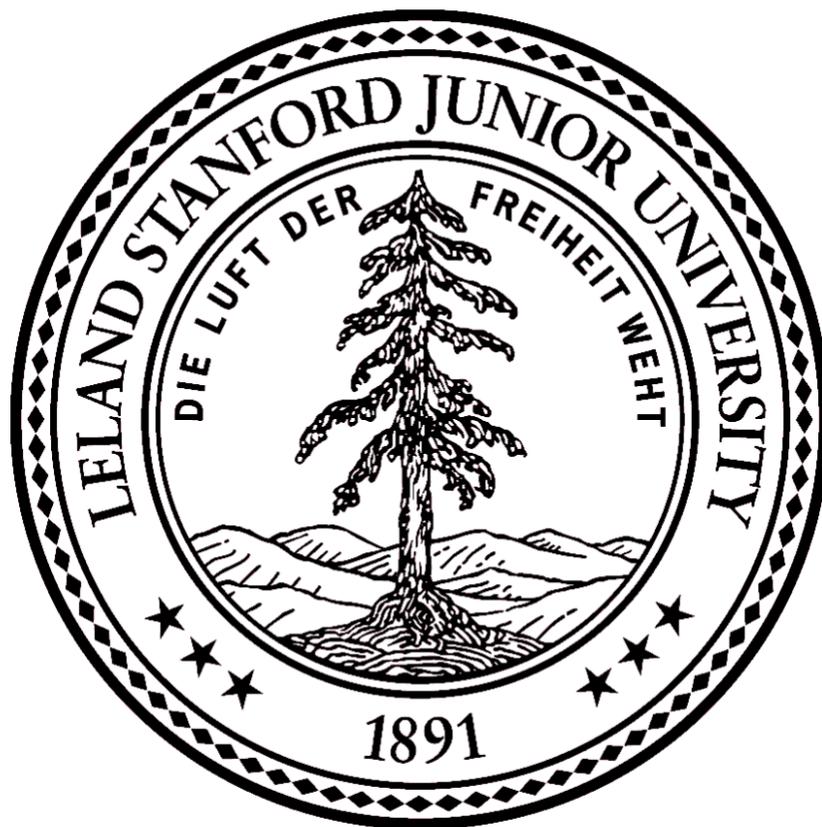


LIMITING STUDENTS' CAPABILITIES: DRUG
TRAFFICKING ORGANIZATION VIOLENCE AND SCHOOL
LEAVING IN MEXICO, 2000-2017



Greta Olivares
Master of Arts Paper
International Education Policy Analysis
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INTERNATIONAL EDUCATION POLICY ANALYSIS

**Limiting Students' Capabilities: Drug Trafficking Organization
Violence and School Leaving in Mexico, 2000-2017**

Greta Olivares

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ABSTRACT

I investigate the relationship between drug-trafficking organization (DTO) presence and violence and school leaving in upper-secondary education in Mexico at the municipality level from 2000-2017. I rely on a fixed-effects model and find that both homicides and DTO presence increase school leaving rates among upper-secondary school students in Mexico by 0.1 and 1.2 percentage points, respectively. These results are understood through the capabilities approach framework to argue that violent crime and the presence of DTOs are influential factors in the level of educational attainment in a municipality because they limit the freedom of students to continue their education.

Keywords: Mexican drug war, School leaving rates, Capabilities approach, Upper-secondary education, Violence

1. Introduction

Latin America is consistently rated as one of the most dangerous regions in the world with only 13% of the world population but 37% of global homicides; of which almost a third can be attributed to organized crime and drug trafficking organizations (DTOs) (Beittel, 2019; Muggah and Aguirre Tobón, 2018). In the last decade, Mexico has seen an 85% increase in homicides with 30-50% of total homicides associated with DTOs (Beittel, 2019). This level of community violence can seep its way into every part of daily life, including schooling, by inducing psychological stress, promoting teacher and student absenteeism, and acting as an obstacle to economic development (Dryden-Peterson, 2016).

The effects of violence linked to DTOs and their presence on educational achievement is well-documented and has been shown to have a negative correlation at national levels in countries with DTO presence such as Colombia, Mexico, and Brazil (Barrera and Ibañez, 2004; Brown and Velásquez, 2017; Monteiro and Rocha, 2017; Orraca Romano, 2018; Rodriguez and Sanchez, 2009). In Mexico it has presented with lower student achievement, employment rates, and a rise in youth that is out of work and out of school (Brown and Velásquez, 2017; Coronado and Saucedo, 2019; De Hoyos et al., 2016a; Jarillo et al., 2016; Robles et al., 2013). The current literature has established a relationship between DTO violence and a decrease in human capital through the analysis of student outcomes, such as test scores and grades, but it ignores a portion of the population, those who leave school. Mexico has a large number of dropouts; only 27% of students that start primary school obtain a college degree with the majority leaving school at the upper-secondary level (Bentaouet Kattan and Székely, 2014). By only researching the influence of DTO violence on student achievement, the current literature limits the study to the low portion of the population who is still in school and ignores those who are most marginalized.

The present study aims to investigate the relationship between living in an area with DTO violence and school leaving rates in Mexico at the upper-secondary level. This study uses the term “school leaving” throughout because the data used does not differentiate dropping out from student migration patterns and therefore include both. This study evaluates the association between DTO violence and school leaving from the human capabilities approach (CA). The capabilities approach is a normative framework that states “the freedom to achieve wellbeing is of primary moral importance” and “freedom is to be understood in terms of people’s capabilities”¹ (Stanford Encyclopedia of Philosophy, 2011). I argue that in contrast to the current literature that focuses on academic achievement and human capital loss, school leaving should be understood as a loss of freedom.

This study contributes to the literature in several ways. By focusing on school leaving rates rather than student achievement this study analyzes a sector of the population that is often overlooked and whose actions pose more severe societal risks than lowered academic achievement. Additionally, the period of analysis is extended by using data from 2000-2017, which is important considering the resurgence in violence in Mexico after the 2016 extradition of Joaquín Guzmán “El Chapo” to the US, which created a power vacuum that has brought forth the deadliest years in recent Mexican history (Beittel, 2019). Moreover, by using the CA to guide the evaluation of the ramifications of DTO presence on educational attainment, this study’s analysis goes beyond thinking about education’s role in productivity and instead pivots towards education’s purpose in human development and DTOs’ part in limiting it. Finally, the use of the CA with quantitative methods allows for the interpretation of findings in terms of students’

¹ Capabilities are what people are able to do and be, opportunities, and real freedoms (Stanford Encyclopedia of Philosophy, 2011).

freedom to pursue further years of schooling. I investigate this at the municipality level, the level of government at which local education and security policies are realized in Mexico. In other words, by studying municipalities, I can conceptualize the conditions of freedom and therefore human development at the level at which they can be effectually actualized.

