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ABSTRACT

This is the first paper to study the economic effects of drug-trafficking organization violence. We exploit the manyfold increase in homicides in 2008-2011 in Mexico resulting from its war on organized drug traffickers to estimate the effect of drug-related homicides on house prices. We use an unusually rich dataset that provides national coverage on house prices and homicides and exploit within-municipality variations. We find that the impact of violence on housing prices is borne entirely by the poor sectors of the population. An increase in homicides equivalent to one standard deviation leads to a 3% decrease in the price of low-income housing. In spite of this large burden on the poor, the willingness to pay in order to reverse the increase in drug-related crime is not high. We estimate it to be approximately 0.1%of Mexico's GDP.

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1. Introduction

Drug production and trafficking are a major problem in many countries. These activities are often associated with violence, a lack of security and corruption in the police force and in the legal system. In some countries, the sheer number of killings that take place may have a negative impact on economic outcomes. In Mexico, there have been more than 50,000 drug-related homicides (DRHs) since 2006, when President Calderon took office and declared a war on drugs.[1] Compared with the deaths occurring in other recent conflicts, such as the campaigns waged by the Irish National Liberation Army (3,500)[2] or ETA (1,000) in Spain,[3] the number of homicides in Mexico is more than an order of magnitude higher. As a result of this violence, five Mexican cities are among the ten most violent cities in the world,[4] and Mexican citizens consider drug-related violence to be their most important concern.[5] Many analysts and prominent policymakers have estimated that this situation translates into a reduction in GDP of as much as 1 to 2 percentage points.[6]Nevertheless, these estimates are more in the nature of guesses rather than being the result of any rigorous attempt to measure the economic causal effect of drug-related violence.

To our knowledge, this is the first paper that explores the effect of drug-trafficking organization (DTO) violence. This is surprising, given that drug policy and its costs and benefits are an issue of concern to many countries and that DTOs are leading to more killings than many recent wars have. We estimate the causal effect of violence on house prices by drawing on a unique dataset of house prices compiled using information on all the houses and apartments that were appraised in connection with applications for mortgages between 2008 and 2011. House prices are not only important in and of themselves; they also reflect the (dis)amenities of living in given locations. To measure the causal impact of homicides on house prices, we take advantage of a rich dataset that contains more than 1.3 million appraisals. These appraisals are distributed among more than a thousand of the country's municipalities (out of a total of 2,445) and take various dwelling characteristics into account. For statistics on homicides, we use a national dataset of deaths (in this case, we focus on murders) collected by the Mexican Federal Secretariat of Health. The sharp increase in DRHs allows us to identify the causal effects that are of

[1] As compared to the 8,901 cases registered in 2000-2006 (Rios, 2012).

[2] Besley and Mueller (2011).

[3] Estimates prepared by the Victims of Terrorism Association –[http://www.avt.org/].

[4] Measured as homicides per 100,000 inhabitants, the rates for these five Mexican cities are: Ciudad Juárez: 148, Acapulco: 128, Torreón: 88, Chihuahua: 83, and Durango: 80. According to the ConsejoCiudadano para la SeguridadPública y la Justicia Penal (Citizens' Council for Public Security and Criminal Justice) this put these cities in the top 10 worldwide in 2011.

[5] ConsultaMitofsky, Monitor Mensual (survey), June 2011.

[6] The Governor of the Central Bank, Agustin Carstens, said that it is "the most important factor inhibiting growth and investment", *Proceso Magazine*, April 6th 2011. See also the BBVA estimate issued in late 2010 and the statement made by the Minister of the Treasury, Ernesto Cordero, who estimated the reduction in GDP caused by the violence at 1.2%, Reuters, September 1st 2010.

interest to us here. We contend that the nature of local DRHs is unrelated to local economic conditions, since they are mainly associated with retaliation killings, battles among drug organizations and clashes with the Army. We provide some evidence of this in the paper as well.

Our findings indicate that increases in DRHs have a negative effect on house prices, but only in the case of low-quality housing. In other words, this negative impact on house price is borne entirely by the poorer segments of the population. Using a partially identified hedonic price equation while conditioning on municipality fixed effects, period effects, secular trends by type of house and specific state trends, as well as controlling for a large set of dwelling characteristics, we estimate that one standard deviation of increase in homicides lowers the price of poor-quality houses by more than 3%. In light of the Rosen (1974) hedonic prices model, where the price of a differentiated good can be described by a vector of characteristics, our parameters of interest could be interpreted as the average marginal willingness to pay for security amenities. Given that many municipalities registered DRH increases of much more than 100% and that housing wealth is typically the largest source of wealth for Mexican families and especially for low-income households, the economic costs of this type of violence could be substantial. In spite of this large burden on the poor, the willingness to pay to reverse the increase in drug-related crime is not high. We estimate it to be approximately 0.1% of Mexico's GDP. We also find that, when the increase in violence is a long-term phenomenon, the negative effects on housing prices for the poor are about 40% larger. Our results are robust across different sources of data on homicides.

Our paper is related to that of Linden and Rockoff (2008), Besley and Mueller (2012) and Di Tella et al. (2010). Exploiting panel data, Linden and Rockoff (2008) find that prices of homes near sex offenders decline considerably (approximately 4% on average) following an offender's arrival in the neighborhood. Besley and Mueller (2012), for their part, examine the effect of violence in Northern Ireland on house prices. They exploit the spatial and temporal variation in violence and model the transition from violence to peace with a Markov switching model. They find that peace leads to an increase in house prices of between 1.3% and 3.5%, with the effect being stronger in the regions where the violence was greatest.

The findings described in this paper are also in line with those of Di Tella et al. (2010), who, while studying another environment and type of conflict, also find that violence places a heavy burden on the poor. These authors exploit the sharp increase in crime seen during the second half of the 1990s and, in particular, during the year 2001 in Buenos Aires, Argentina. Their main research question is whether the rich or the poor have been the main victims of this rise in crime. In the case of home robberies, they find

that the poor have been the main victims of increases in such crimes but, in that case, the channel for this effect is the fact that the rich, unlike the poor, are able to protect their homes by hiring security services and/or installing security devices (see also Levitt, 1999).

The remainder of this paper is structured as follows. Section 2 describes the political context in which Mexico has experienced this DRH increase. The datasets employed for crime and housing variables are presented in Section 3. Section 4 discusses the related literature. Section 5 covers the identification strategy used in the analysis and the main results. Section 6 presents a battery of robustness checks for the results discussed in the preceding section. Section 7 explores what happens when violence is persistent, and Section 8 concludes.

2. Recent Increases in Drug-Related Homicides in Mexico

Drug-related homicides (DRHs) in Mexico started to rise in 2006, and this increase began to grow steeper in 2008, with the cumulative total climbing to almost 50,000 cases by the end of 2011; by contrast, during the preceding presidential term (2000-2006), the number of DRHs was below 10,000 (Rios, 2012). Some analysts believe that this sharp upswing is attributable to President's Calderon frontal attack on drug-trafficking organizations (DTOs), which he launched almost as soon as he took office in December 2006.[7] The hypothesis is that the killings and apprehension of DTO leaders fragmented these organizations, which split into many different units and began to fight each other to gain control of their areas of operation (see, among others, Rios (2012) and Guerrero (2011)). Some other analysts claim that, when the Institutional Revolutionary Party (PRI, in Spanish) lost the presidency after holding sway for almost 70 years, there was no longer a single political power to keep the DTOs in check and to strike deals with them (Astoga and Shirk (2011), Bailey and Godson (2000), and Snyder and Duran-Martinez (2009)). In addition, some authors contend that the successful fight against drug organizations in Colombia displaced operations to Mexico and led to increasing violence there as DTOs strove to gain the upper hand in their new areas of operation (Castillo et al. (2012)).

All these hypotheses are based on reasonable arguments, although it is difficult to disentangle their effects. In any case, it is well-documented that the increase in violence coincided with the start of the Army's operations throughout the country (Escalante 2011). Dell (2012), exploiting a regression discontinuity design applied to close elections, shows that municipalities in which the mayor belonged to the same party as the President witnessed more DRHs just after the crackdowns in Mexico began. Her empirical evidence suggests that the violence reflects rival traffickers' attempts to usurp territories after

[7] On December 11, 2006, the President sent the Army to Michoacán to fight drug dealers in what was called the Joint Michoacán Operation ("OperativoConjunto Michoacán").

a crackdown has weakened the position of the incumbent DTO.[8] Dell's (2012) results support qualitative and descriptive studies which advance the argument that the Mexican government's anti-drug policies have been the primary cause of the sharp increase in violence seen in recent years.

Dell (2012) also states that the number of major DTOs had increased from 6 in 2007 to 16 by 2011, with groups splitting into factions as a result of leadership disputes. The fragmentation of these organizations and the ensuing struggle for preeminence and territory are, according to this view, the most likely causes of the increase in violence. According to Molzahn, Ríos and Shirk (2012), of the 50,000 DRHs in 2006-2011, about 35,000 were due to conflicts among DTOs. Castillo et al. (2012) draw attention to the fact that the violence has been concentrated in municipalities where two or more cartels operate, with the presence of each additional cartel in a particular location bringing an increase in the homicide rate of about 100%.

A second probable exogenous shock to the crime rate is related to Colombia´s crackdown on DTOs. Castillo et al. (2012) exploit drug seizures in Colombia to account for the DRH rate in Mexico, arguing that these seizures could account for 17% of the increase in DRHs in Mexico.

Regardless of whether the spike in DRHs is attributable to political factors or to the consequences of an exogenous shock to the crime rate generated by Colombia's successful war on drugs, it is unlikely that it was the result of changes on the demand side of the drug market, since most drug demand is external,[9] Mexico is the main supplier of illicit drugs to the US, and demand there has not undergone any major or sudden change during the period in question (United Nations Office on Drugs and Crime, *World Drug Report*, 2011).

One interesting aspect of the situation in Mexico is that the violence tends to be geographically concentrated (see Figure 1). This may have to do with the localized nature of drug production. Indeed, Dell (2012) reports that illicit drugs are cultivated in 14% of the country's municipalities. It may also have something to do with proximity to transportation routes to the US border and along the Pacific Coast (Castillo et al. (2012)).

[8] According to Dell (2012): "Over 85 percent of the drug violence consisted of people involved in the drug trade killing each other" either as a way of extracting revenge or as a way of expanding their territories. She also notes that the killings are especially frequent after one side is weakened by government intervention.

[9] Whereas 14% of Americans have used illicit drugs during the past year (U.S. National Survey on Drug Use and Health), only 1.4% of Mexicans have done so (EncuestaNacional de Adicciones, 2008).

