



# The effect of violent crime on the human capital accumulation of young adults<sup>☆</sup>



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## ABSTRACT

This paper estimates the effect of an unprecedented increase of drug-related violence in Mexico on the educational outcomes and employment behavior of young adults. The panel nature and the timing of the Mexican Family Life Survey allows for unique gains in this literature, as we can compare pre- and post-violence outcomes of the same individual, and control for migratory response. The results suggest that young adults exposed to increased local violence attained significantly less years of education, were less likely to complete compulsory schooling, and were more likely to be employed. This change in behavior is driven by household financial hardship rather than fear, as it is unrelated to the parents' perceptions of potential victimization and is strongest for those with parents that are self-employed, the employment group most adversely economically impacted by the Mexican War on Drugs.

## 1. Introduction

The economic, political, and social consequences of civil wars and violent conflicts have been widely studied in the social science literature. Work in this field has been especially active given both the salience of the topic, as a large number of developing countries currently deal with violent civil conflict, and the many ways in which high levels of violence can have long-term consequences on the civilian population. One group that has been found to be particularly vulnerable to conflict exposure is children and young adults. Exposure to violence during this important developmental period may lead to educational deficits that can have long-term consequences on their future well-being, and potentially on the long run growth of the economy as a whole (Akresh and de Walque, 2011; Leon, 2012; Shemyakina, 2011). Accurately measuring the adverse effects of violence on educational attainment and employment behavior of young adults is key to fully understanding the long run and persistent economic costs of violence. This paper adds to this literature by exploring the impact of the sudden, unanticipated, and geographically heterogeneous surge in drug-related crime in Mexico during the late 2000s on schooling and labor decisions of young adults (age 14–17) with the goal of assessing the extent to which a violent environment may alter these important human capital outcomes.

The recent escalation of drug related crime in Mexico provides a unique setting to investigate the effects of violence on human capital accumulation. In the mid 2000s the Mexican government changed the focus of their battle against the powerful drug cartels, from crop eradication to actively seeking to capture cartel leadership. The new strategy bore some early success, but also resulted in an unfortunate and unanticipated consequence. As high-ranking cartel members were captured or killed, the organized crime groups fragmented, multiplied, and began fighting each other for territorial control. Thus, after almost a decade of stable rates of violent crime, homicides per capita nearly tripled within just three years (2007–2010). Moreover, this intensification of violence was not limited to a few regions or only to places that had previously been insecure, but rather spread over large portions of the country including areas that had little to no prior exposure to drug cartel related violence (Guerrero-Gutiérrez, 2011; Guerrero-Gutiérrez, 2012a; Molzahn, et al., 2012).

A novel feature of the outbreak of violence in Mexico, in the context of the economics literature on violence and educational outcomes, is that it represents a setting that is neither a civil war nor an internal armed conflict. In the Mexican case, the violent actor is not striving for territorial independence or confronting the government for political reasons. Moreover, while this is not a case of an internal armed conflict, the violence in Mexico has been so intense in the last few years that it

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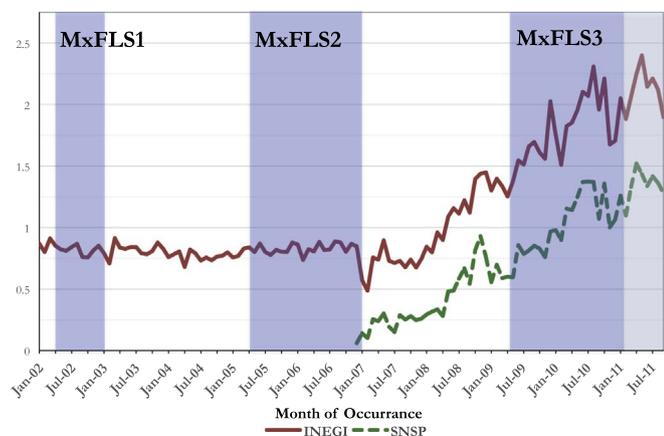


Fig. 1. INEGI and National Public Security System -Monthly Homicide Rate (per 100,000 Inhabitants).

has surpassed the levels found in war torn countries such as Afghanistan and Iraq.<sup>1,2</sup>

Developing analyses that can quantify the impact of violence and conflict on the educational attainment and labor market behaviors of exposed youths, though, imposes some major identification challenges including the typically non-random nature of the location of the violence and systematic behavior responses to crime. Most of the current literature that specifically examines the impact of violence on educational outcomes has relied on cross-sectional data. This type of analysis, though, is quite limited in that it has to rely on variation between localities in rates of violence, which may in fact be correlated with other unobserved or omitted factors that differ between the regions and directly affect the outcomes of interest.