Based on a municipality-fixed effects model, I find that homicide rates have a small but significant association with school leaving rates such that an additional ten homicides per 10,000 inhabitants are associated with a one percentage point increase in school leaving. Similarly, municipalities with DTO presence show a 1.2 percentage point increase in school leaving rates at the upper-secondary level compared to municipalities without DTO presence. These results suggest that violent crime and the presence of DTOs are influential factors in the level of educational attainment in a municipality.

This paper is structured as follows. Section 2 provides a background on DTOs in Mexico and the country's educational attainment landscape. Section 3 describes the contribution of the capabilities approach as the theoretical framework of this study. Section 4 discusses the data followed by the empirical strategy in section 5. Section 6 presents the results. Section 7 discusses the findings' implications and finally, section 8 concludes with areas for future research.

2. Background

2.1. Drug-trafficking organizations and education

In December 2006, Felipe Calderón was sworn in as president of Mexico and ten days later he launched a war against the country's drug cartels by sending thousands of military troops to combat DTOs in key cities around the country (Beittel, 2019). Since 2007, roughly 40% of all homicides in Mexico can be attributed to DTOs, about 120,000 murders (Instituto Nacional de Estadística y Geografía- INEGI, 2018; Salas Oroño et al., 2019). Fig. 1 shows total homicides

since 2000 and uses data collected on DTO-related homicides by the Mexico-city based newspaper, *Milenio*, to demonstrate the surge in homicides after the launch of President Calderón's war on DTOs.

[Figure 1 about here]

As violence in Mexico increased during the Calderón administration, researchers started analyzing the relationship between DTO violence and educational attainment in the country. Many focused on the impact of this surge in community violence on school violence and students' psychological wellbeing, while others explored its repercussions on student achievement and employment levels. Overall the current literature agrees on the channels leading to lower levels of education in areas affected by DTO violence: financial hardship, psychological stress, and fewer contact hours in school (Barrera and Ibañez, 2004; Brown and Velásquez, 2017; Coronado and Saucedo, 2019).

The first channel explores how DTO violence decreases the affected area's economy through widespread violence, threats, and extortions (Internal Displacement Monitoring Center, 2011). Coronado and Saucedo (2019) analyzed the effect of drug-related crimes on high-skilled and low-skilled employment and found that a 10% increase in drug-related violence reduces total employment up to 0.9%, affecting high-skilled employment (1.5%) much more than the low-skilled work (0.3%). Many business owners have had to close down their businesses due to DTO threats and violence and leave the areas, decreasing job opportunities for those that do not have the means to leave (IDMC, 2011). Calderón, Magaloni, and Robles (2013) find that an increase of 10 homicides per 100,000 inhabitants increases unemployment rates in a municipality by 1.5 percentage points. When using the Mexican Family Life Survey to estimate the effect of drug-related violence in Mexico on the educational outcomes and employment behavior in young

adults, Brown and Velázquez (2017) found that youth were less likely to complete compulsory schooling and instead were more likely to be employed since financial hardship was found to be the strongest driver for leaving school. Similar findings have resulted from studies done in Colombia, where drug-violence activity has been correlated with lower enrollment and early entrance into the labor market due to the negative effect DTOs have on the affected area's economy, life expectancy, and education quality (Barrera and Ibañez, 2004; Rodriguez and Sanchez, 2009). Overall, the presence of DTOs can have negative economic impacts on local communities, which in turn pushes school-aged teens to an early exit of school and entry into the labor market to compensate for their parent's low wages and unstable employment opportunities.

Psychological stress is another channel through which DTO violence affects educational attainment. The National Survey on Victimization and Perception of Public Security (ENVIPE for its acronym in Spanish) is conducted annually to obtain information on the perception of public security and the performance of institutions in charge of public security and justice (Instituto Nacional de Estadística y Geografía, 2019). The 2019 ENVIPE survey concluded that 70% of adults in Mexico (18 years and older) perceive their municipality as insecure (INEGI, 2019). People live in a constant state of fear which can have detrimental effects on their psychological wellbeing and students' academic achievements. Michaelsen and Salardi (2020) demonstrate that the largest impacts of violence on educational performance result from homicides committed within the vicinity of schools during the week immediately prior to national standardized tests and increase with geographic proximity and levels of violence. They are able to implement an identification strategy to rule out competing explanations and highlight the importance of acute psychological stress as a critical factor in the relationship between violence and education. Similarly, Caudillo and Torche (2014) find that homicide rates at the

municipal level have a significant effect on the probability of failing a grade in elementary school, and their study suggests that children's stress and anxiety over community violence is the most likely mechanism.

The third and final channel, reduced contact hours in school, also explains how DTO violence relates to decreased educational attainment. Media coverage on incidents of violence or turf wars continuously mentions students missing class as a result of the violence. Low or inconsistent attendance is highly correlated with dropping out among secondary school students in Mexico (Josephson et al., 2018). Orrarca Romano (2018) examines the effect of student's exposure to crime on their educational outcomes and finds a significant relationship ($p < 0.01$) between homicide rates and a reduction in school-level test scores. He determines that this is partly due to a reduction of contact hours in schools and a lack of studying in the household (Orraca Romano, 2018). At other times, it is the teachers who are not able to attend school. Jarillo and co-authors (2016) found that exposure to violence reduced math test scores and was associated with less teacher and student contact hours. Their findings suggest that one month of turf war is associated with an annual decrease of 7.5% of the teaching staff, a 1.23% increase in teacher absenteeism, and a 1.24% increase in the probability of students leaving early from school. Similar findings occur in the *favelas* in Brazil where teacher absences increase by 5.8 percentage points in years with conflicts, while schools are 12 percentage points more likely to experience principal turnover and are twice as likely to close temporarily in years with conflicts of longer duration (Monteiro and Rocha, 2017).

Overall, DTO presence has been shown to affect students' education, whether it may be by pushing them out of school to enter the labor market or creating situations that prevent them from performing to the best of their academic abilities. These criminal organizations limit

students' ability to actualize what they might be able to accomplish if they did not live in a municipality with DTO presence.

2.2. Upper-secondary education and school leaving

The current Mexican administration has pledged to address the socioeconomic roots of criminal violence by channeling more public funds to education and job creation. It is focused on providing opportunities through government-funded scholarships and public-private partnerships with employers, especially to the young men who make up a disproportionate share of the perpetrators and victims of homicides in Mexico (Calderón et al., 2019).

Among OECD countries, Mexico has the largest share of 25-34 year-olds whose highest educational attainment is below secondary education (OECD, 2019a). Up until 2013, about half of 15-19-year-olds were not enrolled in school; however, with the implementation of the 2013 education reform, upper-secondary school became compulsory, and enrollment has since increased to 77% by 2017 (OECD, 2019b). Nonetheless, enrollment does not signify completion; graduation rates have remained low (56%) compared to the OECD average of 86% (OECD, 2019b).