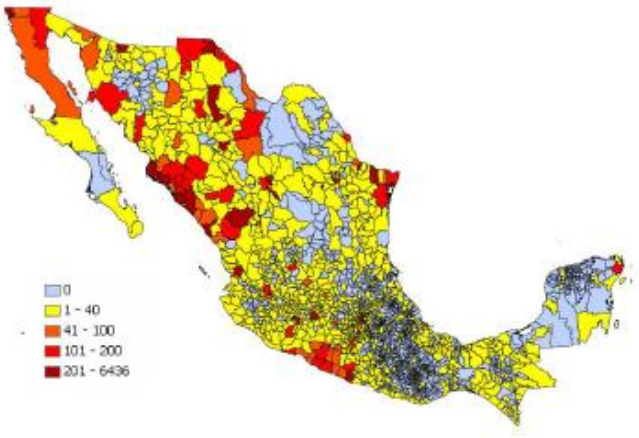

Figure 1: Total Drug-Related Homicides, by Municipality, 2007-2010
Source: Calderon, Diaz-Cayeros, Magaloni, Robles (2012).

Nevertheless, at the municipality level, we find that the increase in violence was sudden and discontinuous and that it occurred in different municipalities at different times, independently of the economic or social characteristics of any particular municipality. Figure 2 shows examples of the spikes seen in DRHs in two of the most affected municipalities, but these patterns are present in dozens of others as well.

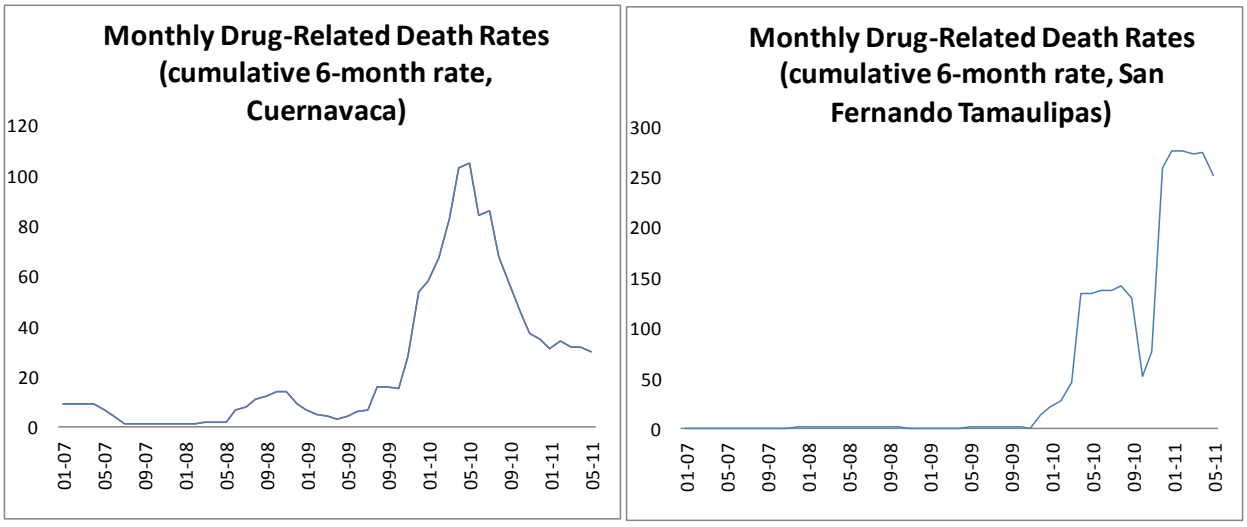

Figure 2: Dynamics of Drug-Related Homicides
Source: National Health Information System (SINAIS), Mexico.

Given that property crime has not been found to be strongly correlated with economic variables such as unemployment,[10] and in view of the patterns that we have described, it comes as no surprise that DRHs

[10] A typical estimate would be that a one-percentage-point increase in the unemployment rate is associated with a one- percent increase in property crime (Levitt 2004).

are not correlated with employment either. This finding will be discussed in Section 5.

Finally, another important fact to note here about DRHs is that they are generally more common in poor sectors of the population. In their study on a gang of drug dealersin the US, Levitt and Venkatesh (2000) find that such gangs hire low-income people, almost all of whom earn very low wages. In Mexico, too, drug dealers are recruited from low-income segments of the population. *Proceso*, a popular Mexican news magazine, calls the poor the "stockfeed of the illicit drug industry".[11] Crime gangs have terrorized the poorest sectors of the population, who live in what has turned into lawless "no man's land". One such example is the town of El Alamillo, Chihuahua.[12]If drug-related crime is poverty-biased and occurs primarily in poor areas, then we can expect it to have different impacts on poor and not-poor populations.This is an important point, since we are interested in the distributional impact of crime.

As one example, in April 2009, there were 13 casualties as a consequence of a confrontation between army forces and a clandestine armed group in San Nicolás del Oro, a little community in the mountains of Guerrero that has no telephone service.[13] The capacity of security forces to pursue and capture gang members and to undertake investigations in these cases is significantly limited in situations such as this. It is also important to note that many drug plantations are located in remote agricultural regions where crime groups may have the local authorities on their side, as has occurred in the poor region of Tierra Caliente in Guerrero, where a number of mayors have been arrested on suspicion of cooperating with organized crime.[14]

3. Data and Descriptive Statistics

One of the strengths of this paper is the quality of the data on both of the main factors involved: homicides and house prices. To measure homicides, we use two data sources: one is the data on DRHs reported by the Office of the President, which are compiled from the registries of several government ministries in Mexico. The other is the data collected from hospitalization records, which register all homicide deaths (whether drug-related or not). For house pricing data, we use a house appraisal database that covers 25 house appraisal characteristics and 1,370,676 valuations. The period for which pricing data is available runs from January 2008 through December 2011, and our final data therefore cover exactly that period. A more detailed explanation of our sources is provided later on in this section.

[11]"Pobres, la reserva del narco", in *Revista Proceso*, March8, 2011 [http://www.proceso.com.mx/?p=277851].
[12]"Somete Narcoterror a Sierra Tarahumara" in *El Norte*, January 24, 2010.
[13]"Reportan 13 muertos tras balacera en Guerrero" in *El Universal*, April 16, 2009.
[14]"Se llevan a alcaldes; acá siguen plomazos" in *El Norte*, July 8, 2009.

3.1 Crime Data

Our main source of data on homicides is the death certificates prepared by civil servants and doctors. This dataset contains variables that identify the cause of death, the date of death and the place where it occurred. The information is centralized by the National Health Information System ("Sistema Nacional de Información en Salud" (SINAIS) in Spanish). The SINAIS database contains a registry of deaths in Mexico but does not provide a clear indication of whether or not homicide deaths were related to drugdealing.

The other source of crime data in Mexico is the Office of the President. In this case, the data is mainly collected by the police and armed forces. One advantage of this dataset is that it is specifically focused on drug-related crime. However, mainly because of the time span of data coverage, we prefer the SINAIS database to the Office of the President's database, since the latter dataset covers a shorter period: from December 2006 to September 2011. As our estimations run from January 2008 to December 2011,[15] we would be losing the data for just one quarter (from September 2011 to December 2011). However, in this paper we use cumulative homicide rates (for the preceding 6-, 12- and 24-month periods) as the causal variable of interest, and we cannot obtain the cumulative 24-month rate using the Office of the President's database for the entire period for which we have data on house prices. Nevertheless, as can be seen in Figure 3, the correlation between the two sources is almost perfect. Thus, estimating the effect of total crime or drug-related crime can be expected to generate similar results. In Section 5.2 we show that the estimates and levels of statistical significance derived from the two databases are indeed very similar.

[15]The SINAIS database covers the period from 2002 onward, but we are limited by the housing valuation database, whose coverage starts in 2008.

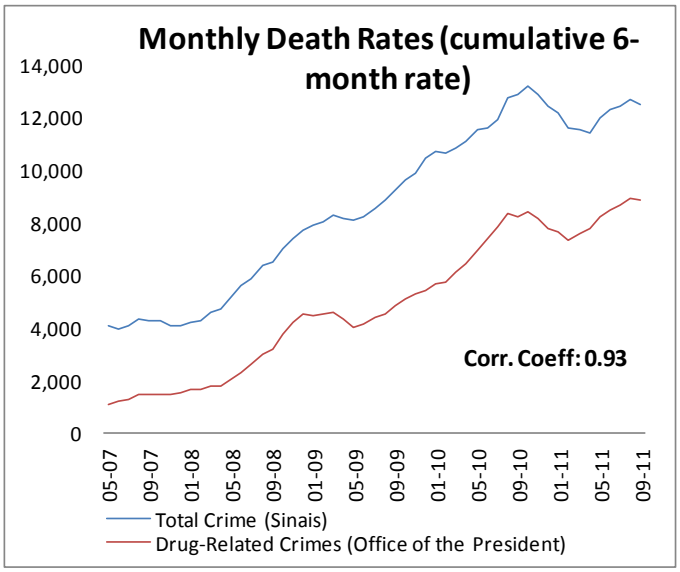

Figure 3: Monthly Drug-Related Homicide Rate and Total Crime Rate in Mexico

Source: National Health Information System (SINAIS) and the Office of the President, Mexico.

3.2 Housing Price Data

By law ("Ley de Transparencia y Fomento a la Competencia en el CréditoGarantizado", 2005), an official appraisal must be made of property put up as collateral for *all* collateral-backed mortgages that are granted by financial intermediaries, and all of those appraisals must be reported to the Federal Mortgage Society ("SociedadHipotecaria Federal" (SHF) in Spanish), which is a government development bank. The appraisal has to be performed by an authorized appraiser (designated by the SHF) on the basis of a very specific, explicit and detailed SHF procedure. According to the applicable rules, the appraisal must be based on sufficient information concerning at least six transactions involving similar houses on the local market. Violations of this rule can result in the revocation of the appraiser's license. Our data covers *all* the houses, apartments and other real estate assets that were appraised in connection with a loan application.

Our data on housing unit appraisals covers the four years between January 2008 and December 2011. In addition to the price variable - which is our main outcome - the dataset covers a number of dwelling characteristics, such as: size of the plot, built-up area, accessory areas, remaining life of the dwelling, age of the dwelling, number of bedrooms, number of bathrooms, number of parking places, whether the dwelling is an apartment or a house, its proximity to the city center and a classification of services, as well as codes for the bank, valuator and municipality. In our main analysis, we retained only those observations that provided GPS information at the locality level (that is, appraisals in localities identified

by GPS coordinates). The reason for this is that we need to control for the size of the locality, which is not possible to determine without knowing the exact location of the house. Although we losta significant number of observations as a result (about 40%), it turns out, as we show in the robustness checks section, that the results obtained using the entire database and those obtained using the trimmed database are very similar. Even with the loss of those observations, we were able to draw upon 1,370,676 observations of housing prices and 25 variables for each dwelling.

