Kingpin Approaches to Fighting Crime and Community Violence: Evidence from Mexico's Drug War*

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Abstract

This study considers the effects of the kingpin strategy, an approach to fighting organized crime in which law-enforcement efforts focus on capturing the leaders of criminal organizations, on community violence in the context of Mexico's drug war. Newly constructed historical data on drug-trafficking organizations' areas of operation at the municipality level and monthly homicide data allow us to control for a rich set of fixed effects and to leverage variation in the timing of kingpin captures to estimate their effects. This analysis indicates that kingpin captures cause large and sustained increases to the homicide rate in the municipality of capture and smaller but significant effects on other municipalities where the kingpin's organization has a presence, supporting the notion that removing kingpins can have destabilizing effects throughout an organization that are accompanied by escalations in violence.

Keywords: violence; crime; kingpin; Mexico; drugs; cartels
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1 Introduction

The two main reasons for waging war on drugs are to reduce societal costs associated with drug abuse and to reduce societal costs associated with the drug trade. The former includes effects on health, productivity, violent behavior, and broader impacts on health care and public assistance programs. The latter includes violence involved with the enforcement of contracts and turf battles, corruption, and activity in related "industries" that are detrimental to welfare including protection rackets, human smuggling, kidnapping, prostitution, weapons trafficking, theft, etc.[1] Naturally, the relative importance of these costs depends on many factors, including the types of drugs involved, the level and spatial distribution of demand, and the organization of the supply network.[2] Correspondingly, there is significant heterogeneity in the approaches that have been used to wage war on drugs. Demand-side approaches take the form of prevention efforts, treatment for abusers, and increases in the cost of abuse through enforcement efforts and punishment. Supply-side approaches, on the other hand, focus on disrupting operations by way of confiscation of drugs and guns, targeting precursors, and arresting and punishing those involved in the drug trade. Given resource constraints and the potential for unintended consequences, policy-makers have to consider which of these policies to use and how intensely to use them, highlighting the importance of understanding their costs and benefits. Towards this end, this paper considers the effects of a particular supply-side approach that has played a prominent role in Mexico's drug war—the targeting of high-ranked members of criminal organizations, also known as the "kingpin strategy"—on community violence.

To put this study into context, it is important to note that most of the existing research in this area focuses on the effects of drug-related interventions on drug abuse in "downstream markets." For example, researchers have shown that the Taliban stamping out poppy production reduced heroin use in Australia (Weatherburn et *al.* 2003), that the effect of Plan Colombia on the supply of Cocaine to the United States was relatively

[1] See Miron (1999) for an in-depth discussion of the manner in which black markets can promote violence and an empirical analysis of drug and alcohol prohibition enforcement in the United States that supports this view.

[2] For example, the societal costs associated with the drug trade are most important in areas heavily involved in the illegal production and distribution of drugs to be consumed elsewhere.

small (Mejía and Restrepo 2013), that reductions in methamphetamine availability in the United States in the mid-1990s reduced drug-related harms (Cunningham and Liu 2003; Dobkin and Nicosia 2009; Cunningham and Finlay 2013), that U.S. state laws limiting the availability of Pseudoephedrine have not changed methamphetamine consumption (Dobkin, Nicosia, and Weinberg 2013) nor have graphic advertising campaigns (Anderson 2010), and that substance-abuse treatment availability reduces mortality (Swensen 2015). Less is known about the causal effects of "upstream interventions" on "upstream communities," i.e., the effects of interventions on outcomes in areas where production, distribution, and their associated costs are most relevant. In work closely related to our study, Dell (2015) shows that drug-trade crackdowns in Mexico driven by close PAN mayoral victories increase the number of drug-trade-related homicides. Consistent with prior studies highlighting how drug-related interventions can and have shifted the spatial distribution of the drug trade in Afghanistan (Clemens 2008, 2013a, 2013b), Dell demonstrates that crackdowns increase homicides in the municipalities where the efforts take place and that they also increase homicides in other municipalities to which trafficking is likely to be diverted.[3]

This paper contributes to this literature by focusing explicitly on the effects of the kingpin strategy, which has featured prominently in Mexico's war on drugs and is one of the hypothesized mechanisms underlying Dell's results. Proponents of the kingpin strategy argue that removing a leader weakens an organization through its effect on its connections, its reputation, and by creating disarray in the ranks below, and that this may in turn reduce the organization's level of criminal activity. Detractors, however, point out that this strategy may increase violence as lower ranked members maneuver to succeed the eliminated leader and rival groups attempt to exploit the weakened state of the organization. Given sound logic underlying arguments in favor of and against the kingpin strategy, there is a clear need for empirical research on the subject. That said, there are two main empirical challenges to estimating the effect of the kingpin strategy that are difficult to overcome. First, policies targeting organized crime are almost always multifaceted, involving the simultaneous use

[3]In related work, Mejía and Restrepo (2013) estimate the causal effect of the drug trade on violence using variation in the prominence of the drug-trade in Colombian municipalities based on land suitability for coca cultivation. Also, Angrist and Kugler (2008) show that exogenous shocks to coca prices increase violence in rural Colombian districts as groups fight over additional rents.

of various strategies. Mexico's war on drugs is no exception—it also involved various approaches implemented at various times with varying degrees of intensity, which we discuss in greater detail in the next section. The second main challenge is that the capture of a kingpin is fairly rare because, by definition, they are small in number. As a result, establishing compelling evidence on the effect of eliminating kingpins in some sense requires a series of case studies.

We find that the capture of a drug-trafficking-organization (DTO) leader in a municipality increases its homicide rate by 61% in the six months following the capture and that this effect is highly persistent into subsequent periods. Consistent with the notion that the kingpin strategy causes widespread destabilization throughout an organization, we also find significant effects (of the same sign but smaller in magnitude) on other municipalities where a captured leader's DTO has a presence. Moreover, we find evidence of spatial displacement as captures appear to reduce the homicide rate for municipalities that neighbor a municipality of capture but where the captured leader's DTO does not have a presence. These estimates can explain 31.8 percent of the increase in homicides in Mexico between 2006 and 2010.

Several pieces of evidence support a causal interpretation of these main results. First, homicide rates in the municipalities of interest and in the comparison group track one another closely prior to captures. That this is the case despite the fact that the war on drugs began well before any of the captures we consider suggests that the empirical strategy can separately identify the effects of kingpin captures in the broader context of the war on drugs. We also show that the main results are driven by effects on the individuals most likely to be directly involved in the drug trade: males and, more specifically, working-age males. In an additional effort to show that the main results are not simply reflecting an increase in propensities to engage in violence that coincides with captures in the relevant municipalities, we demonstrate that domestic violence and infant mortality do not respond to these events in any systematic way that could explain the effects on homicides. Lastly, we present evidence that operations themselves do not increase homicides in an analysis of the first major operations of the war on drugs.

