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The Economic Burden of Crime: Evidence from Mexico

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Abstract

The increased incidence of drug related crime and conflict between organized crime groups in Mexico has been amplified by the government effort to combat the activities of these groups. Evidence suggests that during periods of rising violence, innocent civilians pay a steep price for these disputes. This paper investigates the impact of this amplified environment of violence on labor outcomes: participation in the labor market and earnings at the individual level. The Mexican Family Life Survey offers a unique opportunity to address this research question as the first follow-up was conducted between 2005 and 2006, a period of low levels of violence, and the second follow-up was performed from 2009 to 2012, during years of greatly elevated violence. This data allows us to compare the outcomes of the same individual in periods of varying degrees of violence, while controlling for a rich set of individual and municipality characteristics. Moreover, the longitudinal nature of the survey allows controlling for unobserved heterogeneity at the individual level. Preliminary results show that higher homicides rates negatively affect the labor market participation of men and women, and decrease the earnings of men. In particular, these effects are strongest for those who were self-employed in 2005/06. Ongoing research examines the impact of crime on migration, accumulation of assets, as well as, physical and psycho-social health.

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1. INTRODUCTION

The increased incidence of drug related crime and conflict between organized crime groups (OCGs) during the last few years in Mexico has attracted a great deal of government and public attention. Since 2006, there has been an amplified effort to combat the activities of the OCGs, however, this has merely intensified the war between the army and the illegal groups. Even with heightened focus from the authorities, the economic and political power of the OCGs in Mexico has continued to grow[2].

This increasing strength is largely explained by the expansion of their illicit drug market power. The 1,952 miles of border Mexico shares with the United States constitutes a critical aspect of the Mexican geography that facilitates illegal activities such as contraband and traffic of illicit drugs. These illegal activities, though, are not recent phenomena. Since the 1960's Mexico has produced illicit narcotics that are transported to the United States. In fact, in the 1980's, Mexico was the main corridor of the Latin-American drug traffickers. With increased drug related activities during this period, Mexican OCGs began to organize. Paramilitary groups were created in order to protect the interests of each group, which raised the frequency of confrontations between rivals. Growing terror from massacres and constant violence was the byproduct of these territorial battles.

Another reason for rising violence is that, the last decade has seen the death or incarceration of many previous bosses, which has caused the emergence of new leaders and increased division within the main "cartels"[3]. This serves to increase the number and intensity of battles over critical drug running corridors, as the control of these strategic regions is crucial for a cartels drug-trafficking market and, in conjunction, political and economic power.

A special concern with regards to organized crime is the dramatically increased trend observed from 2007 to 2010. According to a data source from the Presidential Office of Mexico, released in January of 2011, the organized crime rate in 2010 was 58% higher than in 2009 (the homicides related with organized crime increased from 9,614 in 2009 to 15,273 in 2010). This increasing trend is also observed when looking at the official data of homicides rates reported by the National Institute of Statistics and Geography (INEGI, its Spanish acronym), which includes non-organized crime related offenses. This strongly suggests that the increased incidence of

[2] "Around five years ago Mexico's drug-smuggling gangs overtook Colombia's in resources and manpower, (…) As well as expanding down the supply chain, running distribution networks in the United States, they have moved up it, buying cocaine directly in Colombia, Bolivia and Peru. They have become a bigger influence in politics at home" (The Economist, Oct 14th 2010)

[3] The term "drug cartel" is a colloquial term to refer to organized crime organizations but it does not imply any collusion to set prices. We will use the term Organized Crime Groups (OCGs) in this paper to avoid any misinterpretation.

organized crime has a direct effect on overall levels of violence. Intuitively, if the law enforcement institutions and justice system are pre-occupied and/or weakened by the elevated presence of organized crime, this may affect the overall rate of violence. In this sense, high incidence of organized crime in a particular area not only affects those involved in these activities but also the population living in these areas.

This paper is part of a broader research agenda which aim is to study the impact of the increased incidence of crime on various outcomes in Mexico such as migration, labor outcomes, wealth measures (assets and per capita expenditure), fertility and emotional and physical health status. This version of the paper investigates the impact of the increased incidence of violence on participation in the labor market and earnings at the individual level. We also show preliminary evidence of the impact of homicides rates on per capita expenditure (PCE). We analyze the effects on the labor market for the entire sample as well as, samples stratified by whether the person worked as an employee or was self-employed before the period of increased violence. For the PCE results we explore the effect disaggregating the consumption on food expenditures and non-food expenditures.

The identification of the impact of violence on individual outcomes imposes challenges related to omitted variables that affect both the levels of violence and the labor market outcomes, and with possible reverse causality. Our empirical specification exploits available information on homicides rates from the INEGI at the municipality level from 2005 (a period of low levels of violence) to 2009/11 (a period of high levels of violence). In order to analyze the impact of violence on the outcomes of interest we will match the INEGI homicide data to the Mexican Family Life Survey (MxFLS), a nationally representative longitudinal household survey.

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 levels of violence, and the second follow-up was performed from 2009 to 2012, during years of elevated violence. This feature allow us to compare the outcomes of the same individual in periods of low and high violence, while controlling for a rich set of individual and municipality characteristics. Additionally, since the MxFLS is a longitudinal survey, it allows us to remove all time-invariant unobserved heterogeneity at the individual level.

Preliminary results show that homicides rates negatively affect both males and females participation in the labor market, particularly those that were self-employed in 2005/06. Moreover, we find a negative impact on labor market participation in rural areas for those that were employed in 2005 and a negative impact in urban areas for those that were self-employed. These results are

consistent with previous evidence that shows that the poorest individuals are the more likely to be extorted by OCGs and/or the police (Diaz-Cayeros et al, 2011). Homicides rates also have a negative effect on the level of earnings, with males that were self-employed in the first follow-up seeing the largest decrease.

2. BACKGROUND

2.1 Crime in Mexico

Official homicides rates have increased in Mexico from 8.3 homicides per 100.000 inhabitants in 2007 to 20.6 in 2010. The rapid change in the dynamics of the conflict between rival organized crime groups (OCGs) and between OCGs and the Mexican government, as well as the increasing use of violence against citizens has draw the attention of governments, academics and NGOs to the Mexican "war on drugs". Due to the rapidly rising homicide rates and in order to improve the understanding of the rising trends in drug related crime, the office of the President released a data set on drug-crime related homicides registered monthly at the municipality level in January of 2011. The information is available from December 2006 to September 2011[4]. This dataset reveals that homicides rates related to OCGs have increased from 2.67 in 2007 to 12.6 in 2010 and 18 in 2011.

The rapid increase in violent homicides has led to a debate about its causes. One hypothesis is that the rapid and violent increase in homicides is a byproduct of the military strategy of increased confrontation against OCGs that took place since 2006 when Felipe Calderón became president (Molzahn, Rios and Shirk, 2012; Guerrero, 2011). The last report from the Trans-Border Institute[5] sustains that since President Felipe Calderón took office in December of 2006, organized crime related homicides have risen to 47,515, and their proportion relative to all intentional homicides doubled. Calderón's strategy has been to confront and fight against all the OCGs at the same time, independently of their location or size. Since the military strategy has not been geographically focused, this has created geographical dispersion of violence (Guerrero, 2011). A different interpretation of the rise in homicides is that the increasing trend started before Calderón took office and is independent of his military strategy (Rios, 2011).

Related to this debate Dell (2012) compares municipalities where a mayor from Calderon's party (Partido Acción Nacional –PAN) won the election by a margin of 5 percent or less to

[4] The first data set was released in January of 2011 and included information on homicides "allegedly linked to organized crime" from December 2006 to December 2010. In January 2012 a new data set was released on homicides "allegedly caused by criminal rivalry" including information on homicides from January to September of 2011.
[5] The Trans-Border Institute (TBI) is based at the Joan B. Kroc School of Peace Studies at the University of San Diego.

municipalities in which the PAN barely lost by the same margin. Comparing these municipalities 6 months before the election and 6 months after the election, the author finds a significant increase of drug related homicides in the municipalities where Calderón's party won, suggesting that PAN related policies may have triggered the massive increase in homicides.

Moreover, the changes in the military strategy during the last years have been accompanied by a change in the dynamics of crime. Many OCGs have fractured which has caused the number of OCGs to almost triple, from to 6 in 2006 to 16 in 2010 (Guerrero, 2011). The rising number of OCGs has increased the confrontations between groups to enhance their territorial control, and it has spread the use of violent means to build their reputation. In addition OCGs have diversified their financial sources. While drug trafficking activities still account for most of their economic resources, they have been relying more on criminal activities that directly affect the civil population, like extortions and car thefts.

In addition to extortions, strategies to enhance control over civil society are important for OCGs to increase their territorial power. Spreading fear across the citizens both diminishes the probability of individuals reporting criminal activities and increases the likelihood of cooperation when being extorted. Besides, the feeling of fear is exacerbated by the lack of trust in the State's institutions and the high levels of corruption and abuses from the police (Guerrero, 2011; Díaz-Cayeros et al, 2011). Díaz-Cayeros et al (2011) measure the strategies that the OCGs use against the civil society and measure how embedded they have become in the society. Their results show that both OCGs and police take advantage of citizens, particularly preying on the poor and less educated. Dell (2012) finds consistent results exploiting a network model of drug-trafficking routes and information from the National Survey of Occupation and Employment. Dell's results show no effects on male labor participation or wages in the formal sector but in contrast, significant negative results on wages in the informal sector and on female labor force participation.

2.2. Effects of Crime on Labor Outcomes

The literature on the causes and consequences of crime has grown in the last few decades. One branch of the literature has focused on exploring the determinants of crime. Seminal work by Becker (1974) created the foundation of the research in this field. Some of the findings in the literature show that lack of economic opportunities and weak enforcement might decrease the opportunity cost of engaging in criminal activities, and therefore, increase the levels of crime. Under this scenario, lack of economic opportunities may be one of the drivers of crime.