At this point, it is important to clarify the fact that the house prices in our dataset are not final price transactions but rather appraisals which are supposed to be based on going market prices in the relevant neighborhood. A skeptic reader could claim that the appraisal values might not be closely correlated with market prices. However, we have evidence that shows that appraisal prices are strongly correlated with market prices. Although we donot have data on market prices for multiple years, we do have data for the year 2006.[16] In Figure 4, we show the distribution of percentage differences between market and appraisal values (as a percentage of the market price) for the data that we have for the year 2006. The median difference is about 3.5%. We also find that, controlling for city fixed effects, the mean differenceof appraisal and market prices is close to 0 and that the variability in actual prices explain about 93% of the variability in appraisal prices. Thisshows that the appraisal valuations are indeed very close to market prices.

[16]Systematic data on appraisals is available from 2008 on. However, for 2006, we obtained a dataset with a sample of appraisals (and market prices) of one of the major mortgage lenders (Infonavit), which has a coverage of 50 municipalities (our dataset covers more than 1,100 municipalities). The dataset does not contain as many housing characteristics as our dataset does, but the valuation methods are very similar.

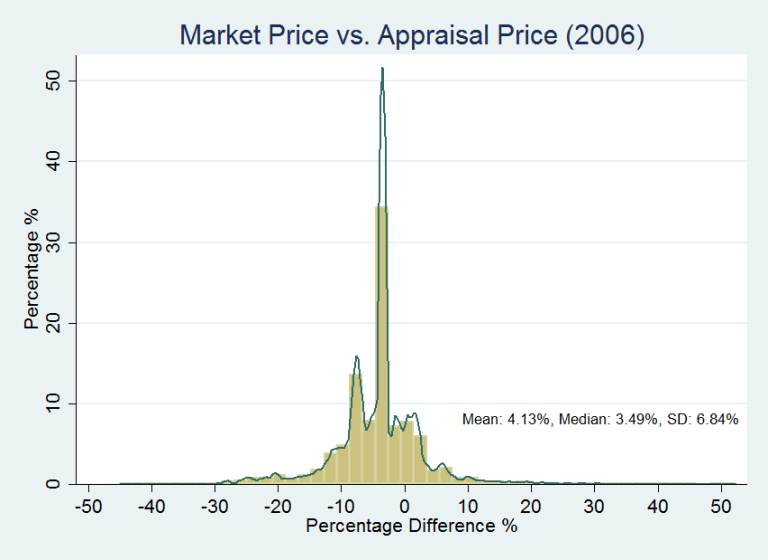

Figure 4: Difference between Market and Appraisal Prices

Source: Federal Mortgage Society (SHF), Mexico.

3.1 Final Dataset

We merged the two datasets (homicides and appraisals) using municipality and year-month as the matching variables. The merged dataset comprises 1,370,367 dwellings in 1,165 municipalities (out of a total of 2,445 in Mexico) on a monthly basis from January 2008 to December 2011.

Dwellings are the main unit of analysis, and we have 25 variables for each of them. Each house can be associated with the cumulative crime rate for the municipality in which the house is located. On average, there are 1,176 appraisals per municipality (adding up the 4 years of the sample), 28,549 appraisals for each of the 48 months included in the period of analysis, and 24.5 appraisals for each municipality-month.[17] Table 1 provides descriptive statistics.

[17]We have 48 months and 1,165 municipalities. Thus, we have 55,920 different municipality-months. Each of those municipality-months corresponds, on average, to 24.5 home appraisals (the observation unit).

Table 1: Descriptive Statistics

Variable	# Obs.	Min	Max	Mean	SD	Description
House Value	1,370,767	9.90	16.11	12.87	0.62	Official appraisal of the house or apartment, in pesos - log
Cumulative Homicides (6 m)	1,370,767	0	7.74	2.87	1.5	Homicides: 6 months (cumulative rate) -log
Cumulative Homicides (12 m)	1,370,767	0	8.23	3.45	1.53	Homicides: 12 months (cumulative rate) -log
Cumulative Homicides (24 m)	1,370,767	0	8.78	4.02	1.55	Homicides: 24 months (cumulative rate) -log
Plot Size	1,370,767	2.94	8.00	4.65	0.59	Size of the plot -log
Built-Up Area	1,370,767	3.43	7.94	4.16	0.48	Built-up area - log
Accessory Area	1,370,767	0	7.82	0.33	0.92	Accessory Area - log
Remaining Lifespan	1,370,767	0.69	7.09	6.50	0.24	Remaining months of useful life - log
Age	1,370,767	7.55	7.60	7.60	0.01	Years since construction finished - log
Number of Bedrooms	1,370,767	0.00	2.39	1.10	0.24	Number of bedrooms - log
Number of Bathrooms	1,370,767	0.00	2.39	0.78	0.20	Number of bathrooms - log
Number of Parking Lots	1,370,767	0.00	3.43	0.69	0.24	Number of parking spaces - log
Small Locality (=1)	1,370,767	0.00	1.00	0.51	0.50	Locality has a population of less than 50,000
Poor-Dwelling (=1)	1,370,767	0.00	1.00	0.11	0.30	Luxuriousness of the house/apartment: "Economical" (bottom 10% of the sample is "lower-income") - log
Has Telephone (=1)	1,370,767	0.00	1.00	0.53	0.50	House or apartment has telephone
House is in a Condo (=1)	1,370,767	0.00	1.00	0.26	0.44	House within a condo
Apartment is in a Condo (=1)	1,370,767	0.00	1.00	0.09	0.29	Apartment within a condo
Urban Proximity: central (=1)	1,370,767	0.00	1.00	0.04	0.20	House or apartment in urban area
Urban Proximity: medium (=1)	1,370,767	0.00	1.00	0.28	0.45	House or apartment near urban area
Urban Proximity: peripheral (=1)	1,370,767	0.00	1.00	0.49	0.50	House or apartment in the periphery of an urban area
Urban Proximity: outskirts (=1)	1,370,767	0.00	1.00	0.18	0.38	House or apartment near the outskirts of an urban area
House has 3 services (=1)	1,370,767	0.00	1.00	0.05	0.21	House or apartment block has access to: potable water, plumbing and street lighting
House has 5 services (=1)	1,370,767	0.00	1.00	0.78	0.41	House or apartment block has access to: potable water, plumbing, street lighting and paved roads
House has 7 services (=1)	1,370,767	0.00	1.00	0.16	0.36	House or apartment block has access to: potable water, plumbing and street lighting, paved roads, natural gas and private security
House Comfort: medium (=1)	1,370,767	0.00	1.00	0.22	0.42	Comfort of the house or apartment: classified as "intermediate"
House Comfort: semi-residential (=1)	1,370,767	0.00	1.00	0.02	0.14	Comfort of the house or apartment: classified as "semi-residential"
House Comfort: residential (=1)	1,370,767	0.00	1.00	0.01	0.09	Comfort of the house or apartment: classified as "residential" (more comfortable than semi-residential)

Having a dataset that includes a considerable number of dwelling characteristics allowed us not only to include a large number of relevant controls in our regression, but also to analyze the differential impacts on house prices for poor and non-poor segments of the population.

Figure 5 sets out the categories of dwellings (low-income, middle-income, high-income, etc.) based on the quality of their infrastructure. In our sample, 3% of the dwellings are classified as high-income, 22% as middle-income, 64% as low income and 10% as economical, or poor.[18][19]

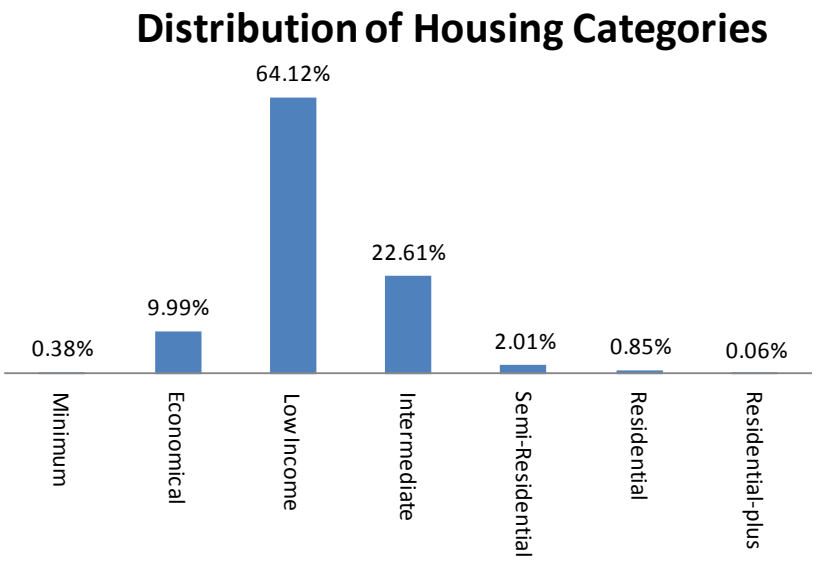

Figure 5: Housing Classification

Source: Federal Mortgage Society (SHF), Mexico.

In our estimations, we define poor dwellings as those that fall into the "minimum" or "economical"categories of the appraisal methodology. Poor dwellings, which comprises about 10% of the sample, has substandard infrastructureand was not built to conform to demanded architectural plans (these dwellings are usually "informal" constructions). As shown in Table 2, poor dwellings have fewer bedrooms and bathrooms, are older, smaller, have less useful life remaining, afford access to fewer services and have general infrastructure of a poorer quality.

[18]This classification is the one used by the Federal Mortgage Society (SociedadHipotecaria Federal) (SHF). Its Intermediate Category, for instance, corresponds to housing that has rooms that are differentiated by use, such as living rooms, bedrooms and kitchens. According to this classification, low-income housing is built in groups, with identical prototypes, but has adequate infrastructure.

[19]There is no straightforward way to compare these housing characteristics to those used in the national census because the definition of "poor or economical housing" that we use is based entirely on the SHF classification. However, it is possible to compare a few of the housing characteristics recorded in our database with the census averages. More specifically, in our data, dwellings with telephones represent 53% of the total vs. 43% in the census results. The distribution for the number of bedrooms is the following (our data, census data): 1 BR (20%, 35%), 2 BR (53%, 40%), 3 BR (23%, 20%), 4BR (2%, 4%), 5 BR (0.4%, 0.8%) and 6 or more BR (0.2%, 0.3%).