High school leaving rates present a substantial challenge for the country since a premature departure from school correlates with more unemployment, a less skilled labor market, increased criminal activity, and a significant portion of youth who are out of work and out of school (known as *ninis*)² (Josephson et al., 2018). *Ninis* correspond to more than 4 million people aged 15-24 in Mexico and make up a fifth of all Latin American dropouts (De Hoyos et al., 2016a; Josephson et al., 2018). The government has tried to intervene with new initiatives

² *Ninis* comes from “*ni estudian ni trabajan*”, the Spanish phrase for those who "neither study nor work" (De Hoyos et al., 2016b).

such as The Movement Against School Dropout (*Yo no abandono*)³ and Build Yourself (*Construye T*)⁴ to discourage dropping out and address the root causes (Josephson et al., 2018). These initiatives along with the 2013 education reform have increased completion rates of upper-secondary students in the last decade, but not at the aspired rate signaling other factors at play.

Several elements have been shown to influence a youth's decision to leave school, such as financial hardship, school-institutional factors, and personal-family matters (Abril Valdez et al., 2008; De Hoyos et al., 2016b; Instituto Nacional para la Evaluación de la Educación, 2018; Josephson et al., 2018).

The first element details how financial constraints can influence a student's decision to leave school due to the high cost of schooling and the need to contribute to the household. During the 2011 National Survey of Dropout in Upper-Secondary Education (ENDEMS for its acronym in Spanish), more than a third of respondents said they had dropped out due to the lack of financial resources for school expenses (Bentaouet Kattan and Székely, 2014). Similarly, other reports on dropout rates in Latin America state that about a third of students consider a need to contribute to the household as the main reason for their school departure (Josephson et al., 2018). The long-term consequences of dropping out far surpass the short-term economic

³ The Movement Against School Dropout (*Yo no abandono*) is a broad national strategy encouraging and supporting schools, to prevent and respond to dropouts. Schools receive a set of manuals that provide guidance on 12 suggested actions for reducing dropouts, and flexible activities to fit the contexts of different states and school systems. The strategy is overseen by the Undersecretary of Upper Secondary Education (SEMS for its acronym in Spanish) and reaches all public upper-secondary schools. (Josephson et al., 2018)

⁴ *Construye T*, overseen by SEMS and the United Nations Development Program (UNDP), began as a risk prevention program in 2007. It has evolved significantly and is now a national curricular program, implemented through the New Education Model (2017), that trains school staff to develop students' socioemotional skills so that they can successfully overcome academic and personal challenges. By 2018 *Construye T* had reached more than 4,000 schools and aims to cover all public upper-secondary schools (Josephson et al., 2018).

relief of prematurely joining the labor force. Leaving school early has been known to affect individuals' ability to access better economic opportunities given their lack of skills. Only 37% of those who did not complete upper-secondary education (USE) in Mexico are employed in the formal sector, with most working in the informal sector, which conduces to lower wages, short-term employment, and a lack of access to social safety nets (Bentaouet Kattan and Székely, 2014; Josephson et al., 2018). Additionally, those who complete their upper-secondary degree can expect to earn 61% more than those who leave school beforehand (Bentaouet Kattan and Székely, 2014). Premature departure from school catalyzes a vicious cycle of poverty and inequality: those in disadvantaged communities are more likely to drop out and thus have fewer prospects to access better opportunities.

Low-quality, undervalued, and scarce schools are the second set of factors that deters students from completing their education. Campos-Vasquez and Santillan (2018) follow the schooling trajectory of a cohort of students under the *Prosperas* conditional-cash transfer program and find that the absence of a high school in their locality increases the probability of dropping out of school before entering USE by 12.2 percentage points. They also find that the quality of school plays a role in students' decision to drop out. Those who attended a low-quality middle school were 13 percentage points more likely to drop out before beginning USE (Campos-Vazquez and Santillan, 2018). Similarly, using data from the 2010 National Youth Survey, Vargas Valle and Valdez García (2016) find an indirect and statistically significant relationship between the perceived quality of students' schools and dropping out.

⁵ *Prospera*, previously known as *Progresá* (1997-2002) and *Oportunidades* (2002-2014) is Mexico's main anti-poverty social assistance program. At its launch in August 1997, it was aimed to cover 300,700 households in 6,344 rural municipalities. By the end of 2015, the program had supported 6.1 million households living in poverty, one-fourth of Mexico's population (Masino and Niño-Zarazúa, 2020).

Finally, personal and family matters have also been distinguished as an element contributing to school leaving. About 20% of students differentiate personal causes such as gender, race, personal motivation, or household demographics as their reason for leaving school (Bentaouet Kattan and Székely, 2014). Women no longer account for the largest share of school dropouts due to the successful implementation of government social programs, yet they do pay a higher penalty than men for leaving school early because of the lower-skilled and lower-paid jobs they tend to obtain once they drop out (Bentaouet Kattan and Székely, 2014; World Bank Group, 2001). On the other hand, Mexico has the highest rate of adolescent fertility⁶ (2.1) among OECD countries (1.6) thus lowering school attendance, which is highly correlated with dropping out (Josephson et al., 2018; OECD, 2017).

The possibility of remaining in school is conditioned by an individual's socioeconomic situation. Factors at different levels play unique yet connected roles in influencing a youth's decision to leave school. Students who are already at a disadvantage by being from a low-income background have fewer possibilities of remaining in school than those who have a higher socioeconomic status. Moreover, these disadvantages are interrelated, thus compounding their effects; those in rural areas, from indigenous backgrounds, or living in violent localities are more likely to come from low-income backgrounds. They are all also more likely to depart early from school and engage in criminal activities, low-paying jobs, or substance abuse (De Hoyos et al., 2016a; World Bank Group, 2011).

Considering the aforementioned relationship between DTO presence and a community's financial hardship and psychological stress, the literature on school leaving leads me to question whether students living in an area with DTO violence are more prone to leaving before

⁶ Measured as the number of births per 1000 women (OECD, 2017).

completing compulsory schooling. More specifically, how strong are DTO presence and violence as conditions associated with a municipality's school leaving rates?

3. Theoretical Framework

Leaving school is not exclusively an individual decision, but rather conditioned by contextual factors in students' immediate and societal environments. With this in mind, this study determines the relationship between leaving school and living in an area with DTO violence through the lens of the capabilities approach (CA).

The CA is a better alternative to conceptualize international educational development as it goes beyond public policy and standardized measures of aggregate economic growth to assert that development's true purpose is to enable people to live full and creative lives (Nussbaum, 2011; Sen, 1999). The CA aims to answer a fundamental question: "What is each person able to do and be?" and is based on two ideas: "the freedom to achieve wellbeing is of primary moral importance" and "freedom is to be understood in terms of people's capabilities, their potential functionings" (Nussbaum, 2011; Stanford Encyclopedia of Philosophy, 2011). To fully evaluate CA, I define the three key terms from these basic assumptions: "functionings", "capabilities", and "freedom"(Nussbaum, 2011).