On the other hand, a branch of the literature has focused on analyzing the impact of violence on social and economic outcomes at the individual and household levels. In particular

there is a rich literature that has analyzed the impact of conflict in developing countries on education, health and migration. A more limited literature has studied the effects of any type of violence on labor markets, in particular at the micro-level (Bozzoli, Brück and Wald, 2011; Calderón and Ibáñez, 2009; Deininger, 2003; Fernández, Ibáñez and Peña, 2011; Kondylis, 2007).

One of the main challenges to measuring the impact of violence on labor outcomes is endogeneity. Even if there is a correlation between crime and labor market outcomes, it is not straightforward to determine causality. There are important contributions in the literature that have measured the impact of crime on labor market outcomes.

Kondilys (2007) exploits data from a longitudinal study to explore the effects of displacement on labor market outcomes in post-war Bosnia and Herzegovina. Since the decision to migrate and where to migrate is not random, the author controls for municipality of destination fixed effects to control for the non-random sorting of displaced individuals. In addition, the author uses the local (in the municipality of origin) level of violence as an instrument for displacement. The results show that displaced Bosnians are less likely to be working relative to the people who did not migrate. Displaced men experience higher unemployment levels, and displaced women are more likely to drop out of the labor force.

In the same line of research, Calderón and Ibáñez (2009) estimates the effects of displacement on the labor markets of destination places. Massive migrations from rural to urban places due to violence in Colombia have increased the number of unskilled workers in urban settings. To overcome endogeneity issues the authors use an instrumental variable (IV) approach and find that a higher supply of unskilled labor increases the likelihood of informality and reduces wages in this sector. In this scenario, forced displacement has an effect on the direct victims of violence but also on informal workers in the labor market of the destination places.

Bozzoli, Brück and Wald (2011) studies the effects of the Colombian conflict on the probability of being self-employed in rural settings. The empirical identification relies on household fixed effects using a selected sample of household from beneficiaries of a conditional cash transfer program in Colombia (Familias en Acción). The authors find a decreasing share in self-employment in municipalities with higher rates of conflict.

2.2. Effects of Crime on Wealth

There is an extended literature analyzing the response of individuals and households to negative shocks. In particular, there has been a large set of studies that examine the ability of households to smooth consumption in times of crisis (see for example, Townsend, 1995; Morduch, 1995). If we

consider exposure to violence as a negative shock to wealth, as, high levels of violence may alter labor market outcomes and thus decrease the level of income at the household level, there is potential for significant consumption smoothing. However, low socioeconomic status individuals may have very few insurance and credit mechanisms in order to smooth consumption. This suggests that the impact of violence on labor outcomes, PCE and wealth may have significant potential to create poverty traps for the most vulnerable population.

A second pathway, through which violence may affect consumption behavior directly, is through the fear of being targeted for conspicuous consumption. For example, individuals in the United States decreased the consumption of visible goods to reduce the probability of victimization from property crime (Mejia and Restrepo, 2010). We will show preliminary results of the effect of homicides rates on PCE, but in this version of the paper we will not test the mechanisms through which violence can affect measures of wealth.

The contribution of this paper is twofold. First, it will estimate the labor market outcomes of individuals living in a scenario of on-going high levels of violence. While, the recent increase of crime in Mexico has augmented the research on the topic, there are relatively few papers that have looked at the effect of crime on labor market outcomes (Cayeros et al (2011) and Dell (2012) are important examples in the recent literature). Additionally, we can exploit the unique characteristics and timing of the MxFLS in order to address these questions. Due to the fact that the MxFLS is a nationally representative survey that conducted waves before and during the massive increase in violence, we can exploit the temporal and geographical variation using official information of homicide rates at the municipality level. Furthermore, the longitudinal nature of the MxFLS allows us to control for time-invariant unobserved heterogeneity at the individual level that may be drivers of labor market outcomes. Second, by looking at the impact of crime on per capita expenditure this paper will add to the literature on consumption smoothing.

3. DATA

3.1. Homicides Data

One of the challenges when analyzing the impact of crime is the availability of the necessary and appropriate data. In this paper we will use the official reports on all intentional homicides from the INEGI. The limitation of this data is that it relies only on registered homicides. This is an important limitation if we think that homicides related to organized crime are highly underreported. However, when comparing the trend on homicides rates reported in the INEGI and homicides rates related to organized crime reported by the President's Office we observe that the INEGI reports capture the same increasing trend. Moreover, the homicides reported in the INEGI are available from 1990 to

2011, which allows us to exploit the panel nature of the MxFLS. In addition, the intensity of organized crime may have an effect on other types of homicides that additionally affect the outcomes in which we are interested. In this section, we will describe the INEGI dataset and compare its trends to the ones reported in the available dataset on homicides related only to organized crime (available from 2007 to 2011) to establish whether the official figures on homicides follow the same trends as the homicides caused by organized crime.

Figure 1 shows the trend of the number of intentional homicides using the INEGI data from 2000 to 2010. During the beginning of the decade the number of homicides was stable in Mexico. This stable trend continued until 2004 when there was a slight increase until 2006. However, since 2007 there has been a significant increase in the number of homicides. To understand the magnitude of intentional homicides relative to the homicides caused by OCGs we compare the trends from the two data sources. The data that measured homicides related to organized crime, released by the Mexican government in December of 2010, provides monthly data, from December 2006 to December 2010, at the municipality level ("allegedly linked to organized crime", for easiness of exposition we will refer to this data as homicides by Organized Crime Groups OCGs.).

Figure 2 illustrates that both sources provide the same increasing trend from 2007 to 2010. Since we will exploit the geographical variation of violence within Mexico, absolute values of homicides might be misleading if we do not consider the size of the population, thus Figure 3 shows the trend from both data sources when using the homicides rates. Figure 3 displays similar increasing trend, where the rate of homicides per 100.000 habitants reached 20.6 in 2010 according to the INEGI data and 12.6 according to the OCGs data set (the most recent data set from the OCG reports an overall homicide rate of 18 for 2011 (Molzahn, Rios and Shirk, 2012)).

Although compared to other countries with high level of violence[6] Mexico does not show the highest homicides rates, the fast increasing trend of homicides has no precedent in Mexico's history. Moreover, the number of homicides has not increased with the same intensity in each area of the country[7]. Map 1 shows the change in homicide rates at the state level between 2007 and 2010 (white States are not included at baseline in MxFLS). This map shows an increasing trend in almost every state (included at baseline in MxFLS) of the country; all but 2 states (DF and Yucatan) suffered an increase in their homicide rates. Map 2 shows the same change when using the data

[6] Honduras (82), El Salvador (66), Venezuela (49), Belize (41), and Guatemala (41), Colombia (33), the Bahamas (28), Brazil (22), and the U.S. territory of Puerto Rico (26) (Molzahn, Rios and Shirk).

[7] When comparing the geographic distribution of homicides between the two data sources the similarities are evident (Map A.1 in the Appendix shows the geographical dispersion at the State level using both data sources). In this paper we will use the INEGI data since it is available for a longer period and it captures both the increasing trends since 2007 and the geographical dispersion.

released by the President's Office. Although there are differences between both data sources we can see that both sources show geographical variation and a non-trivial increase in homicides rates in the vast majority of the country.

It is important to note the potential measurement errors in our variable of violence: homicides rates measured by the INEGI. First, since the INEGI only captures registered homicides there is potential for the of homicide rates to be lower bounds when using this data set. However, as the figures and maps show the INEGI data captures the same increasing trend as the data on homicides related to organized crime. Second, the increasing trend of homicides might reflect a combination of actual homicides and a better administrative job of reporting during the registration process. Although this could be an important source of measurement error in other scenarios, the case of Mexico in the last 7 years has been very particular. The increasing violence has not been evident only by the official numbers (INEGI and the OCGs datasets). Academics, the national press and NGOs have collected information on homicides and the trend persists even when looking at these alternative data sources.

3.2. MxFLS

In order to study the impact of crime on economic outcomes at the individual and household level we will match the homicides data with the Mexican Family Life Survey (MxFLS). The MxFLS is an ongoing longitudinal, nationally representative survey of individuals, households who were living in Mexico in 2002 when the baseline was conducted. It includes information on approximately 8,440 households and 35,600 individuals among 150 communities and 16 states throughout Mexico.

The second wave, MxFLS2, was conducted in 2005-2006. MxFLS has kept low levels of attrition. Over 89% of the panel respondents were re-interviewed in MxFLS2. The third wave, MxFLS3, is currently in the field and we anticipate achieving the same re-contact rate as in MxFLS2.

Table 1 shows the re-contact rates in the second and third wave[8]. The third wave of the survey, MxFLS3, is currently in the field and fieldwork will be completed by mid-2013. At this time (March 2013), over 85% of our panel respondents have been re-interviewed. A unique feature of the MxFLS is that not only follows migrants within Mexico but also follows migrants that have moved to the U.S. As shown in panel A of Table 1, in the second wave, 89.2% of the baseline respondents were re-interviewed. Moreover, we interviewed 91% of the 854 respondents believed

[8] Third wave re-contact rate calculated at this time March 2013

to be in the U.S. The third wave of the survey, MxFLS3, is currently in the field. Fieldwork, both in Mexico and the U.S. will be completed by mid-2013. At this time (March 2013), over 85% of the U.S. migrants have been interviewed in MxFLS3. Panel B of Table 1 shows current recontact rates of MxFLS3. The results for the entire sample show that over 85 percent of baseline respondents have been re-interviewed. For the purpose of this paper we will exclude from our analytical sample panel respondents that were interviewed in the U.S. either in 2005 or during the third wave.