We note that our study was conducted in parallel with Calderón et al. (2015), which also considers the effects of kingpin captures during Mexico's war on drugs on homicides.

As both studies find that kingpin captures increase homicides, while investigating different types of kingpin captures on different types of municipalities and using different comparison groups, the two papers complement each other in providing evidence that reinforces the view that the kingpin strategy escalates violence. A major distinguishing feature of our study is that we use data on the geographic distribution of DTOs over time to analyze spillover effects of kingpin captures across the DTO, whereas Calderón et al. (2015) focus on spillover effects on neighboring municipalities. The importance of this difference is underscored by our finding that the effects on more-distant municipalities account for 30 percent of the effect on homicides, which can account for approximately 10 percent of the increase in homicides in Mexico between 2006 and 2010. This finding is consistent with the far-reaching spillover effects of drug-enforcement efforts documented in Clemens (2008, 2013a, 2013b) and Dell (2015). Our use of these previously unavailable data on the geographic distribution of DTOs over time also allow us to form different comparison groups, the validity of which we discuss in detail in sections 4 and 5. Another important difference is that we directly investigate the degree to which military operations have independent effects on homicides.[4]

The remainder of the paper is organized as follows. In the next section, we provide background on Mexico's drug war, including a discussion of the events that precipitated it, and the relevant DTOs. We then discuss our data and empirical strategy in sections 3 and 4, respectively. Section 5 presents a graphical analysis, the main results, and supporting analyses. Lastly, Section 6 discusses the results and concludes.

2 Background

2.1 Drug-trafficking in Mexico

In many ways, Mexico is ideally situated for producing and trafficking drugs. In addition to having a climate that allows for the growth of a diverse set of drugs, it shares a border with the world's biggest consumer of drugs, the United States. Drug trafficking has also been able to flourish in Mexico as a result of corruption and weak law enforcement. The first

[4]Phillips (2015) also presents an empirical analysis of leader decapitation in Mexico but instead conducts a state-level analysis and does not present any analyses of the potential endogeneity of the captures considered.

DTOs were protected by the government, which designated the areas in which each DTO would carry out their illegal activities. In the 1980s, former police officer Miguel Ángel Félix Gallardo—together with Rafael Caro Quintero and Ernesto Fonseca Carrillo—founded the first Mexican Cartel: the Guadalajara Cartel.[5] After the incarceration of his partners in 1985, Félix Gallardo kept a low profile and decided to divide up the areas in which he operated.[6] According to Grayson (2013), the government and the DTOs had unwritten agreements that "DTO leaders respected the territories of competitors and had to obtain *crossing rights* before traversing their turfs...criminal organization[s] did not sell drugs in Mexico, least of all to children...and prosecutors and judges would turn a blind eye to cooperative criminals."

In the 1990s, however, the environment became less stable as Guadalajara's DTO splintered into four separate DTOs[7] and the Institutional Revolutionary Party (PRI) lost political power (Astorga and Shirk 2010). Morales (2011) describes the late 1990s and early 2000s as a period in which the DTOs became more independent, going from a regimen of political subordination to one of direct confrontation to dispute the control of territory. In late 2005, a new DTO—La Familia—was established in the state of Michoacán followed by a wave of violence.[8] At the beginning of the war on drugs there were five DTOs (or alliances of DTOs), Sinaloa/Beltrán-Leyva, Gulf, Tijuana, La Familia, and Juárez.

2.2 The War on Drugs

As shown in Panel A of Figure 1, the homicide rate in Michoacán grew dramatically between 2005 and 2006. That said, the national homicide rate continued to be extremely stable at 0.8 per 100,000 residents per month (Figure 1, Panel B). Nonetheless, eleven days after the beginning of his term, the newly elected President Felipe Calderón declared war on the DTOs on December 11, 2006, citing the increase in violence in Michoacán as the last straw.

[5]In addition with his connections with the Mexican government, Félix Gallardo was the first Mexican drug trafficker to make connections with Colombian cartels, particularly he established a solid relation with Pablo Escobar (leader of the Medellín Cartel).

[6]Joaquín Guzmán Loera and Ismael Zambada García were given the pacific coast area, the Arellano Félix brothers received the Tijuana corridor, the Carrillo Fuentes family got the Ciudad Juárez corridor, and Juan García Abrejo received the Matamoros corridor.

[7]After the arrest of Félix Gallardo in 1989 and his transfer to a the maximum security prison La Palma in Mexico state, the leaders of the designated areas became independent and founded the second generation of cartels (Sinaloa, Tijuana, Juárez, and Gulf).

[8]La Familia DTO is the metamorphosis of La Empresa which was a former branch of the Gulf Cartel.

While pundits highlighted his desire to have significant reform associated with his presidency and the fact that he was born and raised in Michoacán, his stated reasons for initiating the war was a concern "about the growth of drugs-related violence and the existence of criminal groups trying to take over control of entire regions."[9] Calderón's strategy mainly consisted in a frontal attack led by members of the army, the navy, and the federal police seeking the eradication of crops, the confiscation of drugs and guns, and the incarceration or killing of high ranked drug traffickers (the kingpin strategy). The first operation took place in Michoacán on December 11, 2006, where more than 5000 army and federal police elements were deployed, and subsequent operations followed in other parts of the country.

Mexico's war on drugs was initially viewed as a great success. As shown in Figure 2, plotting data from 2001 to 2010, the national homicide rate dropped sharply in January 2007. The homicide rate jumped back up to 0.72 in March—not quite to its earlier level—and then held steady for the following 9 months. Then, at the beginning of 2008 in a clear break from trend, the homicide rate started to climb. It would continue to climb for several years, reaching a level 150% higher than the pre-drug-war rate at the end of 2010.

This dramatic increase in violence in Mexico has drawn the attention of researchers from different disciplines trying to explain its causes—most attribute this increase in violence to Calderón's war on drugs. Different researchers have focused on the role of the deployment of federal troops all across the country (Escalante 2011, Merino 2011), the expiration of the U. S. Federal Assault Weapons Ban in 2004 (Chicoine 2011, Dube et al.. 2012), the increase of cocaine seizures in Colombia (Castillo et al. 2012, Mejía and Restrepo 2013), and the increased effort to enforce law initiated by the National Action Party (PAN) mayors (Dell 2015).

Our research is motivated by the observation that the escalation of violence began in January 2008, which was the month in which the first cartel leader was captured during the war on drugs (Alfredo Beltrán Leyva). Naturally, many other things were going on in Mexico and around the world at the same time, necessitating a more rigorous consideration to be able to draw any strong conclusions about the effects of Mexico's kingpin strategy. In order to conduct such an analysis, we make use of newly constructed data on the geographic

[9]Financial Times interview, conducted January 17, 2007.

distribution of DTOs over time—in conjunction with several other data sets—to consider the first captures of kingpins associated with each of the five DTOs in operation at the beginning of the war on drugs. These data and the associated identification strategy are described in the next sections.