"Functionings" are what a person actually manages to do and be; they are their achievements (Robeyns, 2017, 2006; Sen, 1989). Functionings are only a narrow set of what people *might* be able to accomplish and achieve, a subset of their capabilities. Specifically, "capabilities" are the combination of functionings a person can achieve, what people are able to do and be: their opportunities and real freedoms (Robeyns, 2017; Sen, 1989). "Freedom" lies in an individual human's ability to choose which of their capabilities to pursue based on their own choice and values. The capabilities approach posits that the purpose of human development is to

create the very conditions that enable individual humans to realize their capabilities.

A person's capabilities correspond to their overall freedom to lead the life they have reason to value (Robeyns, 2003). Education is an invaluable capability as it has intrinsic and extrinsic instrumentality. By studying and going to school, people can also expand their capabilities; each additional skill that schooling provides to people opens the opportunity for further capabilities in their life. For example, a person who learns to read and write now has the capability to participate in civil society or a student who achieves a college education has the capability to pursue a graduate education whilst someone who did not finish college does not have that capability. However, these capabilities are not just realized through an individual's agency but are also structured by their environment. Finishing school and achieving an education is not a functioning everyone manages to obtain due to the political, economic, or social environment in which they live (Robeyns, 2006).

Obstacles in the environment have critically important consequences for the ultimate freedoms human individuals might actualize. The central conceptual and normative value placed on these freedoms and on the responsibility of the state and civil society to remove obstacles preventing their actualization is what differentiates CA as both a philosophical and theoretical framework for human development from more economic and instrumental approaches, like human capital theory. Someone living in an area with DTO activity has different capabilities than someone who does not such that DTO activity limits students' capability to attend school if there are shootings in the vicinity or the teachers are absent. In this way, students' functionings start to reduce; they are not able to consistently attend school or perform academically to the best of their abilities. In an environment where DTOs have significant power, students see their freedom to choose school limited to the point where the capability to complete compulsory

schooling is not viable and they are forced to act upon what is: leaving school. Leaving school therefore becomes their functioning, what they manage to do. The presence of DTOs and their violent activities are obstacles to students' ability to finish schooling and thus limit access to the universe of capabilities education unlocks for those who have unimpeded access.

Previous studies have explored the relationship of violence on educational attainment through a human capital framework, explaining the effect DTO violence has on the human capital accumulation of the country as measured through economic growth and productivity (Barrera and Ibañez, 2004; Brown and Velásquez, 2017; Caudillo and Torche, 2014; Jarillo et al., 2016). However, by focusing only on the economic instrumentality of education, these studies fail to account for education's intrinsic importance and the personal and social roles that education plays in development. In contrast, this study focuses on what Mexican citizens are actually free to choose to do and be when surrounded by DTO violence. I argue that living in an area affected by DTO presence and violence reduces their freedom by restricting the students' capabilities both in the present (in terms of going to school) and in the future (in terms of those capabilities schooling affords). Students' social, economic, and political opportunities are therefore stunted and constrained when their freedom to choose school is obstructed by DTO-related violence. Most studies that have used the capabilities approach do so by looking at the individual through qualitative methods. I contribute to the literature by conceptualizing CA through quantitative methods by which I can interpret my findings with freedom of opportunity as the ultimate goal of a developed society.

4. Data

I use annual data at the municipality level from 2000-2017 on the 2,220 municipalities that have an upper-secondary school in Mexico. I focus on upper-secondary schools for three

reasons. First, Mexico's largest school leaving rates are at the upper-secondary level. Second, students above the age of 12 are more likely to be recruited into DTOs (Michaelsen and Salardi, 2020). Finally, the age bracket for attending upper-secondary schooling (15-18 years old) is a critical time in the life cycle of an individual's development (Bentaouet Kattan and Székely, 2014). There are 237 municipalities not covered in this study because they do not have an upper-secondary school, thus limiting my understanding of those students' educational attainment.

The number of students leaving school each year is measured using the Estadística 911 dataset from the Public Education Department (SEP for its acronym in Spanish). Enrollment information is gathered at the beginning and end of each school year from every public and private school in Mexico (Terrazas González et al., 2015). The number of students leaving each school in each of the country's municipalities each period is calculated using the number of students enrolled in each grade, not including those who are repeating. This is not a perfect calculation for the dropout situation in Mexico considering migration rates within the country and abroad, which is why this study uses the term "school leaving" throughout. However, by collapsing the school-level data to the municipality level, these data control for students who may have changed schools within the municipality. Additionally, there are no data on the number of students who graduate from USE, limiting the study to those who leave school during the first and second year of their USE.

This study uses homicides as the unit of measurement for violent crime in a municipality given its drastic nature, visibility, and the enhanced possibility of being reported (Baier, 2015; Caudillo and Torche, 2014). The number of homicides at the municipality level is obtained from the National Institute of Statistics and Geography of Mexico (INEGI for its acronym in Spanish). These data are gathered from information collected from health records, counting all death

certificates that say homicide (INEGI, 2019). This dataset is preferred over the Executive Secretariat's National System of Public Security (SESNSP for its acronym in Spanish), which accounts for homicides reported in criminal investigations that given Mexico's high degree of criminal impunity is not as reliable (Calderón et al., 2019; Luengo-Cabrera and Butler, 2017). Homicides per 10,000 inhabitants are constructed using population data from 1995, 2000, 2005, 2010, and 2015 census. For years with unavailable information on population figures, the data are interpolated to assume a constant figure.

The nature of DTOs' activities does not allow for data indicating the number of DTO-related homicides, especially at the municipality level, therefore, a dummy variable is generated to account for reported DTO activity in the municipality in any given year. This dummy variable comes from a database created by Fernanda Sobrino, a researcher who uses web-content to obtain information on DTO presence by municipality from 1990-2017 (Sobrino, 2020). Her database is highly correlated with a previous database created similarly by Coscia and Rios (2012) as well as data collected by local newspapers.

Additionally, a series of municipal-level controls, using data from INEGI, are introduced to control for the mechanisms through which DTO violence can influence students' decision to leave school, in particular, financial hardship. Table 1 shows municipality-level averages on this study's variables grouped by municipalities that have been exposed to DTOs at least once in the 2000-2017 period and those that have never been exposed.

[Table 1 about here]

The data suggest that exposure to DTOs is related to school leaving rates in upper-secondary school students. For instance, in municipalities exposed to DTOs at least once in the 17-year period, 23% of students leave school during their upper-secondary career compared to

20% of students in municipalities that have never been exposed to DTOs. Table 1 also shows that DTOs tend to be present in wealthier municipalities. Only 18% of households do not have sewage in municipalities exposed to DTOs in comparison to 31% in municipalities that have never been exposed. Additionally, the supply of schools is much larger in municipalities with DTO presence (576) in comparison to those that do not have DTO presence (28). Finally, a larger proportion of semi-urban municipalities have been exposed to DTOs (52%) in comparison to urban (21%) and rural municipalities (27%). Considering the relationship between financial resources and school leaving as well as DTOs' effect on local economies, these summary statistics serve as motivation to investigate their relationship in a multivariate analytic setting.