The MxFLS is ideally suited for this paper for a number of reasons. First, MxFLS2 was conducted in 2005/06 (during a period of "normal" levels of homicide rates) and the second follow-up (MxFLS3) was performed during 2009 to 2012 (during a period of high levels of violence). Although the information at baseline gives us another measure of pre-violence status, we focus on the first and second follow-up because we are interested in the sample of individual of working age and we don't want to exclude the youngest cohort from our study, as their labor market information would not be available in 2002. By focusing on the first and second follow-up we can look at the impact of crime including the youngest working age individuals. Further, the timing of the MxFLS allows us to compare the outcomes of the same individual in periods of low and high levels of violence and the longitudinal nature of the data allows us to control for unobserved time-invariant characteristics.

Second, in MxFLS3 there has been a particular effort on following migrants within Mexico and to the U.S. This is particularly important for this study because migration may be a behavioral response to crime; if individuals, particularly affected by high levels of violence, migrate as a response to it and they are not tracked, the estimations of the impact of crime on economic outcomes would be underestimated. On average migration between the second and third follow-up (2005/06 and 2009/12) has been low at the municipality level. Only 5.21% of the respondents interviewed in the second follow-up moved to another municipality (this number is close to the 3.22% reported in the 2010 Census and when comparing by state the numbers continue to be very similar.) Although there is little migration between municipalities from the first to second follow-up, if the migration is due to unobserved characteristics correlated with labor market outcomes and related to violence, it may still present a problem. By using a panel dataset, though, we are able to limit the potential bias, as we can control for any time-invariant unobserved characteristics of the respondent. Moreover, since it is possible that individuals may be migrating as a reaction to or in anticipation of violence, we estimate an "intent-to-treat" styled model to remove the possibility for migration that is endogenous to homicide rates. To achieve this, we will assign to an individual the homicide

rate from the 12 months prior to the MxFLS interview in the individual's municipality of residence in 2005[9]. This approach coupled with the limited amount of migration seen in the data gives us confidence that selective migration is not driving our results.

The MxFLS has a rich set of characteristics about its participants, including information about the economic, social and health status of each member of a surveyed household. The questionnaire for adults includes sections on education, labor supply, earnings, migration history, marriage history, fertility history, health status, and use of health care. In addition, one member is interviewed about information at the household level. This questionnaire includes a complete household roster including basic socio-demographic characteristics of each household member, information of household expenditure, and asset ownership.

In addition to surveys at the household level, the MxFLS conducts surveys at the community level through interviews with the community leaders (Rubalcava and Teruel, 2006). This information will permit future analysis of the correlation between the levels of crime measured by the INEGI and the MxFLS.

4. EMPIRICAL STRATEGY

The purpose of the paper is to quantify the effects of violent conflict on economic variables at the individual and household level. The longitudinal nature of the data used in the empirical strategy and the fact that individuals were interviewed in 2005 (period of low levels of violence) and in 2009-2011 (period of high levels of violence) allows estimation of a model that relates the change in the dependent variable of interest (earnings and probability of participation in the labor market) between the time of low and high violence to the change in our measure of violence: homicides rate.

For a number of reasons we expect to find negative effects of violence on these outcomes in Mexico over the last few years. OCGs have not only increased in number, but they have also started to use extortions of civilians as a financial resource and to increase the sense of fear in the community. 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, the extortions might diminish total income of the household, and the fear of being a direct victim of the conflict might decrease the time allocated to labor activities. Moreover, investment in certain regions can

[9] Results from a model in which homicide rates are determined by the municipality in which the person was interviewed in each wave are qualitatively similar.

decrease as a consequence of high levels of violence affecting the supply of jobs, and labor opportunities in the formal sector.

In our empirical strategy **t**he municipality of residence in the second and third wave of the MxFLS determines an individual's exposure to violence. The identification strategy exploits the variation over time of homicides rates between 2005 and 2009-10. One of the challenges to identifying the effect of crime on labor outcomes is potential reverse causality and omitted variable bias. For each of the outcomes of interest we will try two different specifications. The first one will only use individual fixed effects with no regional controls. The second specification will include municipality characteristics available in the 2005 and 2010 Census; however, this set of variables is potentially endogenous and we should be cautious in the interpretation of the results that include these variables.

Our empirical strategy compares the same individual across time periods. By utilizing longitudinal data we are able to take advantage of individual fixed effects, which capture all unobserved, time invariant factors that affect the dependent variable. This is particularly useful if we believe that there are time-invariant characteristics of individuals, such as ability or risk preferences, that are correlated with both labor outcomes and the violence level of the municipality in which the individual chooses to live. Moreover, if homicides are reported with error, the individual fixed effect strategy differences out error that is constant over time. Our empirical strategy can be generalized in the following regression framework:

$$y_{ijt} = \delta V_{jt} + \varphi X_{ijt} + \theta_i + \alpha_{jt} + \beta_t + u_{ijt} \quad (1)$$

Where *y* is the outcome of interest of individual *i* living in municipality *j* in year *t*, *V* includes our measure of violence: homicides rates (number of homicides per 10,000 inhabitants) at the municipality level in time *t* (12 months before the MxFLS interview month) with δ being the coefficient of interest, *X is* a vector of individual and household time-varying characteristics (marital status, employment category, household size, and number of kids in the household), θ_i captures individual fixed effects, α_{jt} denotes municipality characteristics measured in the 2005 and 2010 Mexican Census and β_t includes controls for year and quarter of interview. The fixed effect model with only two periods can be interpreted as a differencing over time model. Differencing over time, the regression that we are interested in is:

$$\Delta y_{ij} = \delta \Delta V_j + \varphi \Delta X_{ij} + \Delta \alpha_j + \rho_s + \beta_t + \Delta u_{ij} \quad (2)$$

As a measure for homicides rates we will exploit different specifications: first, we will use the homicides rate over the 12 months prior to the MxFLS interview; second, we will include lagged

homicide rates in order to capture dynamic effects of crime on the outcomes of interest. Third, we use indicator variables that identify the quartiles of homicides rates to capture non-linearity on the effect of homicides rates. Most of the results using quartiles support the results showed using levels. We will report these estimations in the appendix in the cases in which they provide added insight over and above those using homicide rates measured in levels[10]. In future stages of this project we will continue to explore different strategies to explore any possible non-linear relationships between homicides and the outcomes of interest.

The difficulty in estimating the relationship between violence and economic outcomes could emerge from the fact that homicides rates have not increased in a random fashion over the time and might not be orthogonal to unobserved factors that affect economic performance in the municipality or at the individual level. If the change in the level of homicide rates is correlated with unobserved variables that affect the change in labor outcomes, the level of violence is endogenous and we face omitted variable bias. The correlation between the independent variables with unobserved factors could be explained by self-selection (Wooldridge, 2002). However, individual fixed effects allow us to control for unobserved heterogeneity at the individual level, these unobservables may determine both exposure to violence and labor outcomes. For example, if risk-averse individuals migrate from a high crime region to a low crime region, their selection to the new place of residence affects the exposure to violence and it may affect labor outcomes. Individual fixed effects strategy controls for these time-invariant unobserved characteristics.

The individual fixed effects strategy should solve for potential omitted variable bias; however, in order to have consistent estimates, the idiosyncratic error at each time has to be uncorrelated with the variable that measures crime in both periods (Wooldridge, 2002). It would be reasonable to think that u_{ijt} is correlated with V_{jt} because crime is not allocated in a random way and it might be higher in municipalities with a better economic performance, so the expected profit of the extortions to the civilians is larger. Second, we could think that u_{ijt} is correlated with V_{jt+1} if unobserved variables in 2005 affect both labor outcome variables in 2005 and the level of crime in 2009. There are reasons to believe that increasing crime rates might be correlated with the error term in 2005: first, crime is more likely to happen in areas with better economic growth because it is more profitable to extort civilians in these places, or it might happen in places with a worse economic activity if that is a reflection of bad institutions and low state presence. We will add regional controls to solve this potential issue.

[10] We also estimated a dummy model where the dependent variable has a value equal to one for municipalities with at least one homicide and the results were consistent with the other models.

In addition, individuals may select themselves into low or high crime municipalities based on unobservables that are not constant over time (marital status, number of kids, etc). Any of these forms of selection would bias our estimates. In Table 2 we analyze migration between municipalities as a function of homicides rates, using the same two models discussed previously. In all of the models the level of violence seems to not be a predictor of migration.

An additional concern from the empirical strategy is non-random attrition[11]. At this stage attrition does not seem to be random relative to the labor market variables in 2005. To address this issue we conducted a multiple imputation specification and the results do not change. It is important to have in mind though, that a multiple imputation strategy only works if attrition is selected solely on observed characteristics. If attrition is explained by unobserved factors a multiple imputation strategy or any re-weighting method will not solve the potential bias. As attrition is an important concern for any longitudinal survey, surveyors are still conducting intensive tracking in the field in order to further reduce the number of missing individuals.

In the empirical analysis we will estimate two models. One will only include individual fixed effects and the second will include municipality characteristics. And additional alternative would be including instead of municipality characteristics that could be endogenous to crime, state and time interactions to control for regional fixed effects. However, the model could be mis-specified if the following assumptions do not hold. First, the model assumes that there are not time varying characteristics at the municipality level correlated with bot homicides rates and labor outcomes. If within the same state different municipalities followed different trends that affected in different manner both the dependent variables and the measure of conflict, the model may be biased. Second, there are not time varying characteristics at the individual level that affect both exposures to violence and labor outcomes. Since this strategy imposes important assumptions we will explore it more deeply in future stages of the research.

5. DESCRIPTIVE STATISTICS

Sample and labor characteristics

In this paper we focus on working age individuals (18 years and older in the second wave) who were active participants in the labor market in 2005. Table 3 shows basic characteristics of the sample, columns 1 shows basic means for the entire sample, columns 2 and 3 are disaggregated by gender and columns 4 and 5 are disaggregated by whether the locality of residence in 2005 was rural or urban. Our sample individuals are on average 40 years old in 2005, and predominately male

[11] It is important to have in mind that although we are in the final stages of fieldwork we are still doing intensive tracking of the most difficult cases

(70% of the sample). The labor market active females in our sample are more educated than the males, on average; which does not hold for the general Mexican population. Given the selectivity into being a labor market participant, future stages of the project will measure the effect on entry into the labor market for the younger cohorts. The statistics in Table 4 show that 70% of the sample worked in the formal sector as an employee and these numbers are very similar in both the sub-samples. Moreover, on average, the earnings of employees are higher than those of the self-employed and the earnings of males are higher than those of females (although for employees, the wages of both males and females are very similar). Looking at the household characteristics, we see that the log of PCE is higher in urban places but that it looks very similar for labor market participating men and women.