Table 2: Poor- and Non-Poor Dwellings

	Non-Poor	Poor
Number of Bedrooms	2.15	1.87
	(0.76)	(0.84)
Number of Bathrooms	1.26	1.09
	(0.6)	(0.35)
Years since Constructed	4.44	7.24
	(8.99)	(10.44)
Plot Area (Constructed)	73.82	66.01
	(53.24)	(45.62)
Months of Useful Life Remaining	688	624.88
	(117.01)	(119.7)
Has Telephone	0.54	0.44
	(0.49)	(0.50)
Infrastructure: Poor (*)	0.046	0.17
	(0.21)	(0.37)
Infrastructure: Acceptable (**)	0.95	0.82
	(0.21)	(0.37)

* Includes housing with no services and housing with access to potable water, plumbing and street lighting.

** Includes housing with access to potable water, plumbing, street lighting and paved roads and housing with access to natural gas and private security.

4. Literature Review

There is a quite extensive body of economic literature about crime and its determinants (see Becker 1968 for a seminal paper), much of which has probably been developed in response to the increase in crime in the US in the 1970s and its precipitous decrease in the 1990s (see, among others, Glaeser and Sacerdote, 1999, and Levitt, 2004). Empirically, it is fair to say that a large percentage of these studies have focused on property crime. Levitt (2004) provides a review of the *causes* of the decline in crime in the 1990s in the US and documents the fact that, as demonstrated in the literature, economic conditions --as measured by unemployment or wages-- have little impact on property crime and virtually none on violent crime. He finds that better policing and higher incarceration rates are a large part of the explanation for the 1990s crime decline. Corman and Mocan (2000) use a long time series to study the relationship between homicides and drug use and conclude that they are unrelated. None of the studies mentioned by Levitt relates to DRHs committed by DTOs.

To our knowledge, Dell (2012) is the first to look at the causal determinants of DTO killings. Her

analysis is relevant here because it shows that, in Mexico in the time period under study, government-driven policy causally explains the DRH rate without reference to economic causes. She exploits a regression discontinuity design in mayoral elections and shows that, when a mayor from the PAN party (the party of President Calderón) wins in a close election, the average probability that a drug-related homicide will occur increases by 9 percentage points in any given month during the 5 months following the time that the person takes office. Starting from a baseline rate of 5% per month, this is a huge effect.

The literature regarding the *effects* of crime on economic activity is much less ample, although growing. Abadie and Gardeazabal (2003) show that, relative to a synthetic control group in the absence of terrorism in the 1980s and 1990s, per capita GDP in the Basque country declined by about 10 percentage points. Their study is likely the first to document large macroeconomic effects of violence.

At a more micro level, we review three widely important papers that are relevant to our study, since they look at the effect of crime on house prices. The main focus of these papers is the identification of causal effects of violence, since crime may not be exogenous in an equation of the determinants of housing prices. One of the first papers to address this issue isthat of Gibbons (2004), who uses data from London and looks at "criminal damage to dwellings" and its effect on residential property values. To overcome the potential endogeneityof crime, he uses the spatial lags of crime and the number of offenses reported in respect of non-residential properties as instruments. He concludes that an increase of one standard deviation in property damage decreases property values by 10%.

Another paper related to ours is that of Linden and Rockoff (2008), who study the effect of the arrival of a sex offender in a US neighborhood. They exploit a credible identification strategy by using panel data on housing prices and comparing them before and after a registered sex offender arrives at a specific residence. By using detailed location data, they can measure how the effect varies with distance from the house and find that, although prices of adjacent houses decline by 12%, there is no change for houses located outside of a 0.1-mile radius of a sexoffender's residence.

As mentioned above, another related paper has been authored by Besley and Mueller (2012). They study the effect of peace on housing prices in Northern Ireland in the 1990s after the truce between the Irish Republican Army and the Loyalists was called. They use within-region variations over time in conflict-related homicides and a housing price index for 11 regions in Northern Ireland, with quarterly data from 1984 to 2009. Their study uses murders to estimate a latent Markov process of

peace/violence in which states are defined endogenously, which they then use to construct an estimate of the present value of deaths as a function of murders for each region. This estimate is then used in a structural model of the peace process. The structural model has the advantage of incorporating the persistence of violence into the estimation of its cost. They find that peace leads to an increase in housing prices of between 1.3% and 3.5%, on average, although the effect is many times larger in more violent regions. Using a benchmark OLS regression, with region and time fixed effects (an approach more akin to ours, since, in our case, there are not defined war and peace states), they find that a one standard deviation decrease in assassinations is associated with an increase in housing prices of from 0.8% to 1.4%.

Our paper contributes to the literature in several respects. First, to our knowledge, this is the first paper that explores the effect of DTO violence. This is surprising, given that drug policy and its costs and benefits are an issue of concern to many countries and that DTOs are leading to more killings than many recent wars have. DRHs may have a different pattern of effects from those of terrorism, since they are not committed in pursuit of the political objective of overthrowing a government. One advantage that we share with Besley and Mueller (2012) is that, in the case of homicides, measurement error is less likely to be a serious problem than it may be in the case of other types of crime. Second, our source of variation in violence is disaggregated at the municipality level (we use 1,165 municipalities), allowing us to have better controls for the determinants of crime by using municipality fixed effects, while at the same time controlling for a large set of characteristics of individual dwellings. This limits the attribution of changing prices to changes in the pool of dwellings on sale. Third, and quite importantly, there is substantial variation across time and municipalities in the timing and the intensity of violence. Spikes in violence are probably uncorrelated with trends in economic variables, which typically move more smoothly. We identify the effects of violence as municipality-specific deviations from trends. Furthermore, variation in DRHs is likely driven by government attacks on DTOs, and we believe this is unlikely to be correlated with changes in house prices that are not due to the incidence of DRHs. Finally, the data's geographical coverage gives us confidence that it has substantial external validity and that it is representative at the municipality level.

We are able to look not only at the effect of killings, but also at the effect of persistent violence on housing prices. This is in line with what Besley and Mueller (2012) have done by modeling the peace process using the history of killings in the region in a Markov switching model. We complement their findings in the sense that we can also look at the distribution of the effects according to socioeconomic status, which is a very important policy issue.

It is believed that, as people who are well-off are more mobile and have more resources at their command that they can use to protect their property, it may be expected that the impact of violence will primarily be borne by the poor. There is some evidence to support this conjecture: using survey data from Mexico to assess the level of coercion exerted by DTOs on different groups, Cayeros et al. (2011) show that the extent of extortion by DTOs is greater among recipients of the Oportunidades Program's conditional cash transfers (which are given to the poor). We also find that the impact of violence on poor people is greater (the decrease in house prices is concentrated among low-quality dwellings). This is in line with the results of Di Tella et al. (2010), who find that burglaries of poor people's dwellings increased by about 50% more than those of affluent people's dwellings during the crime wave that hit Argentina in the 1990s and early 2000s. However, the channel through which this differential effect operates appears to be different. In our case, the greater presence of violence in poor neighborhoods is what represents a dis-amenity that leads to a sharper reduction in the price of housing in those locations. In Di Tella et al. (2010), the rich are better prepared to cope with an increase in crime because they can protect themselves (by, for example, hiring private security) and, as a consequence, crime is displaced to poorer areas. This is because burglary, ceteris paribus, is directed towards the rich, while drug traffic activities are conducted by poor people and drug wars occur in poor neighborhoods. Di Tella et al. (2010) find that burglary rates are much higher among low-income families but that there is no significant difference in the number of street robberies, an offense which affects the poor and the rich more or less alike.

5. Econometric Models and Identification Strategy

Our goal is to measure the causal effect of DRHs on housing prices. Simply regressing housing prices on DRHs is likely to be problematic, since crime is likely to be endogenous. Our identification strategy exploits the panel structure of our data by conditioning on municipality fixed effects, period effects and municipality-specific linear time trends. Our basic empirical model is as follows:[20]

$$\log(P_{ijt}) = \alpha_t + \partial_j + t\gamma_j + \delta X_{ijt} + \beta \log(Cum.Hom._{jt}) + \varepsilon_{ijt} \quad (1)$$

where$\log(\mathrm{P_{ijt}})$ is the logarithm of the price of dwelling *i* in municipality *j* in month *t*. α_t, ∂_j are the

[20]If we were to use per capita homicides instead of total homicides, we would have to use a linear approximation of the population based on 2005 and 2010 census data (at the municipality level). This does not make any difference to our specification, in which we include municipality and period fixed effects, as well as municipality-specific linear trends.

fixed effects which control for time trends and those differences across municipalities that are fixed over time. We include a set of 25 dwelling and locality characteristics ($\mathrm{X_{ijt}}$) including indicator variables for the appraiser and for the banks to which the loan application was submitted. Additionally, we control for municipality-specific monthly linear time trends ($t\gamma_{\mathrm{j}}$).

The causal variable is the cumulative number of homicides in municipality *j* at time t. The cumulative number of homicides is the sum of those incidents over the previous 6, 12 and 24 months; these figures provide a more stable measurement that can then be used to characterize dangerous places and to take into account potential lags in the effect of crime on housing prices. We do not expect a short-lived jump in crime (i.e., an increase lasting for just a month or two), even if very large, to affect housing prices. Longer-lasting changes in housing amenities, on the other hand, are the kinds of factors that we would expect to be reflected in their prices. Standard errors are clustered at the level of the municipality.

Equation (1) is a partially identified hedonic price equation that conditions identification on municipality fixed effects, period effects and specific municipality trends. In light of the Rosen (1974) hedonic prices model, where the price of a differentiated good can be described by a vector of characteristics, our parameters of interest could also be interpreted as the average marginal willingness to pay for security amenities.[21]

The causal effect of homicides on housing prices is derived from within-municipality variations in cumulative homicides and housing prices after controlling for a large number of housing characteristics and other determinants of house price appraisals. In other words, to identify the effect of interest to us here, we assume that changes in cumulative homicide rates are strictly exogenous in equation (1).

Equation (1) controls for municipality characteristics fixed over time. For example, local amenities (such as good schools) may influence housing prices and are captured by the municipality fixed effects. Secular trends in housing prices associated with changes in macroeconomic or seasonal conditions are controlled for by the period fixed effects. We also include municipality linear trends in the model. This allows us to take into account the presence of differential trends in prices across municipalities due to unobserved local time-varying effects. Finally, we also control for a large set of observable housing characteristics (as well as characteristics of the bank and individual appraiser

[21]However, see Ekeland et al. (2004) for a very general examination of identification and estimation of hedonic price models.

that appraise the house).