5. Empirical Strategy

In order to evaluate the implications of DTO violence on students' limitations to complete their education through the CA, this quantitative study uses a fixed-effects generalized linear model (GLM). While causal inference is not supported, fixed-effects GLM enables me to investigate the association between DTO violence and school leaving longitudinally (Creswell and Creswell, 2018).

Due to the changes in DTO activity during the last decades in Mexico, it is important to apply a fixed-effects model to this study's panel data to control for unobserved variables that differ from one municipality to the next but do not change over time and to control for variables that vary through time but not across municipalities (Stock and Watson, 2010). Furthermore, using municipality-level fixed effects helps us understand whether the relationship between DTO violence and educational attainment is a national trend or dependent on local contexts. Since both municipality and educational attainment are strongly correlated with community and family-level social and economic resources, the difference in school leaving rates between

municipalities may be influenced by unobserved characteristics. Since municipalities are compared to themselves over the 2000-2017 period, selection bias is eliminated from any time-invariant differences across municipalities. The empirical model is:

$$Leave_{jt} = \beta_0 + \beta_1 hom_{jt} + \beta_2 DTO_{jt} + \beta_3 (DTO * hom)_{jt} + \mathbf{X}'_{jt} \beta_{4i} + \alpha_j + \delta_t + \epsilon_{jt} \quad (1)$$

$Leave_{jt}$ represents the rate of students who left upper-secondary school in municipality j in year t . It is calculated using the 911 dataset by subtracting the number of students in grades 1+2 in year t from the number of students in grades 2+3 in year $t+1$, not including those who are repeating the grade and dividing by the total number of students enrolled. Hom_{jt} represents the homicide rate per 10,000 inhabitants of each municipality in a given year. DTO_{jt} represents a dummy variable indicating DTO presence in a municipality in a given year. $(DTO * hom)_{jt}$ serves to test whether homicide's relationship with leaving schools is higher or lower in municipalities with DTO presence. β_3 indicates the difference in the rate of leaving school for municipalities with homicides related to DTO presence. \mathbf{X}'_{jt} represents a vector of control variables, indexed by j , at the municipality level, including population size, proxies for income and education level, and inequality. α_j indicates municipal fixed effects, δ_t denotes a year period dummy and ϵ_{jt} is an unbiased error term. They are clustered at the municipality level.

Since the study is done using municipal-level data, it is not possible to account for individual-level factors and characteristics that may influence a student to leave school. Additionally, this study's model cannot control for the endogeneity of the dependent and independent variables. An increase in students out of school is correlated with more violence in a community and cartel recruitment. However, living in violent settings can also influence the student's attendance. This reverse causality presents as a limitation of the model. While the presence of DTOs can contribute to students leaving school, students who leave are more likely

to participate in criminal activities (De Hoyos et al., 2016a; World Bank Group, 2011). This study cannot isolate whether an increase in violence influences students to leave school or whether students are already leaving school and then decide to join DTOs who can more easily recruit youth out of school (Michaelsen and Salardi, 2020). Yet, this study's model can test whether an increase in violence and DTO presence are associated with school leaving at the municipality level.

6. Results

6.1. Relationship of violence on leaving school

Regarding the relationship between violence and leaving school, I find that the rate of homicides per 10,000 inhabitants has a small but significant relationship with school leaving rates (see Table 2). This finding is robust to the addition of municipality-fixed effects and time-fixed effects at the municipality level.

[Table 2 about here]

Model 1 illustrates that a one-unit increase in homicide rates has a small relationship to the school leaving rate in the municipality ($\beta = 0.001, p < 0.05$). This finding holds in Model 2, where municipality and time-fixed effects as well as municipality characteristics known to influence school leaving are included to control for their role on students' decisions to leave school. Based on this evidence, I conclude that violent crime is influential in students' decisions to leave school.

The current literature on dropout rates in Mexico and Latin America show evidence that poverty plays a significant role in students' decision to leave school (Bentaouet Kattan and Székely, 2014; Josephson et al., 2018). Model 2 presents similar findings. A proxy for municipality wealth, the proportion of households without appropriate sewage, is used to

evaluate the income level of the municipality. There is a statistically significant relationship on school leaving rates for upper-secondary students based on the economic level of their municipality, such that living in a poorer municipality increases the percentage of students that leave school, all else equal ($\beta = 0.059, p < 0.01$). Specifically, living in a municipality where there are fewer households with appropriate sewage systems is associated with an increase in school leaving rates in the municipality by 5.9 percentage points. Furthermore, the overall education level of the municipality has a statistically significant relationship with school leaving rates ($\beta = 0.531, p < 0.01$). A one-unit increase in the proportion of the population that is illiterate is associated with a 53 percentage point increase in school leaving rates. Based on these findings, I conclude that community factors such as education level and access to resources are associated with school leaving, thus reinforcing the idea that societal factors are compounding.

6.2. Presence of drug-trafficking organizations on school leaving

A dummy variable for DTO presence as well as an interaction variable ($DTO * hom$) are included in Models 3 and 4 to evaluate if homicides associated with DTOs relate to school leaving at the upper-secondary level in Mexico. The inclusion of DTO presence does not change the association between homicide and school leaving established in Models 1 and 2.

Furthermore, I find consistent evidence that DTO presence has a positive relationship with school leaving. Living in a municipality where there is at least one DTO active increases the percentage of students that leave school, all else equal ($\beta = 0.016, p < 0.01$). In Model 4, when controlling for municipality characteristics and including municipality- and time-fixed effects, the statistical significance does not change, thus suggesting a robust association. All else equal, there is a statistically significant and positive relationship between exposure to DTOs and leaving USE, such that DTO activity at a municipality level is associated with a 1.2 percentage

point increase in students leaving school ($\beta=0.012$, $p<0.01$). This is equivalent to an average loss of 335 students per year solely due to DTO presence in Ciudad Juárez, Chihuahua, a border city that has consistently been ranked as one of the world's most dangerous.

To examine heterogeneity, I tested the interaction term between homicide rates and the presence of DTOs. No significant differences are observed in the slopes between municipalities with and without DTO presence on homicide rate's association with school leaving rates (as shown in Models 3 and 4 of Table 2). Based on the evidence that homicides and the presence of DTOs have a small but significant association with school leaving rates, I conclude that students living in a municipality exposed to DTOs see their educational attainment opportunities limited.

7. Discussion

Through the use of the capabilities approach, I interpret these findings as an indication that DTOs and homicides impose structural limits on youth's freedom at the municipality level in Mexico. DTOs and violence are obstacles to capabilities in that they impede students' freedom to pursue more years of schooling. By leaving school, the possibility of engaging in criminal organizations or unemployment is increased and, in this sense, leaving school also becomes an obstacle to societal wellbeing. It limits the path to ending social vulnerability, poverty, and lack of social mobility and reinforces social and economic inequalities, especially for those belonging to marginalized groups (Campero et al., 2014).