Table 4 shows labor market outcomes and self-perception of crime measured on the first and second follow-up. We compared these measures by whether the municipality where they were living in 2005 suffered a high change or a low change in violence. We classify a municipality with a high change if it is in the top 75^{th} percentile of the distribution of change in homicides rates between waves. The numbers show that, after the increasing trend of crime, there was a lower participation in the labor force. Recall that this analysis is made up of all individuals participating in the labor market in 2005. At the time of the interview of MxFLS3 there is a significant decrease in labor market participation, particularly amongst the employee sector, but these differences are not significant between municipalities that suffered a high versus low change in homicides rates. Moreover, before the increasing trend of homicides rates, the municipalities that would later suffer a high change in violence had on average more employees than self-employed, while after the crime surge the difference is significantly reduced. By analyzing these changes in a regression framework that controls for all unobserved heterogeneity at the individual level we aim to identify the effect of homicides on these changes in the labor market.

Table 4 also shows measures of self-perception of crime assessed in MxFLS3. Although we will not explore these measures in our main analysis it is interesting to explore their correlation with the official homicides records. The perception of fear during the day, during the night, the probability of being assaulted, and whether the respondent has been a victim of an assault, all increase from MxFLS2 to MxFLS3. Additionally, these measures increase the most in municipalities that suffered a higher change in homicide rates. These results reaffirm that measuring violence with the homicide rate as a *proxy* is adequate, and that the civilians in Mexico are being victimized to a greater degree during these times of increasing trends in violence.

5.1. Dependent Variables

In this version of the paper we will focus on the impact of crime on two main outcomes: the probability of participating in the labor force (either as a self-employed or as an employee), and earnings (total earnings, and for self-employed and employees). We will also describe very preliminary results of the impact on per capita expenditure.

Participation in the labor market: In this section we present the probability of being employed in the second-follow up conditional on being employed in the first follow-up (we disaggregate this by self-employed: probability of being employed[12] at the time of the interview in MxFLS3 conditional on being self-employed in 2005; and by employee: probability of being employed in MxFLS3 conditional on working as an employee in 2005). However, other kinds of changes are important to explore as well. For example, since there are also a few municipalities with negative changes in their homicides rates, it may be interesting to explore the impact of violence on the change from unemployment to employment. In the next stage of this research we will explore these dynamics and stratify the sample by education of the respondent and age, in order to identify whether crime affects younger and uneducated individuals differently.

Earnings: Our measure of earnings in the empirical section is the quartic root of earnings. Since there are values of zero for earnings, we use the quartic root which is a very close approximation to the log transformation for positive values[13]. In these models we are interested in looking at the effect of violence on the level of earnings for all the individuals that were working in 2005, and additionally looking at the impact on stratified samples of the self-employed and employee groups in 2005.

Per Capita Expenditure: We measure consumption as per capita expenditure at the household level. We use the log transformation for PCE in these models. We stratify the results by food consumption and non-food consumption. In the empirical specification we use household fixed effects.

6. PRELIMINARY RESULTS

In this section we will discuss the results for the outcomes of interest: participation in the labor force, earnings, and per capita expenditure. Since the effects of violence have been different in rural and urban places, we will explore the effects of homicides on average for the whole population and

[12] Either as a self-employed or employee.
[13] We use this measure instead of the logarithm transformation because near 4 percent of individuals in 2005 and 2009 report zero earnings.

then stratify the sample by gender and by the rural/urban status of the localities where individuals lived when they were interviewed in the second wave of the MxFLS.

In addition, we will explore two different estimations: first, we estimate the average effect of the violence on the outcomes of interest using as our main covariate the homicides rates 12 months prior to the MxFLS interview in the individual's municipality of residence in 2005 (homicides at *time t*); second, we use indicator variables the represent the quartiles of the homicide rate distribution to capture non-linearities in the effect of violence, using as the omitted category the lowest quartile. In all the specifications the results with the quartiles support the evidence of the models that use the level of homicides rates, with the exception of labor participation for females which gives more information than the estimation with only levels. Results from the participation in the labor force regressions that use the quartile model are in the Appendix. In the future steps of this research we will continue to explore non-parametric relationships between our outcomes of interest and homicides rates.

Moreover, as we discussed in the identification strategy section, controlling by the right geographic characteristics helps to solve for potential endogeneity issues. To this end we will estimate a model that includes municipality characteristics in addition to the individual fixed effects. Without controls at the region level the bias on homicides rates is ambiguous. If we expect a negative effect of crime on labor outcomes, ignoring regional characteristics could bias the effect of crime towards zero if the incidence of crime is higher in states with better economic opportunities. On the other hand, there could be an upward bias if the incidence of crime is higher in places with lower economic opportunities.

Participation in the labor market and earnings

The purpose of this section is to measure the effects of crime on the probability of participating in the labor force. Additionally, we will look separately at the impact of crime on employees and the self-employed, as it is important to establish whether the increasing levels of violence has differential effects on these two sectors of the labor market. This distinction is particularly important in the context of the violence in Mexico. In addition we explore the impact of violence on the individual level of earnings.

As mentioned in previous sections, evidence from studies in Mexico suggests that organized crime groups have diversified their criminal activities. Although drug trafficking activities remain their main financial source, the organized crime groups have become more involved in activities that directly affect the citizens, such as kidnapping and extortions (Molzahn,

Rios and Shirk, 2012). In this scenario, one hypothesis is that self-employed individuals are easier to target and to extort. If this is the case, high levels of violence might have a direct effect on the employment choices of the general population. Victims of extortions or knowledge about a high probability of potential victimization might create a fear of working as a self-employed and, as a consequence, decrease the average probability of working as a self-employed. On the other hand, increasing cases and news about kidnappings, extortions and fuel and oil thefts might diminish levels of investment in a region, and the closing down of firms, which would have a negative impact on the probability of working as an employee. Moreover, even if the probability of being employed is not affected by the level of violence, the level of earnings could decrease if individuals are working less hours as a mechanism to protect themselves from violence or if the demand of labor decreases because firms close due to violence or invest less as a response to potential threats and extortions.

Tables 5 to 8 show the results for the participation in the labor market and the level of earnings, respectively for the sub-samples of interest: males, females, urban and rural localities. For each of the tables we show the results for individuals that were self-employed or employee in 2005 and we show the results of the two models previously discussed (Panel A for the model that controls only for individual fixed effects and Panel B when adding municipality characteristics). Columns 1 to 4 show the results for the impact on the participation in the labor market and columns 5 to 8 for the quartic root of earnings. The results for males in Columns 1 to 4 in Table 5, Panel A, show that, controlling only for individual fixed effects, there is a negative effect of lagged crime on the probability of participation in the labor market conditional on being self-employed in 2005. In this model contemporaneous homicides rates do not have a significant effect on the probability of participation in the labor force in any of the two specifications (Panel A and Panel B). However, in the model with dummies for the distribution quartiles the lagged crime in *t-1* has a persistent negative effect in the two models and the significance is always observed in the highest quartile (Appendix Table A.1). These results suggest that it is the increase from a lower quartile of the distribution to the highest quartile that has the most significant effect. In addition, the fact that the effect is observed in the lagged period, suggests that levels of violence experienced around 2008 when the violence started to increase, had negative impacts on participation in the labor markets that persisted for more than a year.

Columns 5 to 8 show the results of earnings for males. While it appeared that male labor force participation was undeterred by rising homicide rates, the amount that they earned from their employment shrank significantly due to increased violence amongst the self-employed.

Additionally, after adding municipality controls, the estimates suggest that an increase in homicide rates in time *t* lead to earnings losses for both employees and the self-employed (Panel B). When looking at the quartile estimations (results not reported) as expected the effect is largest and significant in the highest quartiles (*i.e.* in the most violent municipalities); however, when controlling for municipality characteristics there are no significant effects.

The results in Table 6, show the estimations for females. Looking at columns 1 to 4 there does not appear to be any effect of homicides rates on labor market participation for females in any of the specifications (Panel A and B). However, when looking at the estimations using the non-linear model (quartiles model) the results show a different story. The results for the quartile estimation in Table A.2 of the Appendix show a significant negative effect of crime for females that were self-employed in 2005. These women are less likely to keep working after the increasing trend of violence and the effect is significant for municipalities in which the homicide rate increased to the third and fourth quartile, with the magnitude of the effects being largest for women in municipalities in the highest quartile.

Columns 5 to 8 in Table 6 show that, although the sign of homicides is negative as expected, for both the earnings of females that were self-employed and employee in 2005, the effects are not significantly different from zero. These results hold even when looking at the non-linear specification of homicides rates.

The results for males and females, suggest a clear effect of violence on the labor outcomes of those whom were employed in 2005, and the effect seems to be larger for those that were self-employed. Males, suffer a decrease in both the participation in the labor market and their earnings but the impact for females seems to be only through their labor participation.

Tables 7 and 8 show the results disaggregated by the urban/rural status of the individual's place of residence in 2005. The results in Table 7 show a negative effect of homicides rates in *time t* for self-employed individuals and a surprising positive result for employees that persist even when controlling by municipality characteristics. When controlling for lagged homicides rates, we observe a positive effect of homicides rates in *t-2* on labor market participation (these effect persists in both models), which suggests some positive time lag between violence and labor outcomes. This positive effect persists in model 2 (Panel B) but in this specification the contemporaneous effect of crime loses its significance. When turning to the impact of violence on earnings we see again that it is the self-employed that are taking the brunt of the negative labor outcome shock caused by violence. In all specifications urban self-employed are earning significantly less when exposed to higher levels of contemporaneous violent crime. The employees also find that their earnings are

negatively impacted by rising crime, though the estimates are only significant in Model 2, column 4. Finally, a result worth mentioning is that when lagged crime rates are used, the employees have a positive and significant boost in earnings after having experienced higher homicide rates in time *t-1*. This result, as well as the increased labor participation of the employees, are both counter-intuitive and require further investigation.