The validity of our identification strategy could be undermined if changes in homicide rates are also driven by economic factors that influence housing prices. This does not seem to be the case, however. There is evidence that DTOs operate at a regional level (i.e., their area of operations thus encompasses many different municipalities) and that their behavior is not driven by the economic situation of the municipality (Dell, 2012[22]), which reinforces our identification strategy.

To provide further evidence that the timing and intensity of violence do not seem to be driven by the economic situation in a given municipality, we investigate the link between formal employment and crime at the municipality level. We use a dataset containing a municipality-monthly measure of *all* formal employment in Mexico prepared by the Mexican Social Security Institute ("InstitutoMexicanodelSeguro Social" (IMSS) in Spanish) and the SINAIS database on crime.[23] Table 3 reports the estimates ofthe following equation for all municipalities for which we have homicide and employment data:

$$\log(Cum.Hom._{jt}) = \alpha_t + \partial_j + \beta Formal\ employment_{tj} + \varepsilon_{tj} \quad (2)$$

The correlation between homicides and employment is not statistically different from zero, which is consistent with our identifying assumption that the type of crime being analyzed is not related to the labor market or, more broadly, to economic variables.[24]

[22]According to Dell (2012): "Over 85 percent of the drug violence consisted of people involved in the drug trade killing each other" either as a way of extracting revenge or as a way of expanding their territories. She also notes that the killings are especially frequent after one side is weakened by government intervention.

[23]We would like to thank Judith Frias for providing this data, which is even more reliable than survey data because, since it comes from a census of the formal employment sector, it is representative at the level of the municipality and has no measurement error associated with the definition of formal employment.

Table 3: Employment and Homicides

	Log Per Capita Homicides	Log Homicides	Log Cum. Homicides: 6 months	Log Cum. Homicides:12 months	Log Cum. Homicides:24 months
			2006-2008		
Log (Employment Rate)	0.0015	0.0027	0.0029	-0.002	0.007
	(0.003)	(0.005)	(0.008)	(0.010)	(0.012)
Observations	39,888	39,888	39,888	39,888	39,888
R-Squared	0.98	0.97	0.97	0.97	0.97
			2006-2011		
Log (Employment Rate)	0.0019	-0.005	0.002	0.007	0.014
	(0.002)	(0.004)	(0.006)	(0.007)	(0.009)
Observations	127,734	127,734	127,734	127,734	127,734
R-Squared	0.94	0.94	0.94	0.94	0.94

Clustered standard errors in parentheses (municipality), quarter and municipality fixed effects. Quarterly averages.

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

Another potential concern with regard to our identification strategy, which is common to all studies that use home sale prices, is that we are only considering houses that have been appraised for sale. If, for example, richer people who own better houses were to decide to sell their homes so that they could move away from a high-crime area, and the regression model does not control for that, we would underestimate the negative impact of violence on housing prices. In order to deal with this statistical nuisance, we control for an unusually large set of housing characteristics. These characteristics alone can account for up to 92% of the variation in prices (Table 4) when period effect and fixed effects by municipality, bank and appraiser are included. This considerably mitigates concerns about a selection bias being generated by the types of houses that enter the market in each municipality over time.

Table 4: Price Variance Explained by Controls

	Log (Price)		
	(1)	**(2)**	**(3)**
Municipality Fixed Effects	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	No	Yes	Yes
Appraiser Fixed Effects	No	Yes	Yes
Property Characteristics Controls	No	No	Yes
N	1,370,767	1,370,767	1,370,767
R-Squared	0.39	0.62	0.92

* Clustered standard errors in parentheses (municipality)
*** p < 0.01, ** p < 0.05, * p < 0.1

Moreover, our sample covers all the appraisals –homes belonging to low-income and high-income persons – that were done as part of the home mortgage application process. In Mexico, even the poorer segments of the population apply for and obtain mortgage loans: about 65% of our sample is made up of loans furnished by Infonavit, Fovisste or Cofinavit, which are government institutions that subsidize loans for the poorer segments of the population.[25] This unique feature of our dataset allows us to investigate the distributional effect of DRH.

Finally, since we are interested in the differential impact that crime may have on different socioeconomic groups, we also estimate an econometric specification which identifies the differential effect of crime on low-quality housing by interacting homicides with a dummy for low-quality housing. However, there may be factors other than a sudden increase in crime that affect the poor by driving down low-quality housing values. Therefore, in order not to confuse this differential effect with a differential secular trend in the price of houses by socioeconomic status, we also include a differential secular trend for low-quality houses in the model and estimate the following empirical model:

$$\log(P_{ijt}) = \alpha_t + \partial_j + t\gamma_j + \emptyset PoorDwelling_{ijt} + \alpha_t PoorDwelling_{ijt} + \delta X_{ijt} + \\ + \beta \log(Cum.Hom.s_{jt}) + \theta PoorDwelling_{ijt} \log(Cum.Hom._{jt}) + \varepsilon_{ijt} \quad (3)$$

[25] The Infonavit loan is designed for members of the population who earn less than 6,000 Mexican pesos per month (less than USD 500).

6.Main Results

In this section we present our main results, which are based on both the SINAIS data and the data from the Office of the President. Columns 1 to 3 show the estimates for equation (1) for different cumulative periods (6, 12 and 24 months), and columns 4 to 6 do the same for equation (3).

Table 5: The Effect of Homicides on Housing Prices

	(1)	(2)	(3)	(4)	(5)	(6)
	Cumulative Homicides 6 months	**Cumulative Homicides 12 months**	**Cumulative Homicides 24 months**	**Cumulative Homicides 6 months**	**Cumulative Homicides 12 months**	**Cumulative Homicides 24 months**
Cumulative Homicides (log)	-0.0008	0.0030	0.0013	0.0002	0.0042	0.0025
	(0.0019)	(0.0025)	(0.0040)	(0.0020)	(0.0026)	(0.0041)
Cumulative Homicides (log) * Poor Dwelling				-0.0123***	-0.0128***	-0.0130***
				(0.0033)	(0.0032)	(0.0030)
Total Effect: Poor-quality Dwelling				-0.0121***	-0.0086**	-0.0105**
Property and Locality Characteristics	YES	YES	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Trends	YES	YES	YES	YES	YES	YES
Interaction: Month Effect * Poor-qualityDwelling	NO	NO	NO	YES	YES	YES
Observations	1,370,767	1,370,768	1,370,769	1,370,770	1,370,771	1,370,772
R-Squared	0.93	0.93	0.93	0.93	0.93	0.93

Clustered standard errors in parentheses (municipality)

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

We find a zero average effect on housing prices (Table 5). However, we do find a negative impact on the prices of low-quality housing. A 100% increase in homicides is associated with a decrease in housing prices of between -0.9% and -1.2%, depending on the specification adopted. While Besley and Mueller (2012) find that a decrease of one standard deviation in homicides leads to an increase of between 0.8% and 1.4% in prices (when using an OLS benchmark with region and time fixed

effects), we find a price reduction of between 3% and 4% as a result of DRHs in Mexico, butthis applies onlyto poor-quality housing.

Our results indicate that violence, as reflected in homicides, has a regressivedistributive effect, since it affects poorer individuals more than richer ones. These results are consistent with a quite limited body of existing literature that contends that the effects of crime are different for the rich and poor and that wealthier people can either flee from violent places or invest in technologies that will reduce the chances that they will fall victim to crime (see Di Tella et al. (2010) and Levitt (1999)).

The size of the effect that we find is quite large, considering that some municipalities experienced sharp increases in crime. The reader will recall that the increase in crime that occurred between 2006 and 2011 amounted to a rise of more than 200% nationally. Table 6 shows that the cumulative increase in crime was above 100% for 48 municipalities and, in some, it was much higher. In Monterrey, for instance, homicides increased by more than 2,500%, and several municipalities experienced 10-fold increases. Taken at face value and extrapolating at the national level, our results would indicate that from 2006 to 2011 housing prices for the dwellings of poor people decreased by 2.5%, while municipalities such as Monterrey had a price decrease several orders of magnitude larger. Given that their houses are one of the most valuable assets that families possess, especially in the case of the poor, this decline represents a substantial loss of wealth, and it is a loss that is concentrated among the poorer segments of the population.

One important welfare calculation that needs to be performed is the computation of the relevant households' willingness to pay (WTP) to eliminate the increase in DRHs during the period studied. Under certain assumptions, the estimate gradient of the hedonic price function provides the average marginal willingness to pay (MWTP) for a change in DRHs. A standard, although ad-hoc, assumption that is widely used in the literature is to assume that the MWTP function is constant.

Table 6: Municipalities with a More than 100% Increase in Crime in 2007-2011**

Increases in Crime by Municipality*	Total Crime (2007)	Total Crime (2011)	Var. 2001-2007 (%)	Difference (2011-2007)
Valle Hermoso	1	127	12,567	126
Delicias	1	79	7,767	78
Santiago	1	60	5,900	59
Torreón	12	635	5,189	623
Tepic	5	261	5,127	256
Cárdenas	1	49	4,833	48
Colima	1	47	4,567	46
Guadalupe y Calvo	1	43	4,167	42
Yurécuaro	1	39	3,767	38
Pánuco	2	72	3,500	70
CuautitlánIzcalli	1	33	3,233	32
Saltillo	2	67	3,233	65
Montemorelos	1	31	2,967	30
Apodaca	4	119	2,867	115
Allende	1	29	2,833	28
Cadereyta Jiménez	3	85	2,744	82
Hidalgo del Parral	4	103	2,467	99
Cuautla	1	23	2,167	22
Tampico	4	84	2,000	80
Victoria	3	63	1,989	60
Durango	25	520	1,980	495
Zapopan	7	145	1,976	138
Tlaquepaque	3	61	1,944	58
Salamanca	1	20	1,900	19
Fresnillo	1	20	1,900	19
Benito Juárez	1	19	1,767	18
Temixco	2	37	1,767	35
El Fuerte	3	56	1,767	53
Villa de Álvarez	1	19	1,767	18
Acaponeta	1	19	1,767	18
Chihuahua	30	536	1,687	506
Guadalupe	10	175	1,647	165
Puente de Ixtla	1	17	1,633	16
Zamora	1	17	1,633	16
San Marcos	1	17	1,633	16
Toluca	1	17	1,633	16
Cuautla	1	21	39	18
Iztacalco	1	27	57	30
Irapuato	1	24	42	18
Tultitlán	1	36	78	42
Hermosillo	1	45	84	39
Chalco	1	51	57	6
Iztapalapa	1	168	324	156
Zamora	1	33	42	9
Centro	1	30	45	15
San Juan Bautista Tuxtepec	1	21	39	18
Tijuana	1	258	534	276
Apatzingán	1	60	105	45

* Includes only municipalities with a crime rate different from 0 in 2007. As data for the whole of 2011 is not available, the figure for that year is based on an extrapolation of the crime rates for the first 9 months.
** The terms “crime” and “homicide” are used without differentiation.