3 Data

Our analysis brings together data from several sources that ultimately yields a data set at the municipality-month level, spanning January 2001 through December 2010.[10] Our primary outcome variable is based on monthly homicides at the municipality level, constructed using the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI).[11] In order to put these data into per capita rates, we use estimated municipality population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX), which are based on projections from the Census of Population and Housing. While we note that drug-related homicides are available from December 2006 to October 2011, we do not use these data out of concern for the endogeneity of homicides being classified as "drug related" or "not drug related."[12]

Our information on kingpin captures are from a compendium of press releases of the Army (SEDENA), the Navy (SEMAR), and the Office of the Attorney General (PGR). While these press releases contain a wealth of additional information, we focus on the timing of the first capture of a leader or lieutenant from each of the DTOs during the war on drugs. To put into perspective the types of kingpins we are considering, as the name implies, leaders are at the very highest level of the DTO. Lieutenants are immediately below leaders in the

[10] San Ignacio Cerro Gordo and Tulum, which were created during this timespan, are not included in our analysis.

[11] Less than one percent of death certificates with homicide as the presumed cause of death are missing the municipality of occurrence. These observations are not used in our analysis.

[12] In particular, we might be especially concerned that events related to the war on drugs would heighten attention to drug-related violence and thus increase the propensity for homicides to be classified as drug related. Alternatively, a desire to influence the public perception regarding the success of the war on drugs could cause a reduction in the probability that homicides are classified as drug related. As we are interested in violence and not in the way that violence is classified, we believe it prudent to use an approach that abstracts away from such issues though we acknowledge that similar biases could arise if events related to the war on drugs affect the probability that deaths are classified as homicides as opposed to being due to other causes.

DTO organization. As a practical matter, we classify an event as a capture of a DTO leader when a press release indicates that the individual was a head (or one of the heads) of a DTO and identify an event as a capture of a DTO lieutenant when a press release indicates that the individual was a leader of a DTO in some state or region. While these press releases also allow us to identify the capture of lower-level kingpins, such as plaza bosses who control a single municipality, our analysis of such captures (not shown) suggested that they are not as convincingly exogenous as the first captures of higher-level kingpins. As such, we do not consider such events and our estimates can thus be interpreted as identifying the effects of high-level kingpin captures.

As shown in Table 1, there is significant variation in the timing with which high-level kingpins were captured for the five DTOs in operation at the beginning of the war on drugs. The first took place on August 29th, 2007—eight months after the war on drugs began—when Juan Carlos de la Cruz Reyna, a lieutenant in the Gulf DTO was captured. The other four DTOs (Sinaloa-Beltrán-Leyva, Tijuana, Juárez, and La Familia) first had top level leaders captured during the war on drugs at various times between January and December of 2008.[13] Juan Carlos de la Cruz Reyna was considered a main link between the Gulf DTO and to Colombian DTOs; he was responsible for receiving shipments of drugs in Tampico and Northern Veracruz and transferring them to the border areas of Matamoros and Nuevo Laredo, from where they were smuggled into the United States. Alfredo Beltrán Leyva (captured January 21, 2008) was considered one of the main leaders of the Beltrán-Leyva DTO; he directed operations in the states of Sinaloa, Sonora, Chihuahua, Durango, Jalisco, and Nayarit, and was in charge of the two assassin groups known as "Los Pelones" and "Los Güeros." Pedro Sanchez Arras (captured May 13, 2008) of the Juárez DTO was considered one of the top lieutenants in the organization and directed operations in Chihuahua. Eduardo Arellano Félix (captured October 25, 2008) led the Tijuana DTO with his nephew, Luis Fernando Sanchez Arellano. Alberto Espinoza Barrón (captured December 29, 2008) was a lieutenant in the La Familia DTO; he coordinated the receipt of drugs from South America at the Port of Lazaro Cardenas and the subsequent trafficking to the United

[13]Sinaloa and Beltrán-Leyva DTOs were allied before the drug war commenced.

States.[14]

We use newly available historical data on the municipalities of operation for each DTO, the construction of which is described in detail in Coscia and Rios (2012). Briefly, the data was constructed using a MOGO (Making Order using Google as an Oracle) framework for selecting the most reliable subset of web information to collect information on relationships between sets of entities (DTOs and municipalities in this case). It uses indexed web content (e.g., online newspapers and blogs) and various queries to identify DTOs' areas of operation at the municipality level between 1990 and 2010.[15] To avoid concerns about endogeneity, we define areas of operation using only data before the war on drugs began (2004–2006).[16] Moreover, we take a conservative approach and specify that a DTO had a presence in a municipality if the municipality was an "area of operation" for the DTO in any of these three years. Figure 3 maps out the distribution of the DTOs based on this definition. One important takeaway from this figure—which we exploit in our empirical analysis—is that a large share of Mexico has no DTO presence (or a DTO presence that is too weak or inactive to be picked up using Coscia and Rios' approach). Table 1 reports the number of municipalities that are associated with each DTO presence and the fraction of the total Mexican population residing in these municipalities. These measures of influence are consistent with the notion that "the Gulf Cartel was considered the most powerful drug-trafficking organization in Mexico" at the beginning of the war on drugs (Stewart and Posey 2009).

4 Empirical Strategy

While we begin our analysis of the effects of the kingpin captures homicides with a series of graphical comparisons, our main results are based on a generalized difference-in-differences approach. In particular, we estimate the effects of kingpin captures using the following

[14]Details on Juan Carlos de la Cruz Reyna are from government press releases and from a newspaper report in La Jornada on August 30, 2007. Details on all other captured leaders rely solely on government press releases.

[15]Such data was previously only available to the research community at the state level.