The results for rural localities found in Table 8 reveal that a very different story is taking place in these communities compared to what we saw for urban areas. In rural localities we find employees are facing significantly lowered probabilities of being in the labor force as well as significantly lowered wages, due to increases in contemporaneous violent crime rates. Thus, the predominate mechanism driving employee labor market outcomes in urban settings is either different in rural areas, operating in a dissimilar manner, or interacting in a different way with employees in rural settings. In the case of the rural self-employed we see little effect of homicide rates on labor market participation and a negative, though insignificant, impact on earnings. These strikingly different results for respondent's from urban versus rural localities are definitely an area that will receive additional attention moving forward with this research.

Per capita expenditure – very preliminary results

The purpose of this section is to measure the effects of crime on levels of wealth at the household level, in particular consumption. The effect on consumption could be a response of lower levels of earnings, but it could also be a direct effect of high levels of violence. We cannot disentangle the mechanism but following the same empirical specification we can measure the impact. We analyze the impact on PCE by households' residence in urban or rural localities in the third wave.

The results by homicides rates levels in Table 9 for urban localities show a negative effect of contemporaneous homicides rates on the total level of PCE, and also on the disaggregated measures of expenditure of food and non-food items. However, when adding the municipality characteristics the effect for total PCE is no longer significant and the effect for non-food items is, surprisingly positive. We will explore these mixed results more deeply in the future steps if this research. These results are significant only for households living in urban localities in 2005.

7. DISCUSSION AND FUTURE WORK

High levels of crime may modify the context in which individuals operate, affecting behaviors at the individual and household level (Gáfaro, Ibáñez and Calderón, 2011). In particular,

they can have an effect on the labor markets available to individuals. The effects of crime might be negative if the fear of being victims of crime increases the cost of participating in the labor market or if investment decreases in a region, which in turn diminishes job opportunities.

Measuring the impact of crime on labor market outcomes in Mexico is critical given the high incidence of crime observed since 2007 and the change in the dynamics of crime in the last few years. In addition OCGs have diversified their financial sources, and even if drug trafficking activities account for most of their economic resources they have been relying more on criminal activities that directly affect the civil population, like extortions and car thefts.

Exploiting information from the MxFLS in a period of low levels of homicides rates and in a period of high levels of homicides we can estimate and individual fixed effect model that helps to control for any time-invariant unobserved heterogeneity that could affect both exposure to violence and labor outcomes. However, if there are time-variant characteristics both at the municipality level and at the individual level affecting both municipalities' crime and economic opportunities our empirical results could be biased. We will explore different strategies that allows us to control for regional characteristics.

Preliminary results of the individual fixed effect strategy shows that the increasing violence trend in Mexico had a negative effect on labor market participation of men and women that were self-employed in 2005/06, and on earnings of males, but not of women, that were both self-employed or employee in 2005 but the effects are stronger for self-employed males.

Increasing violence in Mexico might not only affect the direct participants but also innocent civilians. If this is the case the government needs to respond to the negative shocks violence may cause on individual's wealth.

8. REFERENCES

Bozzoli, C., Brück, T. and Wald, N. (2011), "Self-Employment and Conflict in Colombia". DIW Berlin Discussion Paper No. 1098.

Calderón, V. and A. Ibáñez. (2009). "Labor Market Effects of Migration-Related Supply Shocks: Evidence from Internal Refugees in Colombia". *Documentos CEDE* No. 2009-14. Bogotá: Universidad de los Andes.

Deininger, K. 2003. Causes and consequences of civil strife - micro-level evidence from Uganda. *Policy Research Working Paper Series* 3045. Washington D.C.: The World Bank.

Dell, M. (2011). "Trafficking Networks and the Mexican Drug War," *mimeo*

Díaz-Cayeros, A., B. Magaloni, A. Matanock, and V. Romero (2011): "Living in Fear: Mapping the Social Embeddedness of Drug Gangs and Violence in Mexico," *mimeo*

Gáfaro, M., A.M. Ibáñez, and V. Calderón (2011). "Forced Migration, Female Labor Force Participation, and Intra-household Bargaining: Does Conflict Empower Women?". *Documentos CEDE* No. 2011-28. Bogotá: Universidad de los Andes.

Guerrero-Gutiérrez, E. (2011): "Security, Drugs, and Violence in Mexico: A Survey," *7th North American Forum, Washington D.C.*

Kondylis, F. (2010). "Conflict Displacement and Labour Market Outcomes in Post-War Bosnia and Hersegovina" *Journal of Development Economics* **93**(2): 235-248.

Molzahn, Rios and Shirk, (2012). "Drug Violence in Mexico: Data and Analysis Through 2011" Trans- Border Institute Joan B. Kroc School of Peace Studies University of San Diego

Rubalcava, Luis and Teruel, Graciela (2006). "User's Guide for the Mexican Family Life Survey First Wave", www.mxfls.uia.mx.

Shirk, D. (2011): "Drug Violence and State Responses in Mexico," *Manuscript: University of San Diego.*

9. TABLES AND FIGURES

Figure 1. Number of Homicides per Year – INEGI

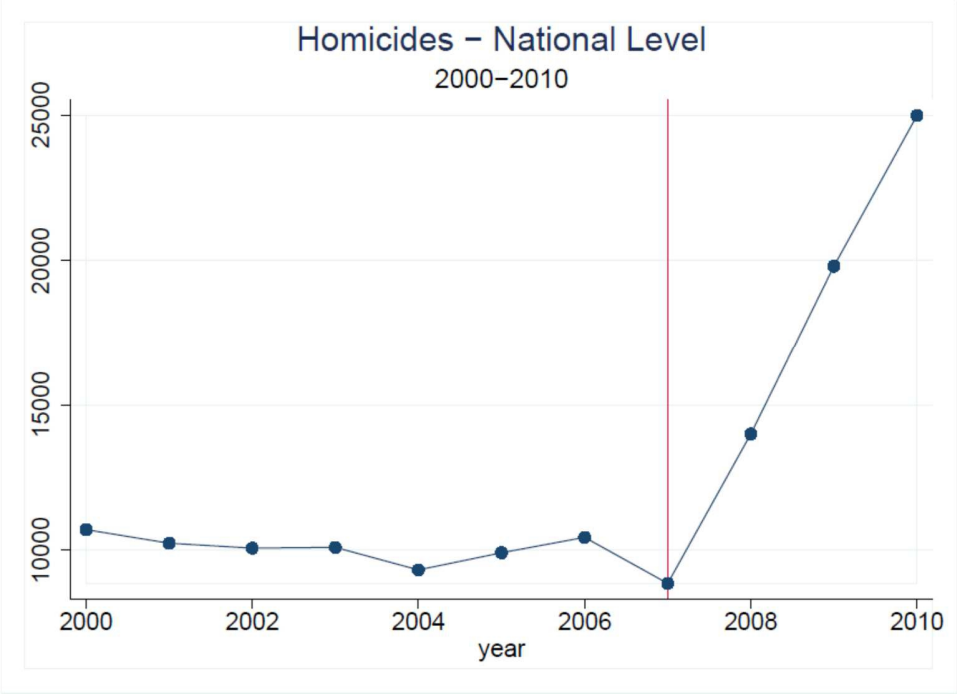


Figure 2. Number of Homicides – INEGI and data from President's Office (OCG's)