Source: Office of the President.

The effect of the DRHs on the value of low-quality houses, based on our main specification (6 months cumulative, Table 5), is -0.0121% for each 1% of increase in total crime. Considering that, according to our data, the average price of a poor-quality house in Mexico is approximately MX$ 320,000 (USD 24,000) and crime increased by about 83% between 2008 and 2011, the monetary impact of crime on an average low-quality house was MX$ 2,700 during the period under study. According to the last census (2010), Mexico has 28,607,568 houses (with 10% of them being poor-quality dwellings in our sample). This means that the total monetary effect of crime, measured as its total impact on houses prices, is MX$ 7,600,000,000(USD600,000,000) in 2008-2011. Therefore, our calculation of the WTP to revert the increase in violence associated with drug trafficking in Mexico is quite low, since the households that are most affected by this type of violence are the very poor households and represent less than 0.1% of Mexico's GDP. The fact remains that the cost to those households is relatively large.

This having been said, according to the canonical Roback (1982) model, the full implicit price of an amenity is the sum of the land or real estate price differential plus the negative of the wage differential. Appendix Table 15 reports the results of fitting the following wage equation:

$$\log(W_{ijt}) = \alpha_t + \partial_j + t\vartheta_{jz} + \delta X_{ij2000} + \emptyset X_{ij2010} + \beta \log(Cum.Hom_{j2010}) + \varepsilon_{ijt} \quad (4)$$

where W_{ijt} is the monthly wage (or hourly wage, in Table 15) of person *i* in municipality *j* during the period *t*;X_{ijt} includes controls at the individual level (years of education, age, squared age, gender and a dummy for low skill levels) and $Cum.Hom._{j2010}$ represents the accumulated crime rate in municipality *j*for 2008-2010. The latest available census data for the last two rounds (2000 and 2010) have been used.[26] The model includes year and municipality fixed effects and linear trends at the state level ($t\vartheta_z$). Tables A and B show the results of our estimations using total monthly wages (Table A) and hourly wages (Table B). Models 1 and 2 differ in terms of how "low-skilled" is defined: model 1 uses "secondary incomplete", whereas model 2 uses "high-school incomplete". None of the models show significant effects of crime for the sample as a whole or specifically for low-skilled workers.[27] Consequently, the above welfare calculations are unchanged when changes in wages are accounted for.

[26]The results of the 2005 census are available but do not include wage data.

[27]Results are similar if cumulative homicides are not expressed in per capita terms.

6.1 Ancillary Results

We will now present some ancillary evidence to support both our empirical findings and our interpretation of those results. First of all, we investigate whether the increase in DRH induces population changes at the municipality level. This is important for the interpretation of the results in the previous section, and the associated welfare analysis performed. In order to establish whether or not people move across municipalities as a response to the increase in DRH, in Table 7,we report the estimates of the following equation for all municipalities for which we have homicide data:

$$DifPob_{2010-2005j} = \beta PerCapitaCumHom_j + \varepsilon_j \quad (5)$$

where$DifPob_{2010-2005j}$ is the difference in population between 2010 and 2005 (census data) in municipality j, whereas $PerCapitaCumHom_j$ is the difference in the per capita crime rate in municipality j for the same period. We tried out different definitions for $DifPob_{2010-2005j}$:absolute difference in total population, rate of population growth, rate of growth of total population with no health-care coverage and rate of growth of total population without sanitation facilities in the house. Notice that the last twovariables are indicators of poverty. The results support the idea that crime did not prompt members of either the poor or non-poor populations to migrate from dangerous municipalities to safer ones.

Table 7: Effect of Per Capita Homicide Rates and Migration

2010-2005

	Cumulative Homicides Per Capita
Absolute Difference in Total Population	-32,205
	(118,207)
Growth Rate of Total Population	1.21
	(1.36)
Growth Rate for Population with No Health Coverage	-0.576
	(1.48)
Growth Rate for Population without Sanitation Facilities	1.20
	(1.36)
Observations	
	1,161

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

Second, we show that poor segments of the population have witnessed a stronger increase incrime in response to the municipality-level incidence of DRHs in the recent past. The evidence that we provide should, nevertheless, be considered as indicative rather than as proof of a causal relationship because it is based only on cross-section variability.

To compile evidence relating to the first hypothesis, we draw on data gathered from the 2012 National Victimization and Public Security Survey[28] and combine it with the crime data used in our main econometric analysis. We estimate the following regression model:

$$Victimization_{ij2012} = \partial + \emptyset PoorHH_{ij2012} + \beta \log(Cum.Hom_{j2008-2011}) + \theta PoorHH_{ij2012} \log(Cum.Hom_{j2008-2011}) + \varepsilon_{ij} \quad (6)$$

where $Victimization_{ij2012}$ corresponds to the reporting of victimization by household *i*in municipality *j*in the 2012 victimization survey, $PoorHH_{ij2012}$ is a dummy variable that indicates whether household *i*in municipality *j*was poor in 2012 (when the survey was conducted) and $log\left(Cum.Hom_{j2008-2011}\right)$ is the log of the homicides occurring in 2008-2011 in municipality *j*. The

[28]Encuesta Nacional de Victimización y Percepción sobre Seguridad Pública (ENVIPE), INEGI.

parameters of interest are β (association of DRHswith the incidence of victimization) and ($\beta + \theta$) (association of DRHswith the incidence of victimization in the case of poor households).

The victimization survey does not provide information about income. However, it does include a few questions regarding the employment status and education of the head of household. Using that information, we constructed the variable $PoorHH$ using the following criteria: a household is poor if the head is: (i) unemployed and has not completedhis or her high school education (i.e., 6 years of primary school plus 3 years of high school); (ii)"employed" but with no salary; or (iii) self-employed and has not completedhis or her high school education.[29]

Table 8 shows the results for 4 variables related to the level of victimization, by household. These variables are labeled“insecurity index”, “feel safe at home”,“awareness of drug-dealing”, and “worried about drug-dealing or insecurity”.[30]

[29]Although we report the use of one particular criterion to determine poverty status, we tried 5 different combinations of employment-status and maximum-education of the head of household as criteria for classifying households as poor or non-poor. The results of the analysis were almost identical, irrespective of the criteria adopted. According to our classification, about 23% of the households in the survey were categorized as poor.

[30]The "Insecurity index" (from 0 (minimum) to 1 (maximum))measures the proportion of respondents who answered "yes" to 17 questions concerning the household members’ knowledge about illegal activities in the neighborhood (e.g., "Have you heard shots near your house?"). "Feel safe at home" measures the proportion who answered “yes” to the question "Do you feel safe at home?"."Awareness of drug-dealing" measures the proportion who answered "yes" to the question "Do you know if drug-dealing is going on near your home?". "Worried about drug-dealing or insecurity"(from 0 (minimum) to 1 (maximum)) measures the proportion of respondents who listed drug-dealing or insecurity as one of their three main concerns (1 if they did so, and otherwise 0).

Table 8: Effect on Victimization[31]

	(1) Insecurity Index	(2) Feel Safe At Home	(3) Knowledge of Drug-Dealing	(4) Worried about Drug-Dealing or Insecurity
Cumulative Homicides 2008/2011 (log)	0.0059***	-0.0089***	0.0148***	0.0030
	(0.0017)	(0.0027)	(0.0043)	(0.0039)
Poor HH	-0.0192***	0.0220**	-0.0443***	0.0222
	(0.0064)	(0.0101)	(0.0133)	(0.0159)
Cumulative Homicides (log) * Poor HH	0.0048***	-0.0057***	0.0100***	0.0048
	(0.0013)	(0.0021)	(0.0027)	(0.0033)
Total Effect on Non-Poor	0.0059***	-0.0089***	0.0148***	0.0030
Total Effect on Poor	0.0107***	-0.0146***	0.0248***	0.0078**
Observations	70,937	70,828	70,937	70,937
R-squared	0.0065	0.0025	0.0065	0.0016

Clustered Standard Errors in Parentheses (municipality)

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

The results are conclusive: for all the considered variables, poor households report a considerably higher association with DRHs. The association on the insecurity index is about two times greater for the poor, while the corresponding figure is 65% greater on the "Feel safe at home" and "Awareness of drug-dealing in the neighborhood" criteria. Moreover, poorhouseholds rank insecurity and drug-dealing among their main concerns more frequently than non-poor households do; by contrast, crime does not seem to significantly alter non-poor households'rankings of their main concerns.This suggests that crime has a large differential effect on poor members of the population in terms of their perception of the security situation.

Taken all together, this empirical evidence is consistent with our interpretation of our main results, namely, that DHRshave a disproportionate impact on the amenities available to poor households in municipalities that are subject to violence-related shocks, and that this tends to depress the prices of the houses of the poor in those municipalities as a function of the intensity of the crime shock.

[31]The original victimization survey (2012) was based on 83,483 observations. About 12,600 of those observations have not been included in our analysis because we restrict the sample to the municipalities that have data on crime and on appraisals. In other words, we restrict the analysis to our main sample. Unfortunately, not all the municipalities included in our main database are included in the victimization survey. Therefore, the victimization analysis covers approximately 70% of the municipalities in our main database.

Finally, additional anecdotal evidence appears to show that the poorest localities tend to have higher crime rates. Newspaper reports are one indication that DRHs are common in relatively poor areas of the country. Cities such as Ciudad Mier in Tamaulipas,[32]Apatzingan[33] and other localities in Coahuila[34] are just a few examples. There are at least two forces that further this process. One is that, as mentioned earlier, crime gangs often recruit their members from the low-income segment of the population. A second one is that many drug-related plantations are located near poor localities.

Our data is consistent with the conclusion that, on a per-capita basis, crime rates are higher in poorer localities. To further prove this, we use data on the socioeconomic status of 4,525 localities.[35]The MexicanMarketing Association (AMAI)has constructed a socioeconomic classification for these localities, which have more than 50,000 inhabitants per locality and contain more than 80% of the population of Mexico.[36]We have calculated the share of the population in eachlocality that falls into categories AB, C+, C, C-, D+, D and E. Table 9 showsthe estimates derived from the following regression:

$$\log(Cum.Hom_{j2006-2011}) = \partial + \sum \beta_n \mathrm{Cat_j} + \varepsilon_j \quad (7)$$

where$\mathrm{Cat_j}$ represents the proportion of the population corresponding to each of the categories for locality *j*, excluding the AB category. $Cum.Hom_{j2006-2011}$are the cumulative number of homicides per 100,000 inhabitants in locality *j*in 2006-2011. We use the localities for which we have data on homicides and socioeconomic classifications and then cluster errors at the municipality level.