[16]Although Coscia and Rios (2012) report areas of operation for years prior to 2004, they note that this information is less reliable.

regression model:

$$\ln H_{mt} = D_{mt}\delta + \alpha_m + \gamma_t + X_{mt}\beta + u_{mt} \tag{1}$$

where $\ln H_{mt}$ is the natural log of the homicide rate in municipality m at time t; D_{mt} is a set of indicator variables reflecting whether a kingpin relevant to the municipality has been captured in 0–5 months ago, 6–11 months ago, or 12+ months ago; α_m are municipality fixed effects; γ_t are month-by-year fixed effects; X_{mt} can include time-varying municipality controls; and u_{mt} is an error term.[17] As such, the estimated effects over time (δ) are identified by comparing changes in violence over time among municipalities for which a relevant kingpin has been captured to the changes observed over time in other municipalities, where the latter are comprised of municipalities that are not linked to any DTO and those that are only linked to DTOs that have yet to have had a captured kingpin. This approach allows us to avoid biases that would otherwise be introduced by fixed differences across municipalities and by the effects of any shocks or interventions that are common across municipalities. The fact that we have municipalities associated with different DTOs who have kingpins captured at different times and we also have municipalities without any DTO presence allows us to additionally control for the effects of the war on drugs that are common to municipalities with a DTO presence, which we accomplish by including variables for 0–5, 6–11, and 12+ months after the beginning of the war interacted with an indicator for the presence of a DTO in the municipality. We can also control for additional spatial heterogeneity by including state-by-year-by-month fixed effects in the model. In doing so, our estimates are based on comparing changes in outcomes observed over time in municipalities affected by kingpin captures to the changes observed in other municipalities in the same state.

Two main aspects of the empirical analysis that we have yet to discuss in detail are: how to define whether a kingpin capture is "relevant to a municipality" and what sorts of captures are considered. We define a kingpin capture as being "relevant to a municipality" in four different ways to allow for treatment effect heterogeneity. In particular, we separately estimate effects of a kingpin capture in the municipalities where a capture takes place, neighboring municipalities where the captured kingpin's DTO had a presence, non-neighboring munici-

[17] We add one to the homicide count to avoid missing values.

palities where the captured kingpin's DTO had a presence, and neighboring municipalities where the captured kingpin's DTO did not have a presence. As described in the previous section, our analysis of "kingpins" focuses on DTO leaders and lieutenants, i.e., those at the very top level of the organization and those who control a state or region. We further restrict attention to the *first* capture of a kingpin for each DTO during the war on drugs. We do so out of concern for the endogeneity that would be introduced when the capture of a kingpin affects homicides while also increasing the probability of the capture of subsequent kingpins. By focusing instead on the effects of an initial capture, our estimates will reflect the effect of a kingpin capture on outcomes that is inclusive of the effects driven by subsequent captures.

We note that standard-error estimation is not straightforward in this context. While we are evaluating a panel of municipalities, there may be reason to cluster standard-error estimates at some higher level(s) because different municipalities may have correlated shocks to outcomes not captured by our model. In some sense, because the source of variation is at the DTO level, it may be preferable to allow the errors to be correlated across municipalities when they share the presence of the same DTO. However, with only five DTOs, this would lead to problems associated with too few clusters. As a compromise, we instead cluster on DTO-combinations, which leverages the fact that there are some municipalities where two, three or four DTOs have a presence.[18] We additionally cluster on states to allow for some spatial correlation in the errors that might occur naturally or through policies implemented at the state level, following the approach to multi-way clustering described in Cameron, Gelbach, and Miller (2011).[19]

5 Results

5.1 Graphical Evidence of the Effects of Kingpin Captures

Before presenting the results of the econometric analysis described above, in this section we present graphical evidence. To begin, Figure 4 plots the homicide rate over time separately

[18] 2,084 municipalities have no DTO presence, 208 have one, 89 have two, 55 have three, and only 18 have four.

[19] This approach leads to somewhat more conservative standard-error estimates than clustering only on states, only on DTO combinations, or only on municipalities.

for municipalities with a DTO presence before the war on drugs and those that did not have such a presence. This figure shows that municipalities with a DTO presence had higher—but not much higher—homicide rates than municipalities without a DTO presence in the six years leading up to the war on drugs. Moreover, they tracked one another quite closely. Perhaps most importantly, they even tracked one another after the beginning of the war on drugs—both dipping immediately before returning to close to their earlier levels—which provides support for using municipalities without a DTO presence as a meaningful comparison group for the purpose of attempting to separate the effects of kingpin captures from the effects of other aspects of the war on drugs. Twelve months after the beginning of the war on drugs, however, the two series began to diverge from one another in a dramatic way. While the capture of Alfredo Beltrán Leyva, leader of the Beltrán Leyva Cartel, would appear to be the most salient event to happen around this time that would disproportionately affect municipalities with a DTO presence, we cannot rule out other explanations such as a lagged effect of earlier aspects of the war on drugs. One explanation that we *can* rule out is that the war on drugs did not begin in earnest until this time—several major operations took place in 2007 which lead to the seizure of 48,042 Kg of cocaine, 2,213,427 Kg of marijuana, and 317 Kg of heroin, significantly more than the amounts seized in the subsequent years.[20]

Across the four panels of Figure 5, we present graphs that more closely correspond to our regression analysis, which exploits variation in the timing with which kingpins from different DTOs were first captured and separately considers municipalities of capture, neighboring municipalities where the captured kingpin's DTO had a presence, non-neighboring municipalities where the captured kingpin's DTO had a presence, and neighboring municipalities where the captured kingpin's DTO did not have a presence. In particular, each panel shows the average difference between homicide rates in the municipalities of interest and the other municipalities in their states that have no DTO presence and do not neighbor a municipality of capture.

Before discussing the effects implied by these graphs, we note that each demonstrates a constant difference in the homicide rates of the municipalities of interest and their comparison municipalities prior to a capture, providing support for the common trends assumption

[20]Third Calderón's Government Report (Tercer Informe de Gobierno, 2009).

underlying the difference-in-differences approach. Moreover, because all of the captures considered took place at least one year after the war on drugs was initiated, this suggests that the initial activities related to the drug war had similar effects on the municipalities of interest and their comparison municipalities, lending support to the idea that the difference-in-differences approach can identify the effects of kingpin captures in the broader context of the war on drugs.

In terms of the differences from comparison municipalities *following* captures, Panel A shows an immediate spike in the homicide rates in municipalities where the captures occurred. This difference appears to come back down 6–12 months after the capture—though not close to the pre-capture difference—before diverging again in a manner that suggests large long-run effects. Panel B focuses on the municipalities that neighbor these municipalities of capture where a captured kingpin's DTO also had a presence. For these municipalities, we see little evidence that homicide rates change (relative to comparison municipalities) following a capture. Panel C focuses on more distant (non-neighboring) municipalities where a captured kingpin's DTO had a presence. This panel indicates that such counties experience a steady increase in homicide rates (relative to comparison municipalities) following the kingpin capture. Panel D, which focuses on municipalities that do not have a DTO presence but which neighbor a municipality where a capture occurred, suggests a modest *decline* in homicide rates following a capture.

As a whole, the evidence shown in figures 4 and 5 supports the notion that kingpin captures escalate violence, particularly in the municipalities of capture and non-neighboring municipalities where a captured leader's DTO has a presence. It is less clear whether captures have effects on the other municipalities of interest, which we consider further in the regression-based analysis below.