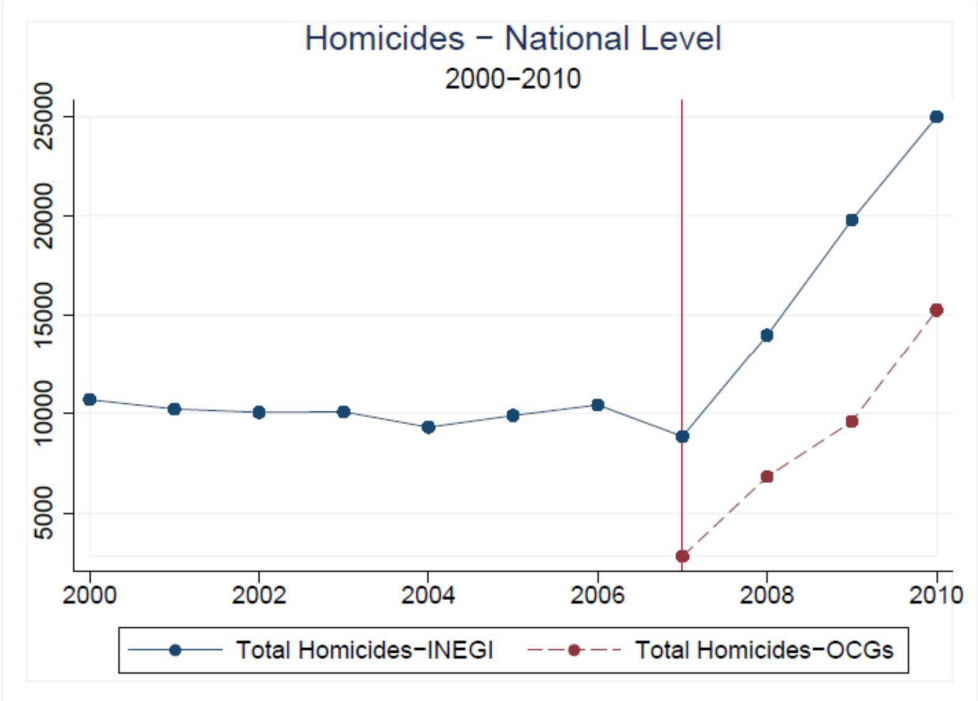
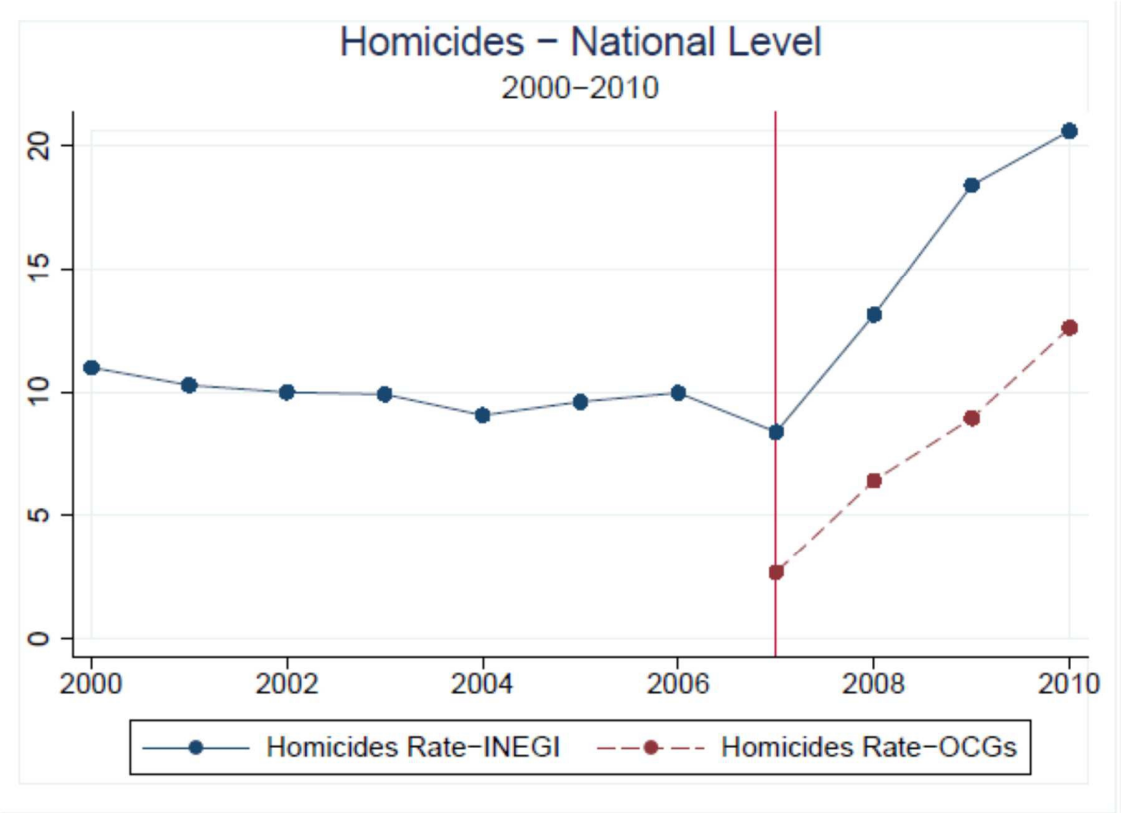
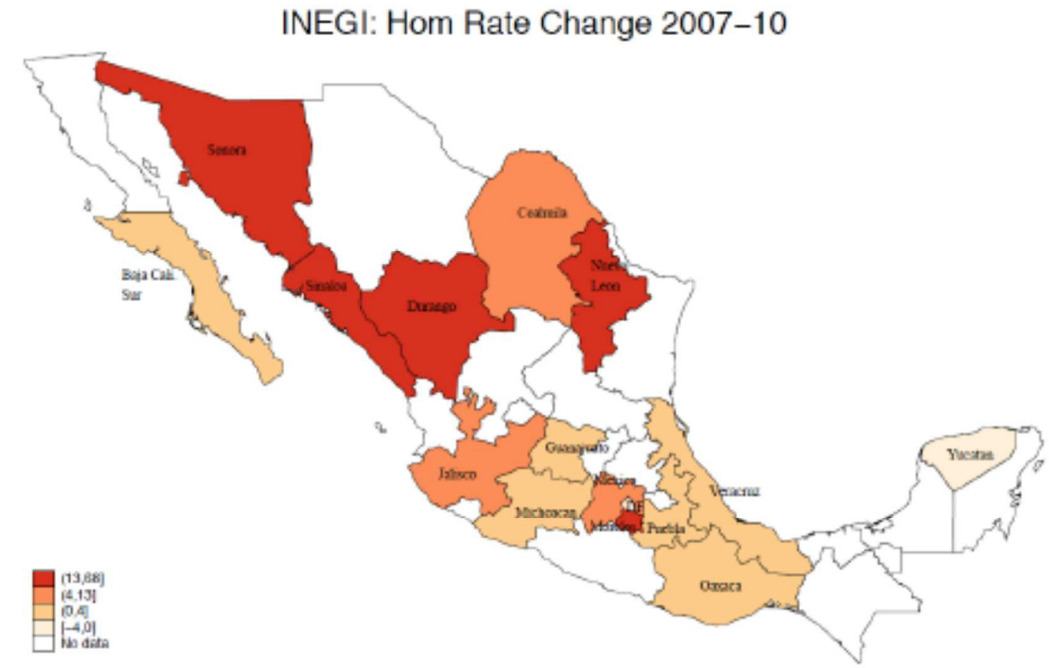


Figure 3. Homicides rates– INEGI and data from President's Office (OCG's)

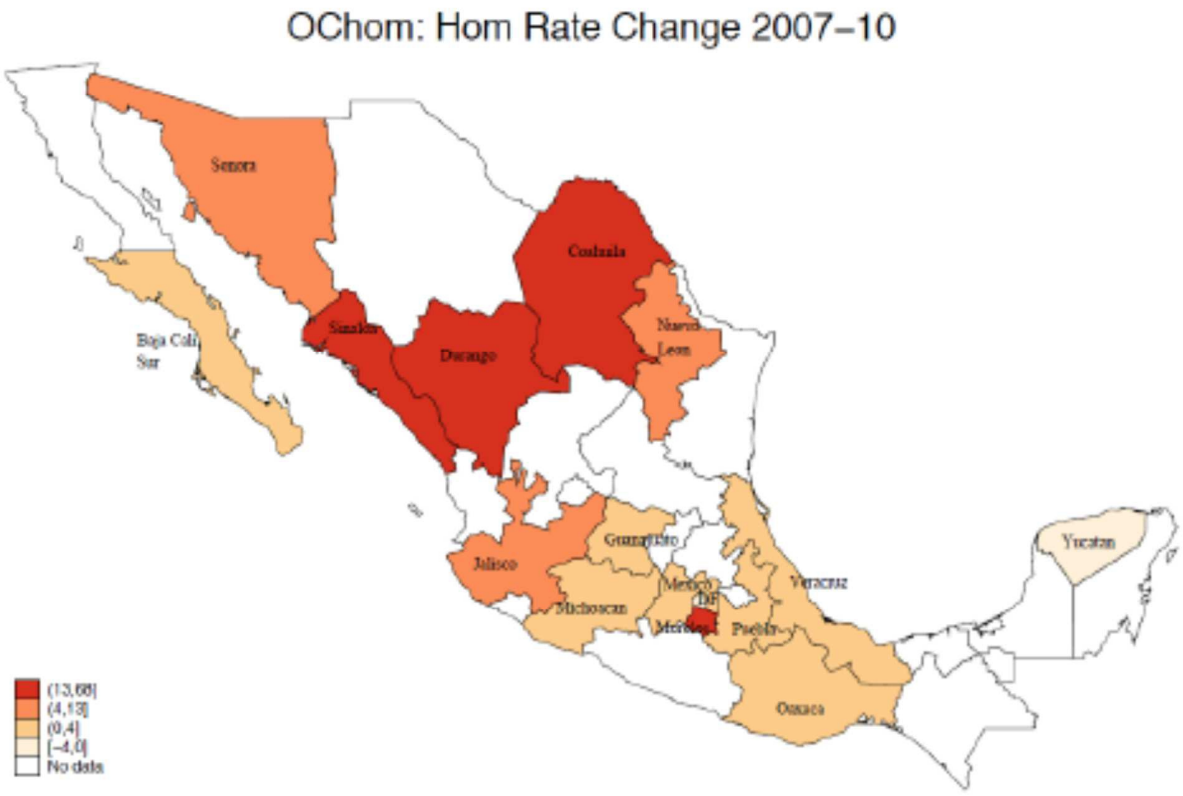


MAP 1. CHANGE IN HOMICIDES RATE 2007-2010 – INEGI



Note: White States are not included at baseline in MxFLS

MAP 2. CHANGE IN HOMICIDES RATE 2007-2010 – OCG (DATA FROM PRESIDENT'S OFFICE)



Note: White States are not included at baseline in MxFLS

Table 1. Sample sizes and recontact rates in MxFLS

Panel A. Recontact rates in MxFLS2

	All			Age in 2002>=15		
	Eligible for survey	Interviewed	% Interviewed	Eligible for survey	Interviewed	% Interviewed
Total	35,134	31,338	89.20	23,222	20,612	88.76
In Mexico	34,280	30,564	89.16	22,606	20,055	88.72
In US	854	774	90.63	616	557	90.42

Source: MxFLS

Note - Excluded panel respondents who died between waves

Panel B. Recontact rates in MxFLS3

	All			Age in 2002>=15		
	Eligible for survey	Interviewed	% Interviewed	Eligible for survey	Interviewed	% Interviewed
Total	34,225	29,238	85.43	22,357	18,845	84.29
In Mexico	32,349	27,640	85.44	21,123	17,791	84.23
In US	1,876	1,598	85.18	1,234	1,054	85.41
US sample ivw in MX		570			430	
US sample ivw in US		1,028			624	

