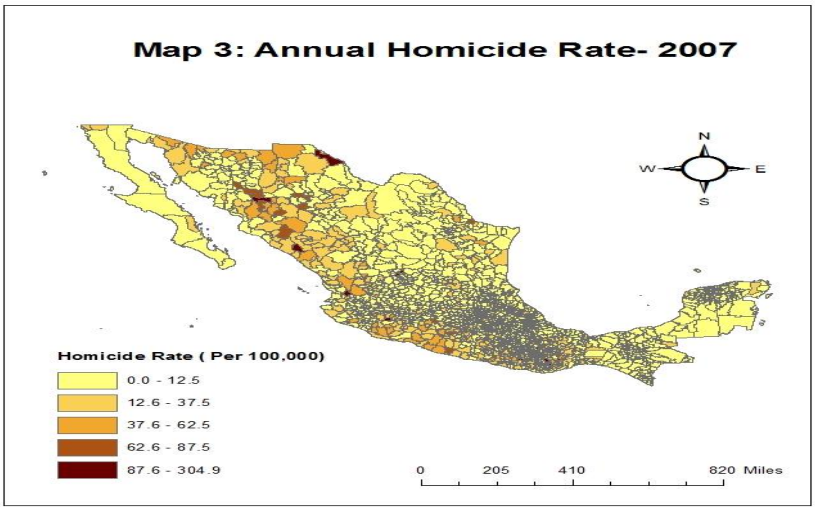


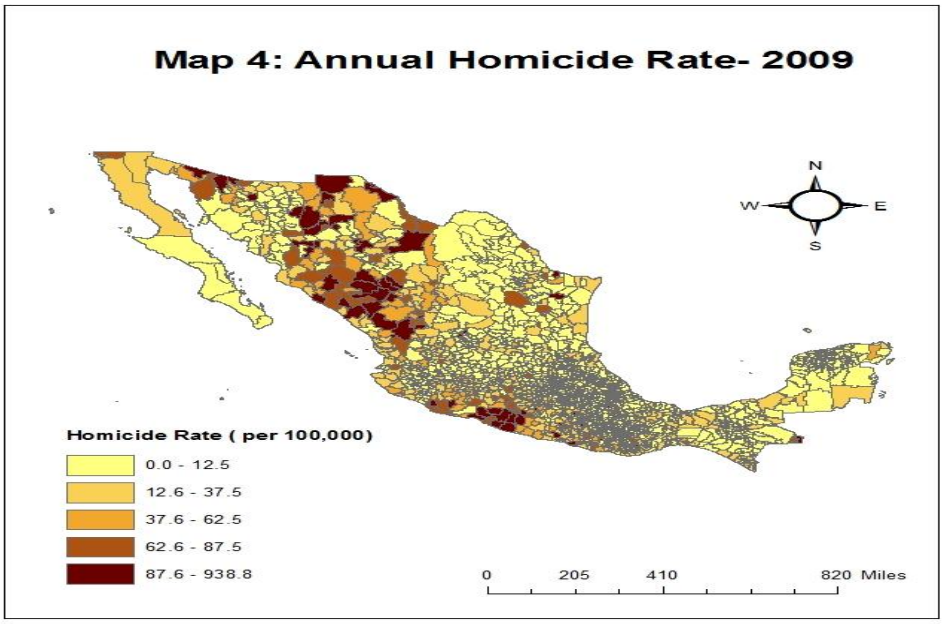
Source: Authors' calculation based on data from http://www.inegi.org.mx/.

Figure 2: Municipality Homicide Rate (per 100,000) by Year








Map 4: Annual Homicide Rate- 2009
N
W
E
S
Homicide Rate (per 100,000)
0.0 - 12.5
12.6 - 37.5
37.6 - 62.5
62.6 - 87.5
87.6 - 938.8
0
205
410
820 Miles