5.2 Regression-based Evidence of the Effects of Kingpin Captures

Columns 1 through 3 of Table 2 present our main results, based on the generalized difference-in-differences model represented by Equation 1. In particular, these columns show the estimated effects of a kingpin capture over time for the municipalities where a capture occurred, neighboring municipalities where the captured kingpin's DTO had a presence, non-

neighboring municipalities where the captured kingpin's DTO had a presence, and neighboring municipalities where the captured kingpin's DTO did not have a presence. The estimates are based on models that control for municipality fixed effects and month-by-year fixed effects. Column 2 additionally controls for state-by-year-by-month fixed effects to address concerns that captures may be correlated with other state-level policy initiatives and/or shocks while Column 3 further adds controls for the effects of the war on drugs that are common to municipalities with a DTO presence by including variables for 0–5, 6–11, and 12+ months after the beginning of the war interacted with an indicator for the presence of a DTO in the municipality. Across these three columns, we note that the estimates are somewhat sensitive to the inclusion of state-by-year-by-month fixed effects and that the estimates are nearly identical but less precise when we additionally control for the effects of the war on drugs that are common to municipalities with a DTO presence.

Regardless of the exact specification, the estimates indicate significant effects of kingpin captures and considerable heterogeneity. In particular, the estimates reflect an immediate and sustained effect on the homicide rate in a municipality of capture of approximately 60%.[21] Due to relatively large standard error estimates, we can neither reject no effect or reject large effects on homicide rates in municipalities where the captured kingpin's DTO had a presence that neighbored the municipality of capture. The estimated effects on non-neighboring municipalities where the captured kingpin's DTO had a presence indicate little-to-no effect in the short run and a significant effect 12+ months following capture that implies that captures increase homicides 13% for these municipalities. The estimated effects are routinely negative for municipalities neighboring the municipality of a capture where the captured kingpin's DTO does not have a presence, suggesting that kingpin captures lead to a spatial displacement of violence.

Columns 4 and 5 of Table 2 assess the validity of the research design by considering whether homicide rates deviate from their expected levels (based on their pre-capture levels and the changes observed in comparison municipalities in the same state) *prior to a kingpin capture* in any of these types of municipalities. These estimates are routinely close to zero

[21] As the outcome is the log of the homicide rate, the percent effects are calculated by exponentiating the coefficient estimate—in this case 0.476—and subtracting one.

and are never statistically significant, which provides support for a causal interpretation of the estimates discussed above.

5.3 Further Analyses Supporting a Causal Interpretation of the Main Results

In the same spirit as our analysis verifying that there are no "effects" before a kingpin capture occurs, which would otherwise suggest that our regression model is picking up something other than the effects of kingpin captures, in Table 3 we separately consider the estimated effects on male homicide rates, female homicide rates, rates of domestic violence, and infant mortality using our preferred model. Whereas gender-specific homicide rates and infant mortality rates are constructed using the data described in Section 3, rates of domestic violence are constructed using administrative records of individuals arrested for the crime of domestic violence from Estadśticas Judiciales en Material Penal de INEGI. Because these data are only available beginning in 2003, our analysis of domestic violence spans 2003–2010 in contrast to all of our other analyses which span 2001–2010.[22]

The estimates in Table 3 provide further support for a causal interpretation of our main results as they indicate: (i) the effects on overall homicides are largely driven by male homicides, which is consistent with gender differences in participation in the drug trade; (ii) there are no significant effects on domestic violence, which provides reassuring evidence that the main results are not driven by idiosyncratic shocks to levels of violence coinciding with captures; and (iii) there are no systematic effects on infant mortality to suggest that the main results are driven by compositional changes towards a higher-risk population in the affected municipalities.[23]

Table 4 presents evidence along similar lines, considering effects on homicide rates for males of different age groups.[24] These estimates indicate that the effects on males are driven

[22]There are also fewer observations used in the analysis of infant mortality than in other analyses, because the outcome is undefined for cells in which the relevant population is zero.

[23]Interestingly, the estimates do indicate significantly elevated rates of infant mortality following a capture in municipalities that neighbor a municipality of capture and have the same DTO presence. That said, these estimated effects on infant mortality do not line up with the estimated effects on homicides, which are not statistically significant and are neither routinely negative nor positive.

[24]The observations are not constant across columns as the outcome is undefined for cells in which the

by those between the ages of 15 and 44, mirroring participation rates in drug trafficking (Fairlie 2002; Vilalta and Martínez 2012). Moreover, the estimated effects on homicides rates for younger and older males tend to be close to zero and not statistically significant at conventional levels.

Though our main results are able to control for national and state-level policies and shocks common across areas in addition to those common to municipalities with a DTO presence through the inclusion of fixed effects, a potential concern with the empirical strategy is that it might conflate the effects of kingpin captures with the effects of military operations more broadly. We were able to speak to this issue above by showing that the municipalities of interest and their comparison municipalities tracked one another before the first captures took place, even after the war on drugs began. In order to further speak to this issue, Figure 6 considers each of the eight major state (or multi-state) operations of the war on drugs in the timeframe spanned by our data.[25] In particular, each panel restricts attention to the state(s) of the operation and separately plots the homicide rate for municipalities with and without a DTO presence. Collectively, these eight panels indicate that the major operations of the drug war did not precipitate increases in homicides in municipalities with a DTO presence relative to those without a DTO presence.

Figure 7 also focuses on homicide rates as they relate to major operations of the war on drugs but instead considers the four major operations that focused on a single municipality or a small number of municipalities: the Marlin-Culiacán-Navolato Operation, the Laguna Segura Operation, the Tijuana Operation, and the Juárez Operation. This figure shows that all municipalities that were the target of an operation saw dramatic rises in their homicide rates at some point in time. More relevant to the validity of our identification strategy, there appears to be no consistent link between operations of the war on drugs and these rises—some of these municipalities saw their homicide rates begin to rise before an operation, some after, and some at around the same time. Instead, the spikes shown in panels (a) and (c) correspond to the capture of leaders which occurred in the municipality; the growth in the homicide rate in Laguna Segura is more gradual. While the rise in the homicide rate in the municipality

relevant population is zero.

[25]The beginning dates for these operations are based on information from the fifth Calderón's Government Report (Quinto Informe de Gobierno, 2011).

of Juárez preceded the Juárez Operation, we note that our identification strategy does not rely on the conditional exogeneity of the timing of major operations but instead relies on the conditional exogenity of the timing of the captures considered. Moreover, the municipality of Juárez would have been affected by the Sierra Madre-Chihuahua Operation and the capture of the Juárez DTO lieutenant Pedro Sánchez Arras, both of which preceded the Juárez Operation.