7.1. Possible ways that DTOs restrict student capabilities

The mechanism through which DTOs influence students' decision to leave school cannot be determined based on the evidence and models presented in this study. Other characteristics associated with DTO activity might be influencing the association found in this study's findings. For instance, youth of schooling age, especially those above 12 years of age, are at a higher risk

of being recruited by DTOs to work as lookouts, drug dealers, hitmen, and mules (Jarillo et al., 2016). These minors (about 30,000 estimated in 2014) are seduced by DTOs' promise of easy money and are influenced to leave school to join them as low-rank members (Cisneros, 2014). Moreover, the government's approach towards DTOs has had consequences on every citizen. Calderon et al. (2015) found evidence that President Calderón's "kingpin capture strategy" towards DTO activity led to a fragmentation of criminal organizations and an increase in cartel fighting, which, in turn, increased DTO-related violence. In 2006, only 53 municipalities in Mexico had DTO presence; by 2017, this number had increased to 600. Fig. 2 shows the share of municipalities affected by DTO activity in 2006, before the Mexican Drug War began, and in 2017.

[Figure 2 about here]

As splintering of DTOs occurred, these criminal organizations diversified their illegal activities to extortion of small businesses, kidnappings of middle-class individuals, and control of retail trade in their territories increasing their need for cheap labor (Díaz-Cayeros et al., 2015). Many of these crimes, including homicides, increased amidst territorial contestation among rival organizations (Magaloni et al., 2020). Extortion, for example, has caused several businesses to close across the country thus decreasing labor opportunities and overall national productivity (IDMC, 2011). In parallel to the increase in homicides stated previously, the number of cases of extortion reported to local public prosecutors' offices also increased by 62% in less than ten years (Magaloni et al., 2020). These illicit activities prey on the municipalities' and citizens' financial stability, an important cause of students dropping out.

For example, Miguel Alemán, Tamaulipas is a municipality with consistently high school leaving rates among upper-secondary school students and DTO presence. Moreover, its prime

location on the border with the United States has made it the focus of several DTOs' territorial contestations, in particular, the Zetas and the Gulf Cartel. There are nine major DTOs in Mexico, each with its own *modus operandi* (Beittel, 2019). Some are more violent than others. Therefore, understanding each DTO's way of operating can be informative regarding this study's findings. The Zetas are highly trained ex-Mexican military members that split from the Gulf Cartel and turned against them, engaging in a hyper-violent competition for territory nationwide (Beittel, 2019). They have amassed significant power to carry out an extractive business model, generating revenue from crimes, such as fuel theft, extortion, human smuggling, and kidnapping. (Beittel, 2019).

As previously mentioned, about a third of youth consider a need to contribute to the household as the main reason for their school departure, therefore DTOs' impact on the local economy is an important factor at play in this relationship (Josephson et al., 2018). In 2015, only 34% of 15-24-year olds in Miguel Alemán attended school, and only 21% completed upper-secondary education (INEGI, 2016). Moreover, 50% of the population is not economically active (INEGI, 2016). In this environment, students' capabilities are limited. They are surrounded by people who left school early and are aware of the lack of employment opportunities available if they do manage to complete their education. The structures in place therefore allow for DTOs to influence students to leave school in indirect and direct manners. DTOs not only limit the formal job opportunities available to students in the municipality but they also lure students out of school by offering employment in their criminal organizations. In this context, students lose the freedom to choose their preferred life trajectory and are forced to act upon their narrowed potential functioning: leave school to provide immediate financial relief to the household.

7.2. Policy implications

Considering the multitude of capabilities that education opens to an individual, the association between violence and DTOs and school leaving indicates these societal factors' role in impeding the fulfillment of capabilities beyond additional years of schooling. It is the responsibility of the state and civil society to remove these obstacles to actualize a free society. In this sense, non-educational policies, such as those concerning security and anti-drug efforts must be taken into consideration during the design of interventions geared towards the prevention of students dropping out of school.

The 2013 education reform which made USE compulsory is not enough to improve educational attainment in Mexico when societal factors hold significant power over students' freedom of opportunities. A collaborative effort between Mexican policymakers at multiple levels of government and experts in education, security, and social development could implement significant and holistic policies to combat DTOs' influence over students' freedom to complete compulsory schooling.

At the national level, the government has tried to discourage dropping out and address the root causes with initiatives such as The Movement Against School Dropout (*Yo no abandono*) and Build Yourself (*Construye T*) (Josephson et al., 2018). These programs mostly focus on information dissemination, participatory planning, and community outreach, yet issues remain in guaranteeing that the students who need it the most are enrolled, stay and do well in schools (OECD, 2019). Moreover, defining which students need these interventions the most has shown problematic. I emphasize that this definition must not be limited to students' financial means but also their external environment. Past policies have focused on violence from and towards the school and have ignored the diverse type of security threats that operate in students' and schools'

societal environments, which limit students' capabilities at a larger and long-term scale (Álvarez and Reyes, 2013). I propose that increased attention and resources should be provided to schools located in municipalities with an above-average rate of homicides per year or with DTO presence. School and teaching staff must be trained to identify psychological stress factors brought forward by nearby DTO violence and attend workshops geared towards security protocols in case of shootings in the vicinity. These schools should have resources allocated towards mental, emotional, and behavioral support for students who, based on their locality of residence, are constant witnesses of violent crimes (Gaias et al., 2019).

Understanding the surroundings of these young people's lives and the actors that influence their decisions is fundamental in designing an all-inclusive and effective intervention to ensure compulsory schooling completion. Programs at the local level have had some success in reducing DTO violence and increasing students' capabilities. Two examples are We are All Juárez (*Todos Somos Juárez*) and Youth: Work Mexico. Both programs were collaborative, multi-sectoral efforts that included citizen stakeholders and prioritized durable gains. *Todos Somos Juárez* was led by the federal, state, and municipal governments with continuous input from a team comprised of representatives from the army, federal and municipal police, and a range of civil society stakeholders (Muggah et al., 2016). In two years, this program contributed to a 70% drop in homicides in Ciudad Juárez (Muggah and Aguirre Tobón, 2018). Similarly, USAID started the Youth: Work Mexico initiative with the International Youth Foundation (IYF) in 2010 to reduce criminal participation from youth by providing paths towards formal employment or schooling in Ciudad Juárez and Tijuana (International Youth Foundation, 2015). In their four-year run, Youth: Work Mexico welcomed almost 10,000 youth into their programs and more than 85% of attendees enrolled back in school after finishing the program

(International Youth Foundation, 2015). These programs should consequently serve as guides for future programs in localities with DTO presence and violence to increase student completion at the upper-secondary level.