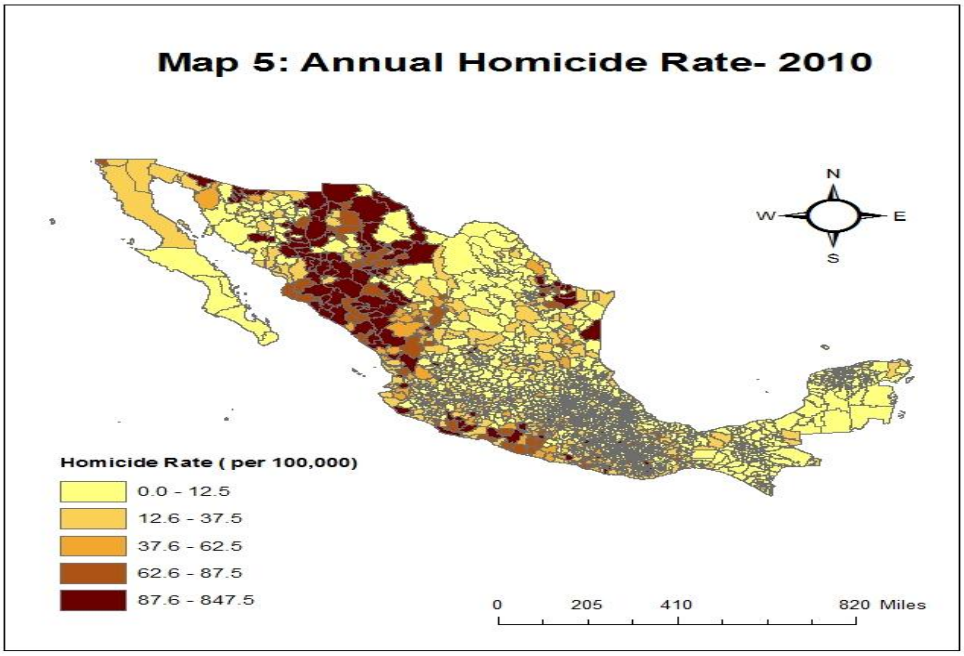

Map 5: Annual Homicide Rate- 2010
N
W
E
S
Homicide Rate (per 100,000)
0.0 - 12.5
12.6 - 37.5
37.6 - 62.5
62.6 - 87.5
87.6 - 847.5
0
205
410
820 Miles

Table 1: Descriptive Statistics

	Control Group		Treated Group		
Variable	Mean	Std. Dev.	Mean	Std. Dev.	P-value
Household Saving					
Has Savings 2005	0.28	0.4474	0.23	0.4230	0.000
Has Savings 2009	0.28	0.4499	0.31	0.4611	
Has Retirement Saving 2005	0.27	0.4457	0.26	0.4397	0.307
Has Retirement Saving 2009	0.34	0.4724	0.34	0.4743	
Saving/Retirement 2005	0.41	0.4924	0.39	0.4871	0.037
Saving/Retirement 2009	0.47	0.4991	0.50	0.5000	
Household Assets					
Own Living House	0.81	0.3950	0.80	0.3967	0.805
Own Other House	0.19	0.3897	0.18	0.3870	0.710
Own Bike	0.40	0.4901	0.40	0.4895	0.812
Own Car	0.36	0.4793	0.37	0.4833	0.212
Own Electronic Devices	0.90	0.3035	0.91	0.2831	0.032
Own Wash/Stove	0.84	0.3657	0.89	0.3108	0.000
Own Domestic appliances	0.82	0.3819	0.85	0.3522	0.000
Own Financial Assets/ Afore	0.15	0.3526	0.12	0.3202	0.000
Own Tractor	0.02	0.1358	0.02	0.1477	0.294
Household Head Char.					
Head Sex	0.80	0.4033	0.79	0.4073	0.559
Head Age	49.01	15.7804	48.95	15.4810	0.858
Head Education	5.01	3.6152	5.30	3.5859	0.001
Head Employed	0.77	0.4204	0.78	0.4156	0.457
Head Income	83871	1159777	92545	2371079	0.875
Household Char.					
Household Size	4.39	2.1559	4.27	2.1078	0.020
Number of Kids	1.35	1.4147	1.28	1.3489	0.025
Number of Girls	0.67	0.9138	0.65	0.8715	0.280
Number of Boys	0.68	0.9212	0.63	0.8656	0.017
Number of Elderly	0.30	0.5974	0.30	0.5930	0.898
Rural	0.40	0.4903	0.42	0.4930	0.197
Gini Index	0.38	0.0379	0.39	0.0289	0.000
Food Poverty	0.22	0.1723	0.19	0.1384	0.000
Log Public Exp. Per Capita	7.66	0.3679	7.60	0.3702	0.000
Log Public Safety Exp. Per Capita	5.21	0.3703	5.18	0.3493	0.000
Log Median Income	7.13	0.4810	7.20	0.4193	0.000
Literacy Rate	10.77	1.9376	11.19	1.6604	0.000
Obs.	3527		3887		

Note: all the characteristics are from pre-escalation period (2005-06 survey)

Table 2: Household Saving- DID for Unconditional Means

	Pre- Treatment Period	Post-Treatment Period	Difference
Control group	0.282	0.282	0
Treated group	0.199	0.306	0.107
Difference	-0.083	0.024	0.107
P-value	0.000***	0.014**	0.000***

Table 3: Household Saving- DID

Variable	Model 1	Model 2	Model 3	Model 4
ATET	0.0699***	0.0579**	0.0770***	0.0760***
	(0.0221)	(0.0233)	(0.0239)	(0.0215)
Household Characteristics	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes
Municipality Characteristics	No	Yes	No	No
Municipality Fixed Effects	No	No	Yes	No
State Fixed Effects	No	No	No	Yes
Observations	12939	12201	12939	12939
Cluster	220	205	220	220

Note: *, **, and *** show significance at 10%, 5%, and 1% levels respectively. Bootstrap standard errors are shown in parenthesis. All models control for head and household characteristics include: head's age, head's education, head's employment, head's income, household size, number of children live in household, and household assets. we control also for data of interview, municipality and state fixed effect.