As a whole, our analysis of state- and municipality-level operations suggests that military operations do not themselves lead to discernible changes in homicide rates. This is consistent with our earlier consideration of homicide rates in the months between the beginning of the war on drugs and the months in which kingpin captures took place, providing further support for a causal interpretation of our main results.

Table 5 offers an additional check on the main results by considering the sensitivity of the estimates to the exclusion of any given DTO. In particular, across the columns of the table we report results systematically excluding from the analysis municipalities where the Sinaloa-Beltrán-Leyva cartels have a presence (Column 2), where the Tijuana Cartel has a presence (Column 3), where the Gulf Cartel has a presence (Column 4), where the Juárez Cartel has a presence (Column 5), and where the Familia Cartel has a presence (Column 6), respectively. This analysis is motivated by the notion that we should be less confident in the results if they are driven by municipalities associated with any one particular DTO. The estimates are most sensitive to the exclusion of municipalities where the Gulf DTO has a presence, which is perhaps not surprising in light of the fact that the the Gulf DTO spans the most municipalities and the municipalities with the largest populations (as shown in Table 1). That said, the estimated effects are actually larger when these municipalities are excluded from the analysis and thus the estimates guide us to the same conclusion regardless of whether any one DTO is excluded from the analysis—kingpin captures lead to large and immediate increases in the homicide rates for municipalities where captures occur and this effect is quite persistent; there are spillover effects onto non-neighboring municipalities where the captured kingpin's DTO has a presence in the long run; and there appear to be effects in the opposite direction for neighboring municipalities where the kingpin's DTO does not have a presence.

6 Discussion and Conclusion

In the preceding sections, we have estimated the effects of the first kingpin captures during Mexico's war on drugs for the DTOs that were in operation prior to the war. Newly available data on DTOs' areas of operation at the municipality level over time and monthly data on homicides allow us to control for a rich set of fixed effects and to leverage variation in the timing of kingpin captures to consider the effects on homicides in the area of capture itself in addition to other areas where the kingpin's DTO has a presence. The results of this analysis indicate that kingpin captures have large and sustained effects on the homicide rate in the municipality of capture and smaller but significant effects on other municipalities where the kingpin's DTO has a presence, supporting the notion that the kingpin strategy can have destabilizing effects throughout an organization while highlighting that this does not imply a reduction in violence. That being said, kingpin captures do appear to reduce homicides for municipalities neighboring a municipality of capture where the captured kingpin's DTO does not have a presence.

These estimates offer a new lens through which we can view the dramatic increase in violence in Mexico since the beginning of the war on drugs. In particular, our estimates suggest that the kingpin captures we consider led to an additional 4,934 homicides between 2007 and 2010, or approximately 7.2 percent of the homicides over that period of time. Roughly 30 percent of these additional homicides are due to spillover effects onto non-neighboring municipalities where a captured kingpin's DTO has a presence. In total, the effects of the kingpin captures we consider can explain 31.8 percent of the increase in homicides between 2006 and 2010.[26] An important caveat to these figures is that we use an imperfect measure of DTOs' areas of operation (based on the MOGO approach described above) and that misclassification would serve to bias our estimates towards zero—as such, they may be best thought of as estimates of the lower bound of the true effects.

While our estimates indicate that Mexico's use of the kingpin strategy caused significant

[26]These numbers were calculated using the regression coefficients corresponding to Column 3 of Table 2. In particular, they are calculated by comparing the predicted number of homicides based on the regression model under the true values of all regressors and the predicted number of homicides with all treatment variables set to zero. These calculations indicate that the capture of kingpins caused an increase in homicides of 49 in 2007, 891 in 2008, 1,864 in 2009 and 2,130 in 2010.

increases in homicides, it is important to note that its war on drugs had several objectives beyond reducing violence, including the establishing the rule of law, that need to be considered in evaluating the policy. Moreover, it remains possible that the kingpin strategy could reduce violence in the long-run in ways that have yet to be seen.

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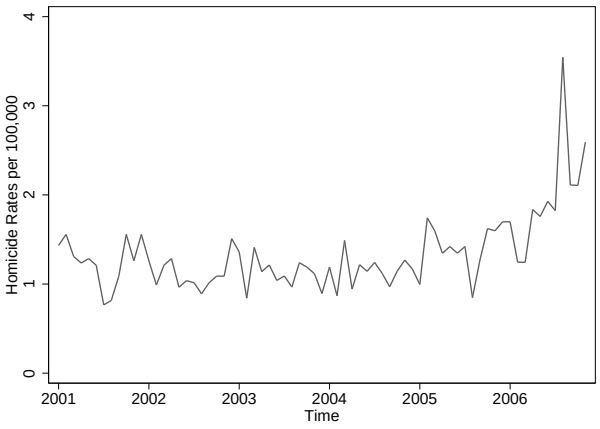
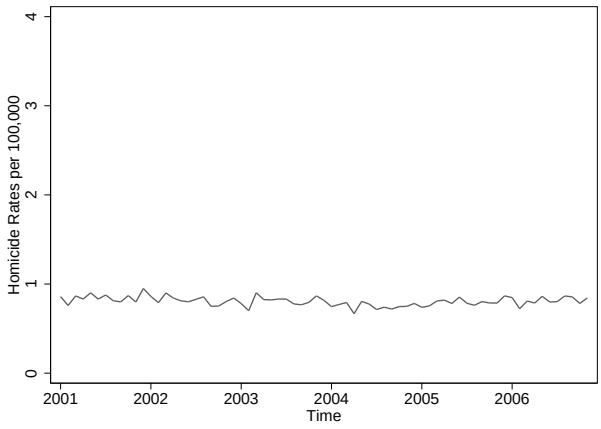
Figure 1
Monthly Homicide Rates Prior the Beginning of the War on Drugs