Although the relationship found in this study is small, the repercussions of ignoring the relationship that DTOs and homicides have with school leaving would be detrimental to ensuring students' capabilities to complete USE and act upon all opportunities that an education offers.

8. Conclusion

DTO violence must be acknowledged when evaluating educational attainment and development; in Mexico, students suffer directly and indirectly from living in areas with DTO violence and, while this relationship is well-documented regarding student academic achievements, little has been studied about its implications on school leaving. With this in mind, the present study analyzes a sector of the population that is often overlooked, those who leave school, and one which could be argued is even more affected by DTO violence. Additionally, this study goes beyond the human capital discourse of previous studies by evaluating Mexican students' opportunities not only as they pertain to their or national future economic growth but also with regard to understanding and assessing their overall freedom (Robeyns, 2006).

This study finds that violence, as defined by homicide rates, is associated with school leaving rates at the upper-secondary level and that the presence of a DTO increases the school leaving rate at the municipality level by 1.2 percentage points. This is a small but significant association, which suggests that these organizations are influential actors to consider when evaluating the school dropout issue in Mexico. The mechanism through which DTOs influence students' decision to leave school cannot be determined based on the evidence and models presented in this study. There are other characteristics associated with DTO activity such as

extortion and recruitment that should be looked at in future studies to better understand this positive relationship. Moreover, this model cannot claim causality, therefore future studies should incorporate instrumental variables such as municipalities' distance from Mexico's oil pipeline network, which is significantly correlated with levels of violence and presence of DTOs but does not relate to educational attainment, to understand the causal mechanisms between DTO violence and school leaving rates (Cruz and Torres, 2019).

Furthermore, a question that remains open for future studies is that of migration patterns. This study's data cannot identify those students that left their municipality and remained in school in another municipality in Mexico or abroad. Further research should integrate migration data to better gauge the school leaving rates at the municipality level. Although no formal numbers are available, the latest figure from the Mexican Commission of Defense and Promotion of Human Rights states that 338,000 people have been forced to migrate due to violence since 2009 (IDMC, 2019). Understanding if municipalities with DTO presence are associated with higher emigration rates would strengthen this study's findings that they are influential actors in limiting students' capabilities and community development.

This study contributes to the literature by providing evidence not only of the relationship between DTO presence on educational attainment in Mexico but also through the use of the capabilities approach as a framework to explore this relationship in countries across the Latin American region that also have strong DTO presence. Through this study, I conclude that DTOs limit youth's power to live the life they have reason to value, whether that may be by finishing their schooling and obtaining formal employment or by receiving the level of education needed to understand current affairs and make educated choices on government leaders and policies. An educated society is a free society.

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Figures and Tables

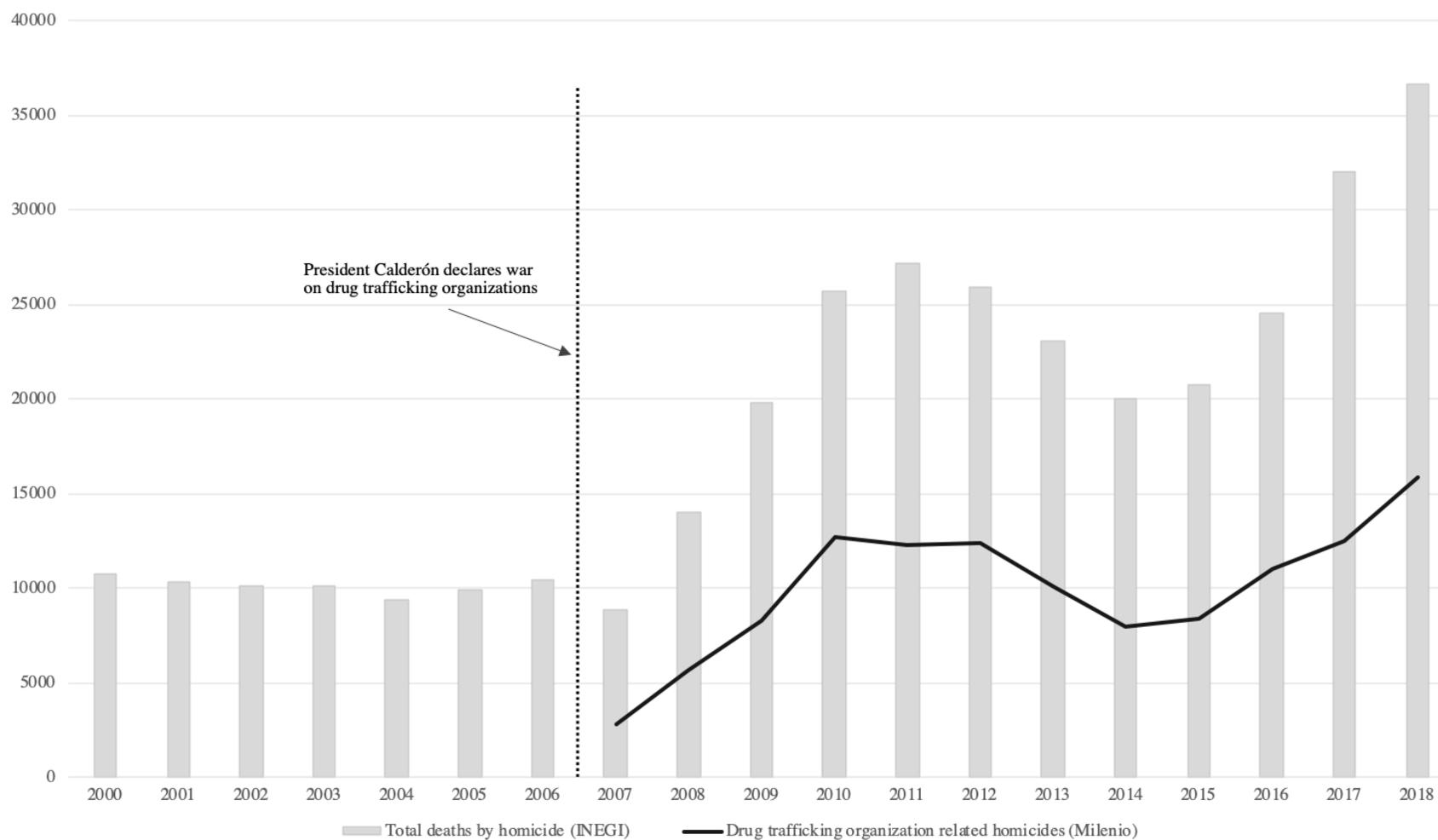


Fig. 1. Total homicides and drug trafficking organization (DTO) related homicides in Mexico (2000-2018)

By author using data on deaths by homicides from INEGI (2000-2018) and DTO-related homicide numbers calculated from data collected by Milenio magazine (2007-2018).