Table 3: Household log (total saving)- DID for Unconditional Means

	Pre- Treatment Period	Post-Treatment Period	Difference
Control group	8.888	8.466	-0.422
Treated group	8.38	8.471	0.091
Difference	-0.508	0.005	0.513
P-value	0.000***	0.953	0.001***

Table 4: Household log (total saving)- DID

Variable	Model 1	Model 2	Model 3	Model 4
ATET	0.3304*	0.1726	0.096	0.2458
	(0.1809)	(0.2013)	(0.1986)	(0.1769)
Household Characteristics	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes
Municipality Characteristics	No	Yes	No	No
Municipality Fixed Effects	No	No	Yes	No
State Fixed Effects	No	No	No	Yes
Observations	2590	2408	2590	2590
Cluster	164	153	164	164

Note: *, **, and *** show significance at 10%, 5%, and 1% levels respectively. Bootstrap standard errors are shown in parenthesis. All models control for head and household characteristics include: head's age, head's education, head's employment, head's income, household size, number of children live in household, and household assets. we control also for data of interview, municipality and state fixed effect.

Table 5: Robustness Analysis for Household Saving (Treatment Assignment)

	Pre- Treatment Period	Post-Treatment Period	Difference
Control group	0.271	0.295	0.024
Treated group	0.175	0.293	0.118
Difference	-0.096	-0.002	0.094
P-value	0.000***	0.8	0.000***

Table 6: Robustness Check for Household Saving

Variable	Model 1	Model 2	Model 3	Model 4
ATET	0.0493**	0.0357	0.0577**	0.0715***
	(0.0237)	(0.0260)	(0.0266)	(0.0245)
Household Characteristics	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes
Municipality Characteristics	No	Yes	No	No
Municipality Fixed Effects	No	No	Yes	No
State Fixed Effects	No	No	No	Yes
Observations	12939	12201	12939	12939
Cluster	220	205	220	220

Note: *, **, and *** show significance at 10%, 5%, and 1% levels respectively. Bootstrap standard errors are shown in parenthesis. All models control for head and household characteristics include: head's age, head's education, head's employment, head's income, household size, number of children live in household, and household assets. we control also for data of interview, municipality and state fixed effect.

Table 7: Robustness Check Household for log (total saving)- DID for Unconditional Means

	Pre- Treatment Period	Post-Treatment Period	Difference
Control group	8.794	8.479	-0.315
Treated group	8.521	8.437	-0.084
Difference	-0.273	-0.042	0.231
P-value	0.124	0.665	0.256

Table 8: Robustness Check Household for Household log (total saving)- DID

Variable	Model 1	Model 2	Model 3	Model 4
ATET	0.0285	0.0175	0.067	-0.0001
	(0.2076)	(0.2129)	(0.2137)	(0.2342)
Household Characteristics	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes
Municipality Characteristics	No	Yes	No	No
Municipality Fixed Effects	No	No	Yes	No
State Fixed Effects	No	No	No	Yes
Observations	2590	2408	2590	2590
Cluster	164	153	164	164

Note: *, **, and *** show significance at 10%, 5%, and 1% levels respectively. Bootstrap standard errors are shown in parenthesis. All models control for head and household characteristics include: head's age, head's education, head's employment, head's income, household size, number of children live in household, and household assets. we control also for data of interview, municipality and state fixed effect.

Table 9: The Effect of Violence on Labor Market Outcome

Variable	Hour Worked		Work		Self Employed		Formal Work	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Panel A: Median Homicide Rate								
ATET	0.1149	-0.097	-0.0048	0.0101	0.0211	0.0171	0.0425**	0.0026
	(1.1330)	(1.1993)	(0.0188)	(0.0189)	(0.0219)	(0.0228)	(0.0199)	(0.0172)
Panel B: Third Quartile Homicide Rate								
ATET	-0.1845	0.9386	-0.0433	-0.0139	0.03	0.0467**	0.0347	0.0169
	(1.4951)	(1.7483)	(0.0266)	(0.0254)	(0.0273)	(0.0225)	(0.0227)	(0.0191)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	8748	8748	12828	12828	8930	8930	12828	12828
Cluster	203	203	220	220	204	204	220	220