(a) Michoacán

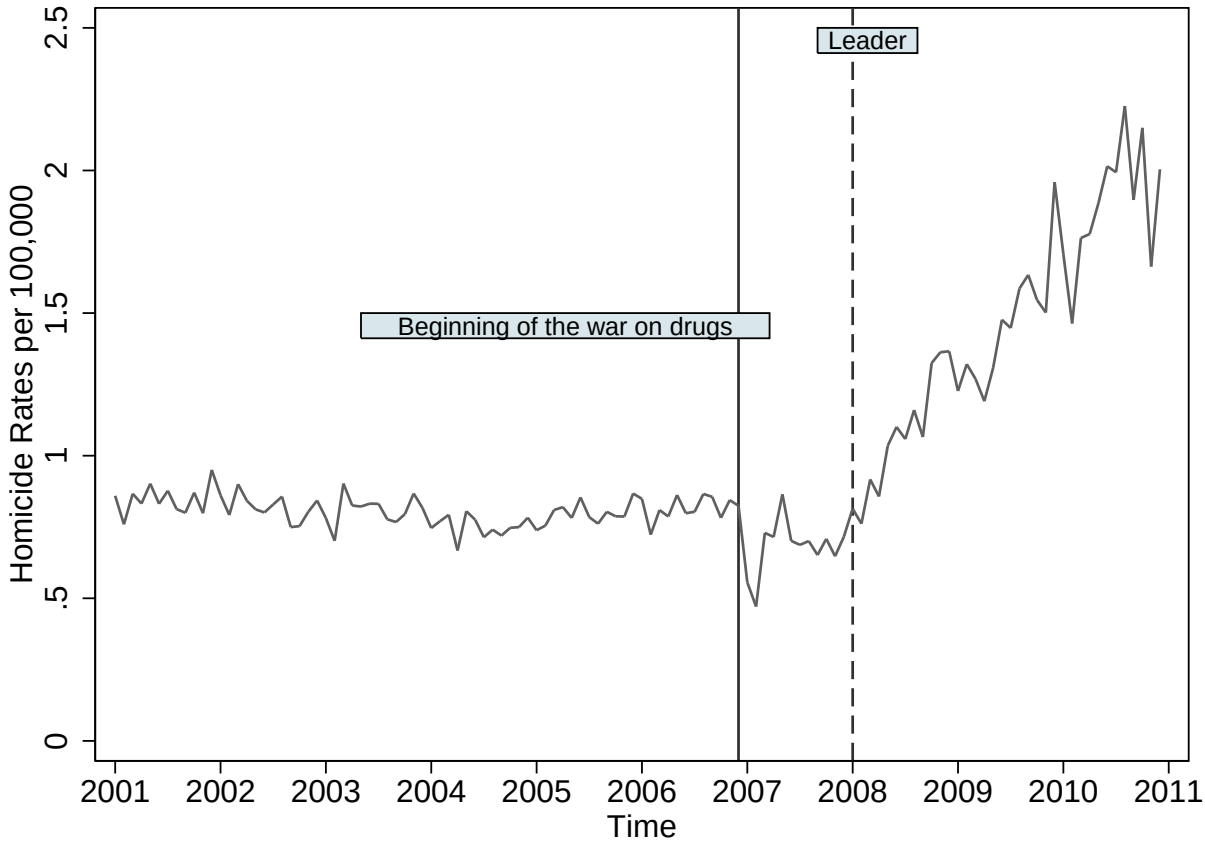


(b) National



Notes: Panel A plots the homicide rate in the state of Michoacán, President Felipe Calderón's home state, leading up to his declaring war on drugs. Panel B plots the nationwide homicide rate over the same time period. These homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

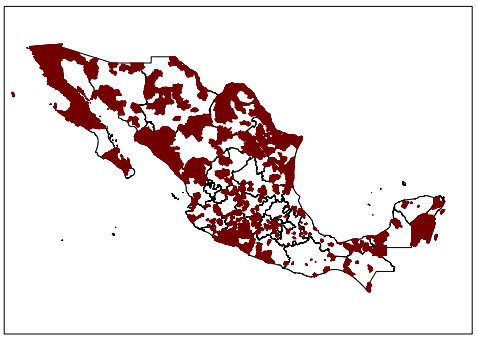
Figure 2
National Homicide Rate



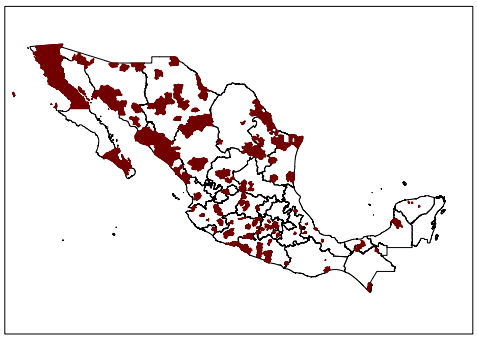
Notes: See Figure 1. Vertical lines are drawn to highlight the beginning of the war on drugs and the first capture of a DTO leader during the war on drugs.