The results are striking: as Table 9 shows, poorer localities do have more per capita homicides than AB localities. The C- and D+ categories had 436 and 248 more homicides per 100,000 inhabitants

[32] http://mexico.cnn.com/nacional/2011/09/02/el-95-de-los-habitantes-de-un-municipio-huyeron-por-la-violencia.
[33] http://app.vlex.com/#/vid/llevan-alcaldes-aca-siguen-plomazos-77664433
[34]See,forinstance, "Jóvenes y pobres, los 26 muertos" in *El Diario de Coahuila*, Dicember 4th 2011 and "Reportan 13 muertos tras balacera en Guerrero" in *El Universal*, April 16th 2009.
[35]Localities are subdivisions of municipalities. There are almost 200,000 localities in Mexico, but most are tiny.
[36]Although we have wages data for the years 2000 and 2010 (that we use in a previous section), we cannot use it here because it is not representative at the locality level. Instead, we use the socio-economic index constructed by AMAI. The methodology uses variables from the population census to assign a score to households. The variables used are the following: the number of rooms and toilets, types of floors, if the house has a shower, if the household has a gas stove, the number of light bulbs, the number of cars, phones and computers, the presence of paid TV, and the level of schooling of the head of household. The level of crime or homicides is not used in this classification, which dates back to 2008. The score is then split into the various categories (AB, C+, C, C-, D+, D and E), and each household is assigned to one of these categories. The percentages of the Mexican population that fall into these AMAI categoriesare 6.8, 14.2, 17, 17.1, 18.5, 21.4 and 5, respectively.

than the AB localities. The relationship still holds, although less strongly, for extremely poor D and E areas.

Table 9: Crime and Socioeconomic Locality Status

	Log (Crime per Capita)
Category C+	51.89
	(50.76)
Category C	78.01
	(70.93)
Category C-	436.45***
	(147.30)
Category D+	248.2***
	(41.11)
Category D	153.61***
	(29.39)
Category E	164.11***
	(31.77)
Observations	4,259
R-Squared	0.01

Clustered Standard Errors in Parentheses (municipality)

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

In line with this evidence, Figure 6 relates cumulative homicides and the share of the population in categories C- and D+ non-parametrically. It shows that the relationship is strong and monotonous even when using the raw data.

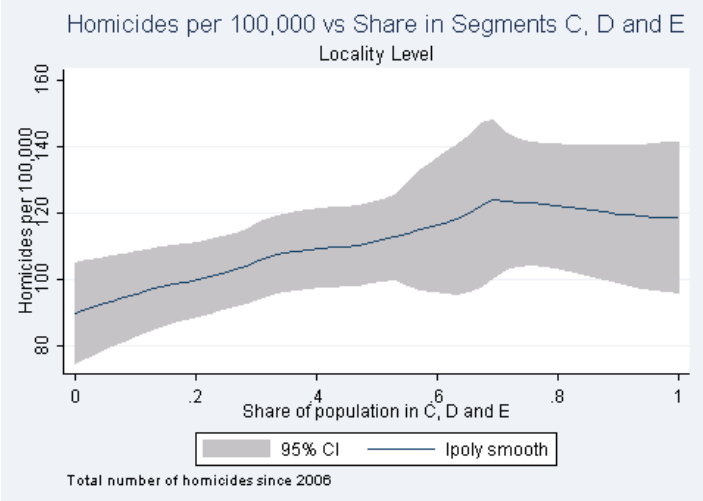

Figure 6: Homicides and Socioeconomic Status,by Locality

6.2 Robustness Checks

In the interest of robustness, we have re-done our main estimations using different data and specifications, since our main database includes only those houses that can be geo-localized. We have done this because we think it is important to control for the size of the locality, which cannot otherwise be determined. To establish that our results are notheavily dependent on the size of the locality concerned,in table 10 we display the results of our main regressions -equations (1) and (3)- using the full database (and, thus, not controlling for the size of the locality). The general results are very similar: the effect is zero for the non-poor dwellings and is negative and significant for the poordwellings in the specification for 6 and 24 months. The 12-month specification was the only one in which the total effect for the poor-housing group is not significant at conventional levels of statistical significance, with a p-value of 0.14.[37]

[37]Apart from the observations that are not based on geo-localization data, we include about 2,000 observations (0.08% of the sample)in this specification that identify a given locality but that were excluded from the main dataset because they seemed to be repeated observations.

Table 10: The Effect of Homicides on Housing Prices (Robustness)

	(1)	(2)	(3)	(4)	(5)	(6)
	Cumulative Homicides 6 months	**Cumulative Homicides 12 months**	**Cumulative Homicides 24 months**	**Cumulative Homicides 6 months**	**Cumulative Homicides 12 months**	**Cumulative Homicides 24 months**
Cumulative Homicides (log)	0.0000	0.0026	0.0020	0.0009	0.0033	0.0020
	(0.0020)	(0.0027)	(0.0039)	(0.0021)	(0.0028)	(0.0039)
Cumulative Homicides (log) * Poor Dwelling				-0.0095**	-0.0099**	-0.0102**
				(0.0045)	(0.0043)	(0.0040)
Total Effect: Poor Dwelling				-0.0086*	-0.0066	-0.0082*
Property and Locality Characteristics	YES	YES	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Trends	YES	YES	YES	YES	YES	YES
Interaction: Month Effect * Poor Dwelling	NO	NO	NO	YES	YES	YES
Observations	2,279,492	2,279,492	2,279,492	2279492	2279492	2279492
R-Squared	0.919	0.919	0.919	0.918	0.919	0.919

Clustered Standard Errors in Parentheses (municipality)

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

We have also recalculated these estimations using DRHs as the causalvariable.To this end, we have drawn on the database of the Office of the President, which as noted above, represents an independent source of information. Since DRHs have been the main driver of changes in homicide patterns during the period under study, it is to be expected that the use of this variable will yield the same correlation pattern as the one derived from the SINAIS database. Since in this case we have a shorter time series, we report results only for the cumulative 6- and 12-month DRH rates.

Table 11: The Effect of Homicides on Housing Prices (Database of the Office of the President)

	Log (Property Price)			
	(1) Cumulative Homicides 6 months	(2) Cumulative Homicides 12 months	(3) Cumulative Homicides 6 months	(4) Cumulative Homicides 12 months
Cumulative Homicide Rate (log)	-0.00073	-0.0010	0.0002	-0.0001
	(0.0015)	(0.0017)	(0.0016)	-0.0019
Cumulative Homicides (log) * Poor Dwelling			-0.0093***	-0.0096***
			(0.0034)	(0.0032)
Total Effect: Poor Dwelling			-0.0091***	-0.0098***
Property and Locality Characteristics	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES
Municipality Trends	YES	YES	YES	YES
Interaction: Month Effect * Poor Dwelling	NO	NO	YES	YES
Observations	1,320,015	1,320,015	1,320,015	1,320,015
R-Squared	0.93	0.93	0.93	0.93

Clustered standard errors in parentheses (municipality).

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

As was to be expected, the results, as shownin Table 11,are almost unchanged. The effect of DRHs is concentrated among low-income housing, and the reduction in price is about 3% for a one standard deviation increase in DRHs.

Finally, we estimate our main regression, but without controlling for linear trends at the municipality level. In our principal specification, we preferred to include those trends to take into account the presence of differential trends in prices across municipalities due to unobserved local time-varying effects. In any case, Table 12 shows that the results remain almost unchanged: excluding the linear trends does not modify the sign or significance of the effects. Therefore, the distributive effects of DRHsthat we found in our main specification are robust to the removal of the linear trends by municipality as control variables.

Table 12: The Effect of Homicides on Housing Prices WhenExcluding Municipality Linear Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	Cumulative Homicides 6 months	Cumulative Homicides 6 months	Cumulative Homicides 12 months	Cumulative Homicides 12 months	Cumulative Homicides 24 months	Cumulative Homicides 24 months
Cumulative Homicide Rates (log)	-0.0066*	-0. 0051	-0.0053	-0.0040	-0.0088	-0.0074
	(0.0032)	(0.0038)	(0.0049)	(0.0051)	(0.0075)	(0.0075)
Cumulative Homicides (log) * Poor Dwelling		-0.0131***		-0.0133***		-0.0136***
		(0.0033)		(0.0032)		(0.0031)
Total Effect: Poor Dwelling		-0.0182***		-0.0173***		-0.020***
Property and Locality Characteristics	YES	YES	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES	YES	YES
Municipality Trends	NO	NO	NO	NO	NO	NO
Interaction: Month Effect * Poor Dwelling	NO	YES	NO	YES	NO	YES
Observations	1,370,767	1,370,767	1,370,767	1,370,767	1,370,767	1,370,767
R-Squared	0.924	0. 924	0. 924	0. 924	0. 924	0. 924

Clustered standard errors in parentheses (municipality).
*** p<0.01, ** p<0.05, *p<0.1

7. The Effect of Persistent Violence

Besley and Mueller (2012) argue that violence affects housing prices and that homicides are an observable proxy for violence. The distinction turns out to be important: patterns of homicide that lead to more violence in the future affect housing prices more than short-lived increases in violence. We now test this prediction using a reduced form model, taking advantage of the fact that the duration of the violence varied widely across municipalities.

We use four different definitions of persistent violence that reflect the magnitude of the increase seen in 2008-2011, as well as the changes in the level of violence witnessed in the interim years. To be considered "persistent", the pattern of homicides must fulfill two conditions: (i) The increase in crime must have been at least 150% (or 200%) from 2008 to 2011, and (ii) each year, the crime rate must have been higher than it was the previous year *or*, at the least, there must have been more

homicides than there were during the base year (2008). Depending on the definition, there are about 270 municipalities that are classified as experiencing a "persistent" increase in violence.