By using a fortuitously timed and rich data source to examine a plausibly unanticipated and large change in a country's violence environment, this study is able to make a contribution both to the literature on the educational consequences of violence, in general, as well as, on the effects of the Mexican drug war, specifically. First, unlike any other analysis of this topic, by using longitudinal data that has information on the same individuals before and during the surge in crime we can estimate individual fixed effects models that account for unobserved time-invariant heterogeneity. Second, using panel data designed to follow migrants, we are uniquely able to directly analyze migration as a behavioral response to violence and, given the presence of selective migration, we are able to shield our estimates from its bias in our identification strategy. Third, by looking not only at schooling, but also labor market outcomes and home production of young adults we can provide a more comprehensive analysis of the potential long-term consequences of violence. Fourth, due to the rich individual and family information in our dataset, we can explore if certain sectors of the population have been more severely impacted by the recent events in Mexico, providing information on the likely channels through which the high levels of violent crime are affecting the human capital

<sup>1</sup> An armed conflict is a contested incompatibility which concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths (Wallenstein and Sollenberg, 2001).

<sup>2</sup> Newspapers reports state that according to the most updated dataset of the National Public Security System (SNSP), between January and November of 2013 there were 31,532 homicides in the country including 16,736 labeled as "intentional" murder. In the same period there were approximately 8000 homicides in Iraq. Taking into account their different population sizes, a comparable rate of murders in Mexico would account for a total of 27,000 homicides (Mora, 2013). The levels of violence in Ciudad Juarez have been particularly high. In 2010, Ciudad Juarez was the city with the highest murder rate in the world (3622 homicides in 2010, with a homicide rate of 272 per 100,000 residents.) That accounts for a higher number of the total number of civilians' deaths in Afghanistan during the same period and more than double the number of U.S. troops killed in the entire Iraq war (Rosenberg and Cardona, 2011).

accumulation of the exposed young adults. Lastly, as mentioned previously, the Mexican setting we are examining is unique to this literature as it is not a civil war or an internal armed conflict and there is little to no infrastructure damage, rather this is an environment of violence, victimization, and fear perpetrated by local criminal actors.

The next section describes the violent crime context in Mexico in general, and its potential relationship to the educational attainment of young adults, specifically. Section 3 provides an overview of the homicide and individual data used in our analysis. Section 4 details the empirical strategy and in Section 5 we discuss its results. Finally, Section 6 addresses the remaining threats to identification and Section 7 concludes.

## 2. Background

The violent crime and conflict environment in Mexico has radically changed over the last few years. According to official data on homicides reported by the National Institute of Statistics and Geography (INEGI), the homicide rate in Mexico had been stable and declining from the mid 1990s until 2007, but between 2007 and 2010 the homicide rate per 100,000 people rapidly increased by almost 200%, from an annual average of 8.5 in 2007 to 24.4 in 2011 (Fig. 1 provides monthly homicide rates in Mexico from 2000 to 2011 with a solid red). Moreover, when specifically examining drug related violent crime, it becomes evident that most of the increase in the homicide rate found in the INEGI data is a consequence of a recent surge in drug-related violence in Mexico (the monthly drug-related homicide rate is shown in Fig. 1 with a green dashed line).<sup>3</sup>

While the magnitude of the violence has risen significantly in the last few years across Mexico, the level of the change across municipalities varies a great deal. For example, between 2005 and 2009 the range of growth rates in homicides between municipalities was as much as a 30-fold increase in one area to an 80% decrease in another (Fig. 2 displays maps of municipality homicide rates in Mexico in 2002, 2005, 2007, and 2009). Thus, along with the temporal variation in violence, this analysis will also be able to exploit the large degree of heterogeneity in the geographic distribution of violent crime exposure across municipalities.

Many academics and journalists have been drawn to studying this interesting case of a rapid and unexpected increase in violent crime in order to determine its impetus (Castillo et al., 2014; Dell, 2015; Guerrero-Gutiérrez, 2011; Guerrero-Gutiérrez, 2012b; Molzahn et al, 2012; Rios and Shirk, 2011; and Rios, 2013). The most widely accepted hypothesis maintains that the violence is a byproduct of the military strategy of direct confrontation against leaders of the Organized Crime Groups (OCGs) in Mexico implemented by Felipe Calderón days after his Presidential election. By focusing directly on the killing or capture of cartel leaders, Calderón's strategy led to a fragmentation of the existing OCGs, increasing their number from 6 in 2007 to 16 in 2010 (Guerrero-Gutiérrez, 2012a). With the removal of cartel leadership, violence between factions within OCGs to gain control of the cartel escalated. As the number of OCGs grew, the territory used for drug trafficking activities, and thus exposed to drug-related violence, grew substantially. Thus, many municipalities within Mexico that previously had very low levels of violent crime and no cartel presence had now become important drug trade route battlegrounds. The confrontations within cartels and with new emerging split-off OCGs not only amplified the number of homicides but also changed the nature of these crimes, as conspicuous displays of violence, such as narco-messages attached to dead corpses, began to be widely used to establish territorial control. Moreover, as the level of violence escalated and the need for additional

<sup>3</sup> Drug-related homicide data was compiled and made publicly available by the National Public Security System (SNSP) starting in 2007. However, during the administration of President Peña Nieto online access to this information was discontinued.

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