Table 10: The Effect of Violence on Assets Ownership at Median Homicide Rate

Variable	Own Living House	Own Other House	Own Bike	Own Car	Own Electronic Devices	Own Wash/Stove	Own Domestic appliances	Own Financial Assets/ Afore	Own Tractor
Panel 1: Household and Head Characteristics									
ATET	-0.009	0.0233	0.0728*	0.0734**	0.0532**	0.0951**	0.0785**	0.0403*	0.0048
	(0.0283)	(0.0279)	(0.0400)	(0.0349)	(0.0225)	(0.0414)	(0.0354)	(0.0211)	(0.0069)
Panel 2: Household and Head Characteristics and Municipality Fixed Effects									
ATET	-0.0171	0.0237	0.0181	0.0606	0.027	0.0121	0.0351	0.0236	0.002
	(0.0209)	(0.0197)	(0.0303)	(0.0395)	(0.0209)	(0.0253)	(0.0297)	(0.0244)	(0.0054)
Observations	14964	14964	14964	14964	14963	14963	14963	14963	14963
Cluster	230	230	230	230	230	230	230	230	230

Table 11: The Effect of Violence on Assets Ownership at Third Quartile Homicide Rate

Variable	Own Living House	Own Other House	Own Bike	Own Car	Own Electronic Devices	Own Wash/Stove	Own Domestic appliances	Own Financial Assets/ Afore	Own Tractor
Panel 1: Household and Head Characteristics									
ATET	0.0443	0.0616	0.1782***	0.0674	0.0707*	0.0826	0.0467	0.0359*	0.0236*
	(0.0469)	(0.0375)	(0.0431)	(0.0499)	(0.0375)	(0.0596)	(0.0514)	(0.0187)	(0.0120)
Panel 2: Household and Head Characteristics and Municipality Fixed Effects									
ATET	-0.0032	0.0282	0.0526*	0.0291	0.0301	0.0061	0.0132	0.0228	0.0018
	(0.0333)	(0.0200)	(0.0271)	(0.0466)	(0.0267)	(0.0302)	(0.0393)	(0.0201)	(0.0059)
Observations	14964	14964	14964	14964	14963	14963	14963	14963	14963
Cluster	230	230	230	230	230	230	230	230	230

Appendix

Table A1: Heterogeneous Effects for Household Saving by Gender

Variable	Model 1			Model **2**		
	Total	Male	Female	Total	Male	Female
Panel A: Median Homicide Rate						
ATET	0.0699***	0.0722***	0.0501	0.0770***	0.0818***	0.1039*
	(0.0221)	(0.0253)	(0.0483)	(0.0239)	(0.0270)	(0.0599)
Panel B: Third Quartile Homicide Rate						
ATET	0.0493**	0.0537*	0.0306	0.0577**	0.0753***	0.0091
	(0.0237)	(0.0288)	(0.0354)	(0.0266)	(0.0283)	(0.0453)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Characteristics	No	No	No	No	No	No
Municipality Fixed Effects	No	No	No	No	No	No
State Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	12939	9371	3568	12939	9371	3568
Cluster	220	191	184	220	191	184

Table A2: Heterogeneous Effects for Household Saving by Education Level

Variable	Model 1			Model 4		
	Total	Edu<= 9 years	Edu> 9 years	Total	Edu<= 9 years	Edu> 9 years
Panel A: Median Homicide Rate						
ATET	0.0699***	0.0799***	-0.0048	0.0770***	0.0836***	-0.0002
	(0.0221)	(0.0228)	(0.0563)	(0.0239)	(0.0246)	(0.0733)
Panel B: Third Quartile Homicide Rate						
ATET	0.0493**	0.0479*	0.0936	0.0577**	0.0622**	0.0272
	(0.0237)	(0.0252)	(0.0752)	(0.0266)	(0.0280)	(0.0815)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Characteristics	No	No	No	No	No	No
Municipality Fixed Effects	No	No	No	No	No	No
State Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	12939	11615	1324	12939	11615	1324
Cluster	220	207	148	220	207	148

Table A3: Heterogeneous Effects for Household Saving by Region

Variable	Model 1			Model 2		
	Total	Urban	Rural	Total	Urban	Rural
Panel A: Median Homicide Rate						
ATET	0.0699***	0.0720**	0.0524*	0.0770***	0.0709**	0.0782**
	(0.0221)	(0.0302)	(0.0287)	(0.0239)	(0.0313)	(0.0358)
Panel B: Third Quartile Homicide Rate						
ATET	0.0493**	0.0733***	0.0166	0.0577**	0.0628**	0.0334
	(0.0237)	(0.0275)	(0.0394)	(0.0266)	(0.0266)	(0.0484)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Head Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Interview Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Characteristics	No	No	No	No	No	No
Observations	12939	7067	5872	12939	7067	5872
Cluster	220	171	112	220	171	112