Source: MxFLS

Note - Excluded panel respondents who died between waves

Table 2. Probability of between municipality migration between MxFLS2 and MxFLS3

Dependent variable	Mover =1			
	Model 1: Only Ind FE		Moder 2: Ind FE + Mpio characteristics	
	(1)	(2)	(3)	(4)
INEGI homicides				
Homicides rates *time t*	-0.002	-0.003	0	-0.003
	[0.003]	[0.004]	[0.003]	[0.003]
Homicides rates *time t-1*		0.004		0.005
		[0.005]		[0.005]
Homicides rates *time t-2*		0.002		-0.003
		[0.004]		[0.005]
MxFLS variables				
(1) Married	-0.005	-0.005	-0.001	-0.004
	[0.007]	[0.007]	[0.007]	[0.007]
Household size	-0.009***	-0.009***	-0.009***	-0.009***
	[0.002]	[0.002]	[0.002]	[0.002]
# of coresident children	0.006*	0.006*	0.006**	0.006*
	[0.003]	[0.003]	[0.003]	[0.003]
(1) Impatience measure	0	0	-0.001	-0.002
	[0.004]	[0.004]	[0.003]	[0.004]
Zscore Raven's score	0	0	-0.001	-0.001
	[0.002]	[0.002]	[0.002]	[0.002]
(1) Rural	-0.021**	-0.021**	-0.022*	-0.018
	[0.010]	[0.010]	[0.013]	[0.013]
Census municipality characteristics				
(1) children 6-11 no school attendance				0
				[0.011]
(1) children 12-14 no school attendance				0.003
				[0.005]
(1) children 15-24 with school attendance				0.003
				[0.005]
(1) older than 15: incomplete elementary school				-0.002
				[0.002]
(1) older than 15: no read or write				0.013
				[0.011]
(1) dwelling with water service				0.001
				[0.001]
(1) dwelling: toilette				-0.001
				[0.001]
(1) dwelling: TV				0.002
				[0.004]
(1) dwelling: sewage				0
				[0.002]
(1) dwelling: refrigerator				-0.009
				[0.009]
(1) dwelling: pc				-0.007*
				[0.004]
(1) dwelling: washer				0.008
				[0.008]
(1) dwelling: electricity				0.001
				[0.002]
(1) dwelling: all services				0
				[0.002]
Constant	0.119**	0.116*	0.663***	-0.204
	[0.060]	[0.060]	[0.232]	[0.362]
Number of observations	15,536	15,536	15,536	15,533
Number of individuals	7,769	7,769	7,769	7,769
R squared	0.0949	0.0955	0.219	0.136

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Note: Includes year and quarter of interview

Table 3. Sample Characteristics measured in Mxfls2

	Means				
	(1)	(2)	(3)	(4)	(5)
Variables measured in 2005	All	Male	Female	Urban	Rural
Basic Demographics					
Age	39.18	39.82	37.88	38.49	40.32
(1) Female	33.22			37.37	26.40
Years of education	7.70	7.33	8.43	8.73	6.01
Zscore Raven's Score	0.22	0.20	0.27	0.32	0.06
(1) Married	67.01	74.86	51.23	66.53	67.80
Labor Outcomes					
(1) Employee	68.09	69.52	65.20	70.63	63.99
(1) Self-employed	24.76	25.00	24.27	22.40	28.56
Earnings last 12 months	39,777	41,246	36,824	47,838	26,550
Earnings last 12 months - employee	47,697	47,276	48,601	56,422	32,198
Earnings last 12 months - self	29,660	33,372	21,958	36,727	20,741
Household Characteristics					
(1) Non agricultural business	14.69	12.23	19.66	17.36	10.37
(1) Farm business	17.59	19.33	14.09	7.32	34.30
Log PCE	6.84	6.76	6.98	7.05	6.49
Household size	5.01	5.08	4.86	4.87	5.24
# co-resident children	1.44	1.50	1.34	1.37	1.57
Migration					
(1) Migration by age 12	19.28	18.69	21.35	20.17	17.39
(1) Expectation about migrating in future	14.51	13.22	16.89	17.53	9.60
Locality characteristics					
(1) Rural	37.87	41.73	30.09		
Observations	7832	5231	2601	4867	2965

Table 4. Characteristics in first and second follow-up according to change on homicides rates at place of residence

	Variables measured in MxFLS2			Variables measured in MxFLS3		
Δ hom rates at place of residence in 2005	Low change	High change	pv value difference	Low change	High change	pv value difference
Labor Outcomes						
(1) Worked last week	100.00	100.00		80.28	81.69	0.16
(1) Employee	67.30	70.29	0.01	55.99	58.37	0.07
(1) Self-employed	25.35	23.10	0.04	20.73	19.54	0.26
Earnings last 12 months	39,832	39,620	0.96	49,137	42,834	0.61
Earnings last 12 months - employee	26,211	40,302	0.00	73,578	45,313	0.63
Earnings last 12 months - self	49,402	43,105	0.26	60,565	58,249	0.73
Self-perception of crime						
(1) Fear during the day	2.88	2.68	0.67	3.88	6.21	0.00
(1) Fear during the night	5.12	3.42	0.00	6.48	8.63	0.00
(1) Probability being assaulted	25.29	25.66	0.76	28.26	32.66	0.00
(1) Has been a victim of an assault	10.41	9.62	0.35	10.20	16.33	0.02
	5800	2033		5800	2033	

Table 5. Labor market outcomes - MALES

PANEL A. Model 1: Only Individual Fixed Effects

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.005	0	0.001	0.001	-0.206**	-0.15	-0.046	-0.061
	[0.005]	[0.006]	[0.002]	[0.003]	[0.098]	[0.111]	[0.048]	[0.057]
Homicide rates: *time t-1*		-0.016*		-0.001		-0.157		0.041
		[0.009]		[0.004]		[0.162]		[0.102]
Homicide rates: *time t-2*		-0.003		0.001		-0.024		0.01
		[0.008]		[0.005]		[0.137]		[0.107]
Constant	0.781***	0.793***	0.899***	0.899***	8.094***	8.213***	12.942***	12.923***
	[0.055]	[0.056]	[0.100]	[0.100]	[1.977]	[1.977]	[2.292]	[2.291]
Obervations	2,726	2,726	7,957	7,957	2,726	2,726	7,957	7,957
Individuals	1,452	1,452	4,147	4,147	1,452	1,452	4,147	4,147
R squared	0.169	0.172	0.102	0.102	0.0406	0.0412	0.00937	0.00941

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

PANEL B. Model 2: Individual Fixed Effects and Municipality characteristics

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.006	-0.002	0	0	-0.182*	-0.146	-0.097*	-0.114*
	[0.006]	[0.006]	[0.002]	[0.003]	[0.101]	[0.114]	[0.051]	[0.060]
Homicide rates: *time t-1*		-0.012		0.001		-0.111		0.06
		[0.010]		[0.004]		[0.175]		[0.104]
Homicide rates: *time t-2*		0.006		-0.004		0.031		-0.103
		[0.009]		[0.005]		[0.157]		[0.113]
Constant	0.458	0.457	1.148***	1.214***	-4.893	-4.642	20.028***	21.192***
	[0.481]	[0.493]	[0.260]	[0.264]	[9.281]	[9.636]	[5.656]	[5.741]
Obervations	2,725	2,725	7,956	7,956	2,725	2,725	7,956	7,956
Individuals	1,452	1,452	4,147	4,147	1,452	1,452	4,147	4,147
R squared	0.181	0.182	0.107	0.107	0.0523	0.0526	0.0135	0.0138

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

Table 6. Labor market outcomes - FEMALES

PANEL A. Model 1: Only Individual Fixed Effects

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.006	-0.006	0.006	-0.001	-0.152	-0.084	-0.089	-0.134
	[0.013]	[0.014]	[0.005]	[0.007]	[0.154]	[0.172]	[0.083]	[0.100]
Homicide rates: *time t-1*		-0.005		0.016		-0.308		0.093
		[0.022]		[0.010]		[0.302]		[0.153]
Homicide rates: *time t-2*		0.012		0.01		-0.173		0.093
		[0.019]		[0.010]		[0.269]		[0.149]
Constant	0.464***	0.454***	1.104***	1.044***	7.161***	7.585***	12.636***	11.975***
	[0.136]	[0.139]	[0.110]	[0.107]	[1.843]	[1.879]	[1.695]	[1.634]
Obervations	1,295	1,295	3,933	3,933	1,295	1,295	3,933	3,933
Individuals	678	678	2,025	2,025	678	678	2,025	2,025
R squared	0.488	0.488	0.358	0.36	0.227	0.228	0.106	0.106

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

PANEL B. Model 2: Individual Fixed Effects and Municipality characteristics

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.001	0.003	0.004	-0.003	-0.213	-0.119	-0.121	-0.159
	[0.015]	[0.016]	[0.006]	[0.007]	[0.170]	[0.188]	[0.089]	[0.107]
Homicide rates: *time t-1*		-0.015		0.016		-0.401		0.082
		[0.025]		[0.010]		[0.319]		[0.156]
Homicide rates: *time t-2*		-0.026		0.008		-0.582*		0.075
		[0.023]		[0.010]		[0.303]		[0.160]
Constant	0.971	1.128	1.534***	1.498***	6.157	9.677	20.503**	20.153**
	[1.094]	[1.105]	[0.567]	[0.566]	[15.194]	[15.245]	[9.718]	[9.797]
Obervations	1,295	1,295	3,932	3,932	1,295	1,295	3,932	3,932
Individuals	678	678	2,025	2,025	678	678	2,025	2,025
R squared	0.515	0.516	0.368	0.37	0.262	0.267	0.109	0.11