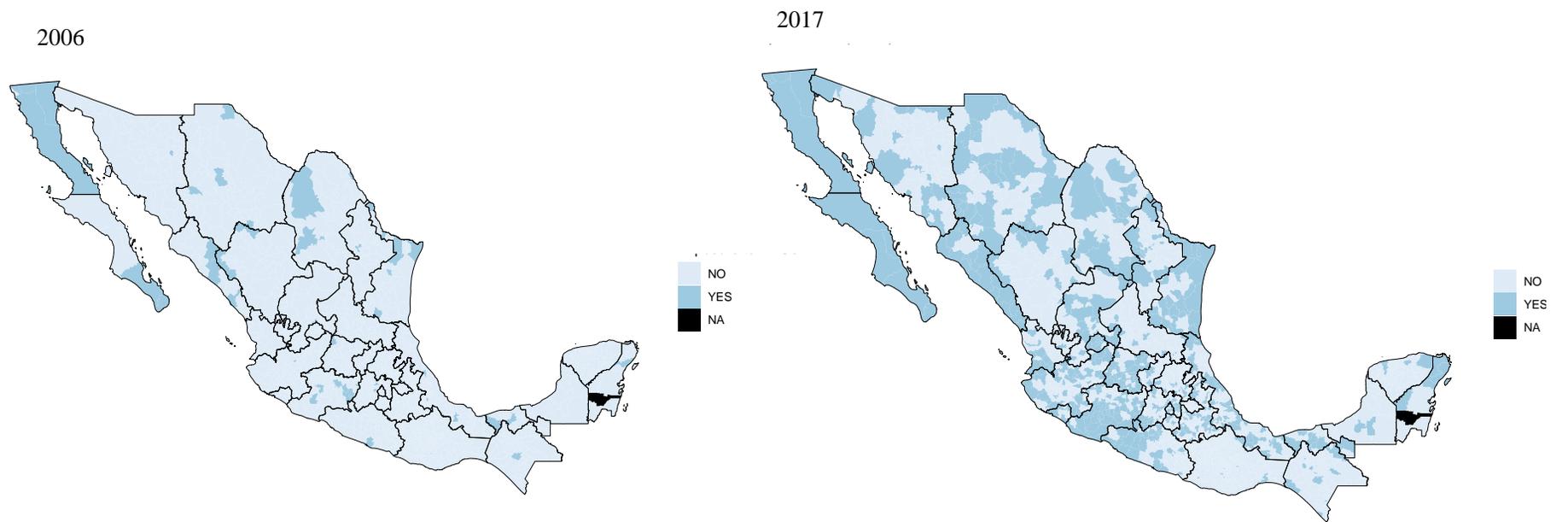


Fig. 2. Presence of drug trafficking organizations at the municipality level in Mexico (2006 and 2017).

By author using data from Sobrino (2019) and done in R.
The municipality marked NA has no available information on DTO presence.

Table 1

Summary statistics of municipal-level variables, by drug-trafficking organization (DTO) presence (2000-2017)

| Variable | Municipalities not exposed to DTO (N= 1,354) | | Municipalities exposed to DTO (N=866) | | Difference of Means | Hedge's G |
|--|---|-------|--|-------|------------------------|-----------|
| | Mean | SD | Mean | SD | | |
| <i>Municipal-level outcomes</i> | | | | | | |
| School leaving from first to second year | 0.239 | 0.086 | 0.254 | 0.075 | -0.014*** | 0.176 |
| School leaving from second to third year | 0.191 | 0.128 | 0.207 | 0.136 | -0.016*** | 0.123 |
| Total USE school leaving | 0.206 | 0.084 | 0.231 | 0.085 | -0.247*** | 0.292 |
| <i>Municipal-level characteristics</i> | | | | | | |
| Homicide rate by 10,000 | 1.323 | 1.986 | 1.973 | 2.282 | -0.650*** | 0.308 |
| Households without sewage (%) | 0.306 | 0.252 | 0.160 | 0.175 | 0.146*** | 0.649 |
| Illiterate population (%) | 0.170 | 0.102 | 0.102 | 0.072 | 0.068*** | 0.749 |
| Gini coefficient | 0.383 | 0.051 | 0.419 | 0.041 | -0.036*** | 0.772 |
| Municipality size (%) | | | | | | |
| Rural (less than 15,000 pop.) | 0.622 | 0.468 | 0.274 | 0.434 | 0.348*** | 0.765 |
| Semi-urban (15,000-100,000 pop.) | 0.349 | 0.462 | 0.515 | 0.479 | -0.166*** | 0.354 |
| Urban (more than 100,000 pop.) | 0.029 | 0.154 | 0.212 | 0.397 | -0.182*** | 0.661 |
| Average school size | 110.8 | 115.5 | 83.47 | 97.24 | 27.353*** | 0.251 |
| Number of schools | 27.89 | 157.3 | 576.4 | 4,431 | -545.551*** | 0.198 |

Note: Data are representative of averages for the period of 2000-2017. The illiterate population is calculated as the percentage of the municipalities' population older than 15 that cannot read nor write.

Two-sample t-test using groups is calculated and Hedges G effect size is reported. All difference of means have a p -value<0.01.

Table 2

Fixed-effects regression predicting school leaving at the upper-secondary level

| | (1) | (2) | (3) | (4) |
|---|---------------------|----------------------|---------------------|----------------------|
| Homicide rate by 10,000 | 0.001*** (0.000) | 0.001*** (0.000) | 0.001** (0.000) | 0.001** (0.000) |
| Proportion of households without sewage | | 0.063*** (0.021) | | 0.059*** (0.021) |
| Proportion of illiterate population | | 0.553*** (0.091) | | 0.531*** (0.091) |
| Rural (less than 15,000 pop.) | | -0.012 (0.011) | | -0.012 (0.011) |
| Semi-urban (15,000-100,000 pop.) | | -0.011 (0.009) | | -0.009 (0.009) |
| Urban (omitted) | | - | | - |
| Gini coefficient | | 0.030 (0.041) | | 0.028 (0.040) |
| Average school size | | -0.000*** (0.000) | | -0.000*** (0.000) |
| Number of schools | | 0.000 (0.000) | | -0.000 (0.000) |
| DTO presence | | | 0.016*** (0.004) | 0.012*** (0.004) |
| Homicide rate * DTO presence | | | 0.000 (0.001) | 0.000 (0.001) |
| Constant | 0.214*** (0.003) | 0.145*** (0.022) | 0.210*** (0.004) | 0.145*** (0.022) |
| Observations | 33,311 | 33,311 | 33,311 | 33,311 |
| R-squared | 0.067 | 0.103 | 0.068 | 0.103 |
| Number of municipalities | 2,220 | 2,220 | 2,220 | 2,220 |
| Municipality-fixed effects | No | Yes | No | Yes |
| Time-fixed effects | Yes | Yes | Yes | Yes |

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

Note: Standard errors (clustered at the municipality level) are reported in parentheses. This study uses panel data at the municipality level from 2000-2017. The outcome variable is the average rate of students that leave school in a given year at the upper-secondary level.