We modify the specification for equation (3) to include interactions with a "persistent" increase in DRHs. Thus, we estimate the following empirical models (7) and (8):

$$\log(P_{ijt}) = \alpha_t + \partial_j + t\gamma_j + \emptyset PermanentIncrease_{ijt} + \alpha_t PermanentIncrease_{ijt} + \delta X_{ijt} + \quad (7)$$

7)

$$\begin{aligned}\log(P_{ijt}) = {} & \alpha_t + \partial_j + t\gamma_j + \emptyset LowQuality_{ijt} + \alpha_t LowQuality_{ijt} + \delta X_{ijt} \\ & + \beta \log(Cum.Hom.s_{jt}) \\ & + \theta LowQuality_{ijt} \log(Cum.Hom._{jt}) \\ & + \tau PermanentIncrease_j \log(Cum.Hom._{jt}) \\ & + \rho PermanentIncrease_j LowQuality_{ijt} \log(Cum.Hom._{jt}) + \varepsilon_{ijt}\end{aligned} \quad (8)$$

Table 13 shows the effect of persistent violence on housing prices. Columns (1) and (3) indicate the presence of persistent violence if the homicide rate rose by at least 150% (200% for the other columns) between 2008 and 2011 and if the homicide count climbed every year or, at the least, relative to its 2008 level. Our main results hold true: there is no average effect of either short-lived or persistent increases in crime, on average. These effects appear only in relation to the dwellings of the poorer segments of the population. As conjectured, the negative effects on prices for lower-income housing are about 28%-45% larger in situations where the increase in DRHs is persistent than they are in cases where the increase is short-lived.

Table 13: The Effect of Homicides on Housing Prices: Persistent vs. Short-Lived Increases in Homicides[38]

	Log (Property Price)			
	(1)	(2)	(3)	(4)
	Cumulative Homicides 6 months	Cumulative Homicides 6 months	Cumulative Homicides 6 months	Cumulative Homicides 6 months
Cumulative Homicide Rates (log)	-0.0003	-0.0013	0.0010	0.0000
	(0.0026)	(0.0026)	(0.0028)	(0.003)
Cumulative Homicides (log) x Persistent Increases	-0.0014	0.0010	-0.0019	0.0006
	(0.0037)	(0.0038)	(0.0039)	(0.0039)
Cumulative Homicides (log) x Poor Dwelling			-0.0120***	-0.0120***
			(0.0035)	(0.0034)
Cumulative Homicides (log) x Poor Dwelling x Persistent Increases			-0.0029	-0.0038
			(0.0029)	(0.0033)
Total Effect: Persistent Increases	-0.0016	-0.0003		
Total Effect: Short-Lived Increases –Poor Dwelling			-0.0110***	-0.0120***
Total Effect: Persistent Increases - Poor Dwelling			-0.0150***	-0.0150***
Total Effect: Short-Lived Increases - Non-Poor Dwelling			0.0011	0.0000
Total Effect: Persistent Increases–Non-Poor Dwelling			-0.0008	0.0006
Property and Locality Characteristics	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES
Municipality Trends	YES	YES	YES	YES
Interaction: Month Effect * Poor Dwelling	NO	NO	YES	YES
Observations	1,370,767	1,370,767	1,370,767	1,370,767
R-Squared	0.93	0.93	0.93	0.93

Clustered standard errors in parentheses (municipality).

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

[38] As in the previous section, to show that our results are not heavily dependent on the fact that we exclude the houses for which there is no geo-localization data from our original database, we ran the regression for equations (5) and (6) with the entire database (and, thus, without controlling for locality size). AppendixTable 13 shows the effect of persistent violence on housing prices. Columns (1) and (3) indicate the presence of persistent violence if the homicide rate rose by at least 150% (200% for the other columns) between 2008 and 2011 and if the homicide count climbed every year or, at the least, relative to its 2008 level. Our main results remain unchanged: there is no average effect of either short-lived or persistent increases in crime. These effects appear only in relation to the dwellings of the poorer segments of the population. When using the whole database, the effect of temporal crime has no effect on the value of either the lower-income or higher-income houses. However, the impact of a long-term increase in crime has 0 effect on the higher-income houses but a negative and highly significant effect on the lower-income ones. As conjectured, the negative effects on prices for lower-income housing are about 100%-150% larger in situations where the increase in DRHs is persistent than they are in cases where the increase is short-lived. This, again, suggests that crime significantly affects the prices of the lower-income houses when it is long-standing, whereas the higher-income houses donot seem to be affected by long- or short-lived increases in crime. Definitions of "persistent Increases": Model (1) and (3): (Increase in homicides > 150% between 2011 and 2008) AND (homicides in every year >= homicides in the previous year OR homicides in every year > homicides in 2008).

8. Conclusion

Crime is a serious social phenomenon that affects the population's welfare in many ways. Although it is much more prevalent in less developed countries than in developed ones, the literature on this phenomenon in the latter is woefully limited. In Mexico, crime has increased sharply in recent years. In fact, since 2008, more than 50,000 Mexicans have been killed, which is a shockingly high numbercompared with the deaths occurring in other recent conflicts, such as the campaigns waged by the Irish National Liberation Army (3,500) or ETA(1,000) in Spain. Although the government and the private sector are both claiming that this violence is hurting the Mexican economy badly, no rigorous study has been undertaken in order to support this claim.

We focus on the effect of crime on home prices, which reflect people's willingness to live in a certain area, by computing the (negative) value of the dis-amenities of a location. Taking advantage of the unpredictable nature of drug-related homicides in Mexico, we exploit within-municipality variation over time and an extensive database on housing prices and characteristics at the national level. We first show that crime has tended to appear as "shocks" (or deviations from trend) and, thus, have not been related to economic variables. Second, we show that crime has in fact triggered a substantial reduction in housing prices, but only in poor areas: one standard deviation in crime corresponds to a change of about 3%-4% in the price of poor people's houses, but does not lead to any change in the prices of houses owned by people who are not poor. Given that houses are one of the most valuable assets that families usually have, especially in the case of the poor, a decline of this magnitude represents a substantial loss of wealth.Crime thus has a regressive redistributive effect. In spite of the heavy burden on the poor that this represents, the willingness to pay to revertthe increase in drug-related crime is not high. We estimate it to be equivalent to approximately 0.1% of Mexico's GDP.

Finally, we also find that, where violence has been persistent (i.e., where there has been a large, sustained increase in homicides), the negative effects on housing prices in poor areas are 40% greater than they have been in areas experiencing short-lived spikes in DRHs.Our findings, as described in this paper, are in line with those of Di Tella et al. (2010), who, in studying another environment and type of conflict, also find that violence places a heavy burden on the poor and with

those of Besley and Mueller (2012), who find that the advent of peace leads to a significant increase in house prices and that this effect is stronger in the regions where the violence was greatest.

A plausible interpretation of our results is that DHRsnegatively affect the housing amenities of poor segments of the population to a disproportionate extent in municipalities that are subject to violence-related shocks. In keeping with this conclusion, poor households tend to move more often than non-poor households, and the prices of low-income houses tend to decrease in those municipalities as a function of the intensity of the crime-related shock. We present evidence that indicates that crime does in fact have a big differential effect on the poor in terms of their perception of the security situation. We also show that, although poor and non-poor households both tend to move more in the municipalities where the increase in crime is the greatest, the effect is more than 50% greater in the case of poor households. Taken together, the various pieces of empirical evidence are consistent with our interpretation.

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Appendix

Table 14: The Effect of Homicides on Housing Prices: Persistent vs. Short-Lived Increases in Homicides (Robustness)

	Log (Property Price)			
	(1) Cumulative Homicides 6 months	(2) Cumulative Homicides 6 months	(3) Cumulative Homicides 6 months	(4) Cumulative Homicides6 months
Cumulative Homicides (log)	0.0018	-0.0013	0.0028	0.0032
	(0.0026)	(0.0026)	(0.0028)	(0.0032)
Cumulative Homicides (log) x Persistent Increases	-0.0042	0.0009	-0.0047	-0.0047
	(0.0039)	(0.0038)	(0.0040)	(0.0039)
Cumulative Homicides (log) x Poor Dwelling			-0.0094*	-0.0092**
			(0.0048)	(0.0046)
Cumulative Homicides (log) x Poor Dwelling x Permanente Growth			-0.0016	-0.0037
			(0.0035)	(0.0035)
Total Effect: Persistent Increases	-0.0025	-0.0004		
Total Effect: Temporal Growth - Poor Dwelling			-0.0066	-0.0060
Total Effect: Persistent Increases - Poor Dwelling			-0.0130***	-0.0150***
Total Effect: Temporal Growth - Non-Poor Dwelling			0.0028	0.0032
Total Effect: Persistent Increases - Non-Poor Dwelling			-0.0019	-0.0015
Property and locality characteristics	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES
Appraiser Fixed Effects	YES	YES	YES	YES
Municipality Fixed Effects	YES	YES	YES	YES
Municipality Trends	YES	YES	YES	YES
Interaction: Month Effect * Lower-Quality	NO	NO	YES	YES
Observations	2,279,492	2,279,493	2,279,494	2,279,495
R-Squared	0.918	0.919	0.919	0.919

Clustered Standard Errors in Parentheses (municipality)

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

Model (1) and (3): (Increase in homicides > 150% between 2011 and 2008) AND (homicides in every year >= homicides in the previous year OR homicides in every year > homicides in 2008)

Model (2) and (4): (Increase in homicides > 200% between 2011 and 2008) AND (homicides in every year >= homicides in the previous year OR homicides in every year > homicides in 2008)

Table 15: The Effect of Homicides on Wages

(A)

	Wages			
	(1)	**(1)**	**(2)**	**(2)**
Cumulated Crime (2008-2010), log	-0.006	-0.004	-0.007	-0.006
	(0.004)	(0.004)	(0.005)	(0.005)
Cumulated crime (log) * Low Skilled		-0.00001***		-0.00001***
		(0.000)		(0.000)
Effect on low skilled		-0.004		-0.006
Observations	4,509,831	4,509,831	4,509,831	4,509,831

Includes: municipality fixed effects, age, squared age, education dummies, literate dummy and gender (for years 2000 and 2010), linear trends at the State level

Clustered Standard Errors in Parentheses (municipality)
*** p<0.01, ** p<0.05, *p<0.1

(B)

	Hourly Wages			
	(1)	**(1)**	**(2)**	**(2)**
Cumulated Crime (2008-2010), log	-0.006	-0.005	-0.005	-0.004
	(0.005)	(0.005)	(0.005)	(0.005)
Cumulated crime (log) * Low Skilled		-0.00001***		-0.00002***
		(0.000)		(0.000)
Effect on low skilled		-0.005		-0.005
Observations	4,509,831	4,509,831	4,509,831	4,509,831

Includes: municipality fixed effects, age, squared age, education dummies, literate dummy and gender (for years 2000 and 2010), linear trends at the State level

Clustered Standard Errors in Parentheses (municipality)

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