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

Table 7. Labor market outcomes - URBAN PLACES

PANEL A. Model 1: Only Individual Fixed Effects

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.008	-0.018*	0.008***	0.006*	-0.260**	-0.323*	0.024	-0.066
	[0.007]	[0.010]	[0.003]	[0.004]	[0.121]	[0.178]	[0.054]	[0.068]
Homicide rates: *time t-1*		0.021		0.003		0.208		0.254**
		[0.014]		[0.006]		[0.286]		[0.129]
Homicide rates: *time t-2*		0.001		0.012**		-0.264		-0.071
		[0.013]		[0.006]		[0.260]		[0.133]
Constant	0.758***	1.030***	0.899***	0.974***	10.819***	12.466***	12.574***	13.219***
	[0.104]	[0.142]	[0.109]	[0.050]	[1.908]	[2.378]	[2.422]	[0.949]
Obervations	2,223	2,223	7,557	7,557	2,223	2,223	7,557	7,557
Individuals	1,171	1,171	3,937	3,937	1,171	1,171	3,937	3,937
R squared	0.262	0.263	0.178	0.178	0.0778	0.0788	0.0199	0.0207

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

PANEL B. Model 2: Individual Fixed Effects and Municipality characteristics

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	-0.009	-0.015	0.007**	0.005	-0.257*	-0.296*	-0.036	-0.139*
	[0.008]	[0.010]	[0.003]	[0.004]	[0.132]	[0.179]	[0.059]	[0.075]
Homicide rates: *time t-1*		0.015		0.005		0.149		0.303**
		[0.014]		[0.006]		[0.283]		[0.135]
Homicide rates: *time t-2*		0.001		0.010*		-0.275		-0.17
		[0.015]		[0.006]		[0.301]		[0.143]
Constant	-0.052	-0.072	1.725***	1.705***	-10.832	-9.203	26.055***	28.542***
	[0.724]	[0.728]	[0.403]	[0.421]	[13.465]	[13.629]	[8.578]	[8.678]
Obervations	2,222	2,222	7,555	7,555	2,222	2,222	7,555	7,555
Individuals	1,171	1,171	3,937	3,937	1,171	1,171	3,937	3,937
R squared	0.283	0.283	0.181	0.182	0.0954	0.0962	0.0242	0.0252

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

Table 8. Labor market outcomes - RURAL PLACES

PANEL A. Model 1: Only Individual Fixed Effects

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	0.001	0.003	-0.008*	-0.007	-0.159	-0.131	-0.220***	-0.176**
	[0.007]	[0.008]	[0.005]	[0.006]	[0.127]	[0.128]	[0.075]	[0.087]
Homicide rates: *time t-1*		-0.011		-0.002		-0.163		-0.132
		[0.012]		[0.007]		[0.182]		[0.127]
Homicide rates: *time t-2*		0.009		-0.005		0.077		0.063
		[0.011]		[0.007]		[0.153]		[0.122]
Constant	0.916***	0.912***	0.724***	1.056***	2.605	2.601	10.118***	13.650***
	[0.109]	[0.109]	[0.268]	[0.091]	[1.621]	[1.640]	[3.368]	[1.657]
Obervations	1,798	1,798	4,333	4,333	1,798	1,798	4,333	4,333
Individuals	959	959	2,235	2,235	959	959	2,235	2,235
R squared	0.284	0.286	0.191	0.191	0.0956	0.0969	0.0327	0.0334

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

PANEL B. Model 2: Individual Fixed Effects and Municipality characteristics

Dependent Variable	Worked last week =1				Quartic root of earnings			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variable	self	self	employee	employee	self	self	employee	employee
Homicide rates: *time t*	0.003	0.007	-0.010**	-0.010*	-0.096	-0.065	-0.243***	-0.196**
	[0.008]	[0.009]	[0.005]	[0.006]	[0.141]	[0.144]	[0.078]	[0.091]
Homicide rates: *time t-1*		-0.016		-0.001		-0.129		-0.123
		[0.014]		[0.008]		[0.212]		[0.132]
Homicide rates: *time t-2*		0.028**		-0.011		0.245		-0.005
		[0.014]		[0.008]		[0.201]		[0.135]
Constant	0.223	0.162	0.474	0.504	-4.638	-5.262	17.804**	17.580**
	[0.636]	[0.657]	[0.497]	[0.498]	[10.717]	[11.033]	[7.136]	[7.166]
Obervations	1,798	1,798	4,333	4,333	1,798	1,798	4,333	4,333
Individuals	959	959	2,235	2,235	959	959	2,235	2,235
R squared	0.297	0.303	0.202	0.203	0.114	0.116	0.038	0.0385

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

Table 9. LogPCE - RURAL PLACES

PANEL A. Model 1: Only Individual Fixed Effects

Dependent variable	LogPCE : Total		LogPCE : Non Food		LogPCE : Food	
	(1)	(2)	(3)	(4)	(5)	(6)
Homicide rates: *time t*	-0.009**	-0.015***	-0.003	-0.019**	-0.019***	-0.017***
	[0.004]	[0.005]	[0.006]	[0.008]	[0.004]	[0.005]
Homicide rates: *time t-1*		0.020**		0.053***		-0.003
		[0.010]		[0.015]		[0.009]
Homicide rates: *time t-2*		-0.027***		-0.044***		-0.016*
		[0.009]		[0.015]		[0.008]
Constant	7.330***	7.727***	6.230***	6.298***	6.910***	6.925***
	[0.088]	[0.132]	[0.135]	[0.246]	[0.103]	[0.103]
Obervations	18,952	18,952	18,773	18,773	18,906	18,906
Individuals	9,594	9,594	9,580	9,580	9,594	9,594
R squared	0.104	0.105	0.0485	0.0501	0.112	0.112

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

PANEL B. Model 2: Individual Fixed Effects and Municipality characteristics

Dependent variable	LogPCE : Total		LogPCE : Non Food		LogPCE : Food	
	(1)	(2)	(3)	(4)	(5)	(6)
Homicide rates: *time t*	-0.001	0	0.015**	0.006	-0.013***	-0.006
	[0.004]	[0.006]	[0.007]	[0.009]	[0.004]	[0.006]
Homicide rates: *time t-1*		-0.001		0.025*		-0.020**
		[0.010]		[0.015]		[0.010]
Homicide rates: *time t-2*		-0.003		-0.011		0.001
		[0.009]		[0.014]		[0.009]
Constant	6.856***	6.884***	2.016**	2.108**	7.068***	7.053***
	[0.567]	[0.576]	[0.824]	[0.832]	[0.564]	[0.572]
Obervations	18,947	18,947	18,768	18,768	18,901	18,901
Individuals	9,594	9,594	9,580	9,580	9,594	9,594
R squared	0.126	0.126	0.0743	0.0745	0.131	0.131

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

10. APPENDIX

Table A.1. Labor market outcomes - SELF- EMPLOYED MALES

Dependent Variable: Worked last week =1				
	Model 1: Only Individual Fixed Effects		Model 2: Individual Fixed Effects and Municipality characteristics	
	(1) self	(2) self	(1) self	(2) self
Quartile 2 - hom rates: *time t*	-0.013	-0.02	-0.018	-0.024
	[0.024]	[0.025]	[0.027]	[0.028]
Quartile 3 - hom rates: *time t*	-0.009	-0.017	-0.01	-0.017
	[0.027]	[0.028]	[0.029]	[0.030]
Quartile 4 - hom rates: *time t*	-0.016	-0.014	-0.02	-0.019
	[0.029]	[0.030]	[0.031]	[0.032]
Quartile 2 - hom rates: *time t-1*		0.008		0.008
		[0.023]		[0.025]
Quartile 3 - hom rates: *time t-1*		-0.027		-0.02
		[0.024]		[0.026]
Quartile 4 - hom rates: *time t-1*		-0.060**		-0.053*
		[0.031]		[0.032]
Quartile 2 - hom rates: *time t-2*		0.004		-0.001
		[0.026]		[0.027]
Quartile 3 - hom rates: *time t-2*		0.014		0.017
		[0.025]		[0.026]
Quartile 4 - hom rates: *time t-2*		0.001		0.006
		[0.026]		[0.028]
Constant	0.779***	0.773***	0.468	0.575
	[0.055]	[0.061]	[0.513]	[0.511]
Obervations	2,726	2,726	2,725	2,725
Individuals	1,452	1,452	1,452	1,452
R squared	0.169	0.173	0.18	0.184

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural

Table A.2. Labor market outcomes - FEMALES

Dependent Variable: Worked last week =1

	Model 1: Only Individual Fixed Effects		Model 2: Individual Fixed Effects and Municipality characteristics	
	(1) self	(2) self	(1) self	(2) self
Quartile 2 - hom rates: *time t*	-0.090*	-0.107**	-0.051	-0.042
	[0.051]	[0.051]	[0.066]	[0.068]
Quartile 3 - hom rates: *time t*	-0.149***	-0.173***	-0.141**	-0.150**
	[0.052]	[0.053]	[0.064]	[0.067]
Quartile 4 - hom rates: *time t*	-0.158***	-0.216***	-0.150**	-0.184**
	[0.057]	[0.057]	[0.076]	[0.078]
Quartile 2 - hom rates: *time t-1*		-0.160***		-0.081
		[0.048]		[0.058]
Quartile 3 - hom rates: *time t-1*		-0.130**		-0.08
		[0.053]		[0.061]
Quartile 4 - hom rates: *time t-1*		-0.035		-0.023
		[0.061]		[0.066]
Quartile 2 - hom rates: *time t-2*		0.098		0.03
		[0.061]		[0.065]
Quartile 3 - hom rates: *time t-2*		0.105*		0.071
		[0.056]		[0.060]
Quartile 4 - hom rates: *time t-2*		0.011		0.029
		[0.054]		[0.058]
Constant	0.568***	0.674***	0.009	-0.001
	[0.142]	[0.155]	[0.215]	[0.247]
Obervations	1,295	1,295	1,295	1,295
Individuals	678	678	678	678
R squared	0.495	0.509	0.568	0.571

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

All Models include: individual time-variant characteritics: marital status, hhsize, # kids, rural