Figure 3
Municipalities with DTO Presence, 2004-2006

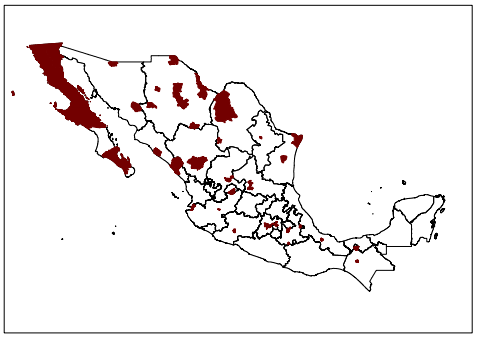
(a) Any DTO



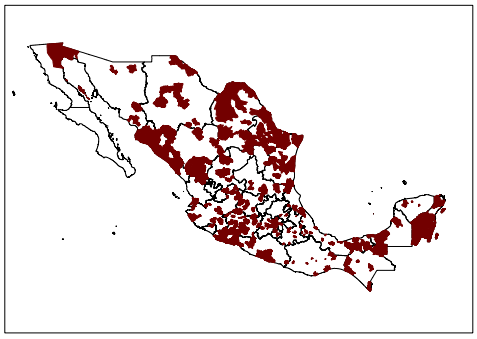
(b) Sinaloa-Beltrán-Leyva DTO



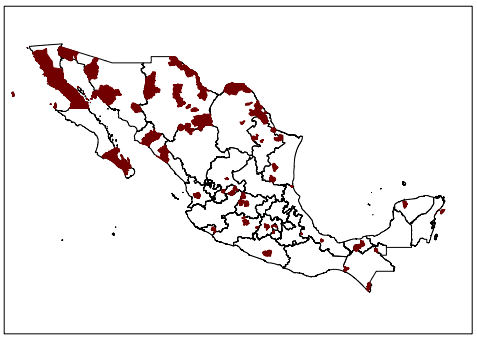
(c) Tijuana DTO



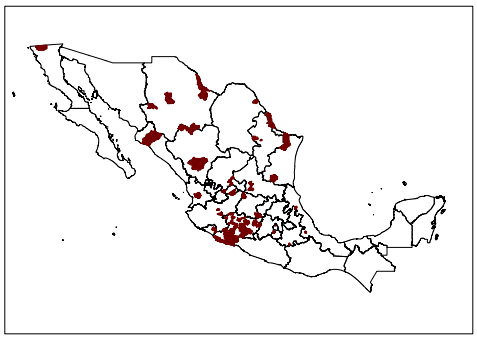
(d) Gulf DTO



(e) Juárez DTO

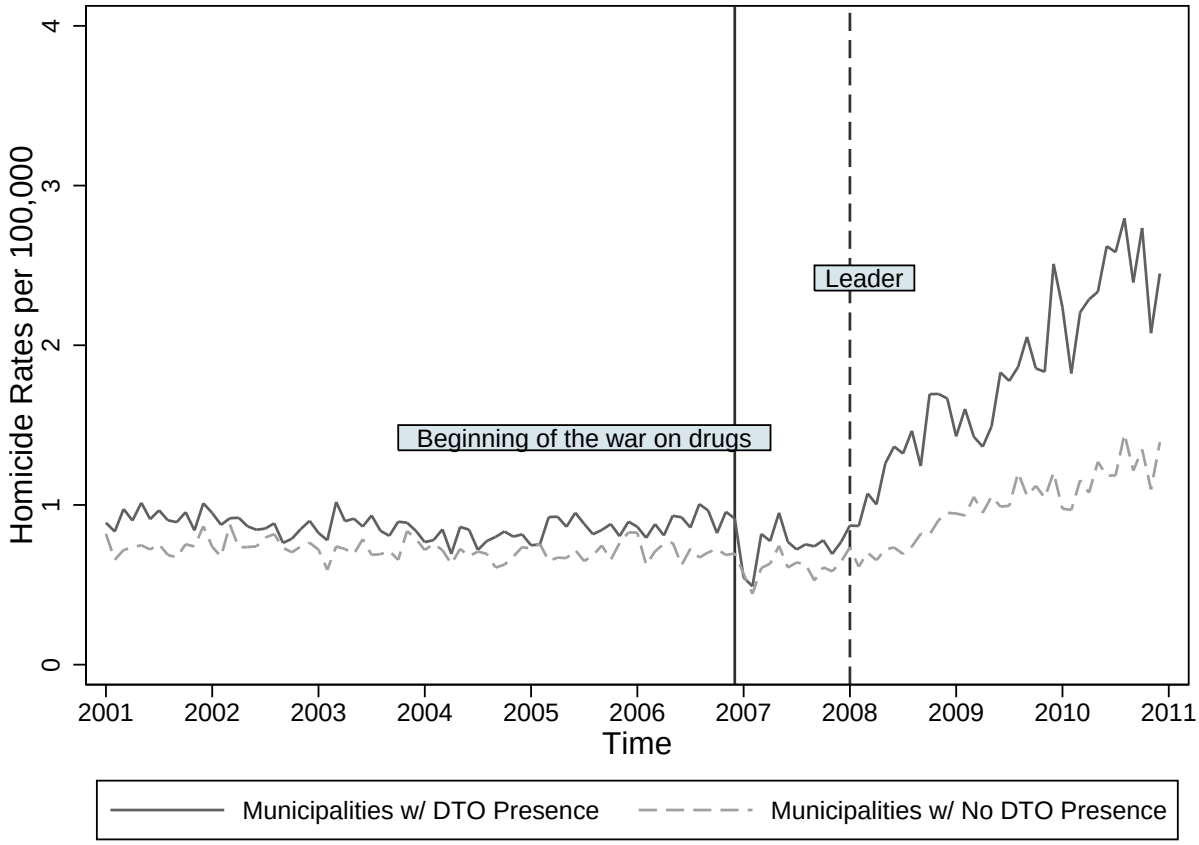


(f) La Familia DTO



Notes: Each panel shows the municipalities with the specified DTO presence prior to the war on drugs. The areas of operation for each DTO are based on Coscia and Rios (2012).

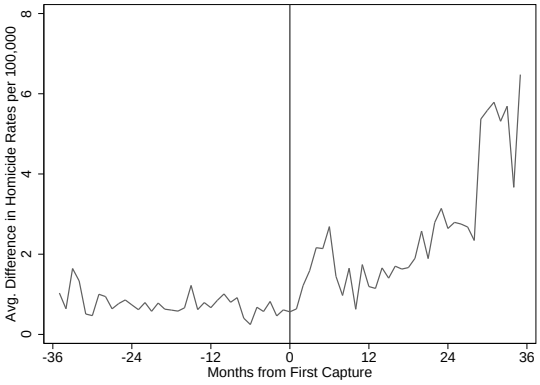
Figure 4
Homicide Rates for Municipalities With and Without a DTO Presence



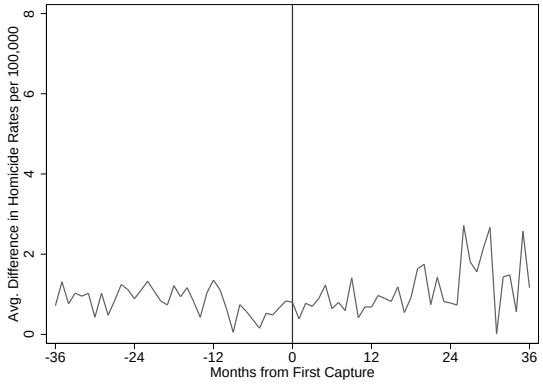
Notes: Municipalities with and without a DTO presence prior to the war on drugs are shown in Figure 3. Vertical lines are drawn to highlight the beginning of the war on drugs and the first capture of a DTO leader during the war on drugs. Homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

Figure 5
Homicide Rates in Municipalities of Interest
Relative to Others in the Same State without a DTO Presence

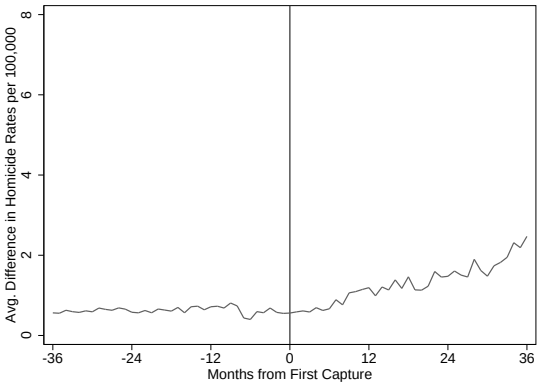
(a) Municipalities of capture



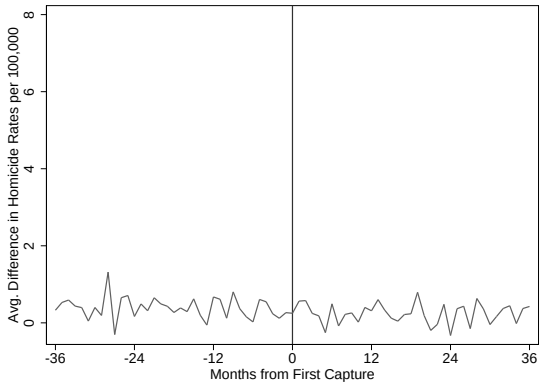
(b) Neighboring municipalities where captured leader's DTO has a presence



(c) Non-neighboring municipalities where captured leader's DTO has a presence

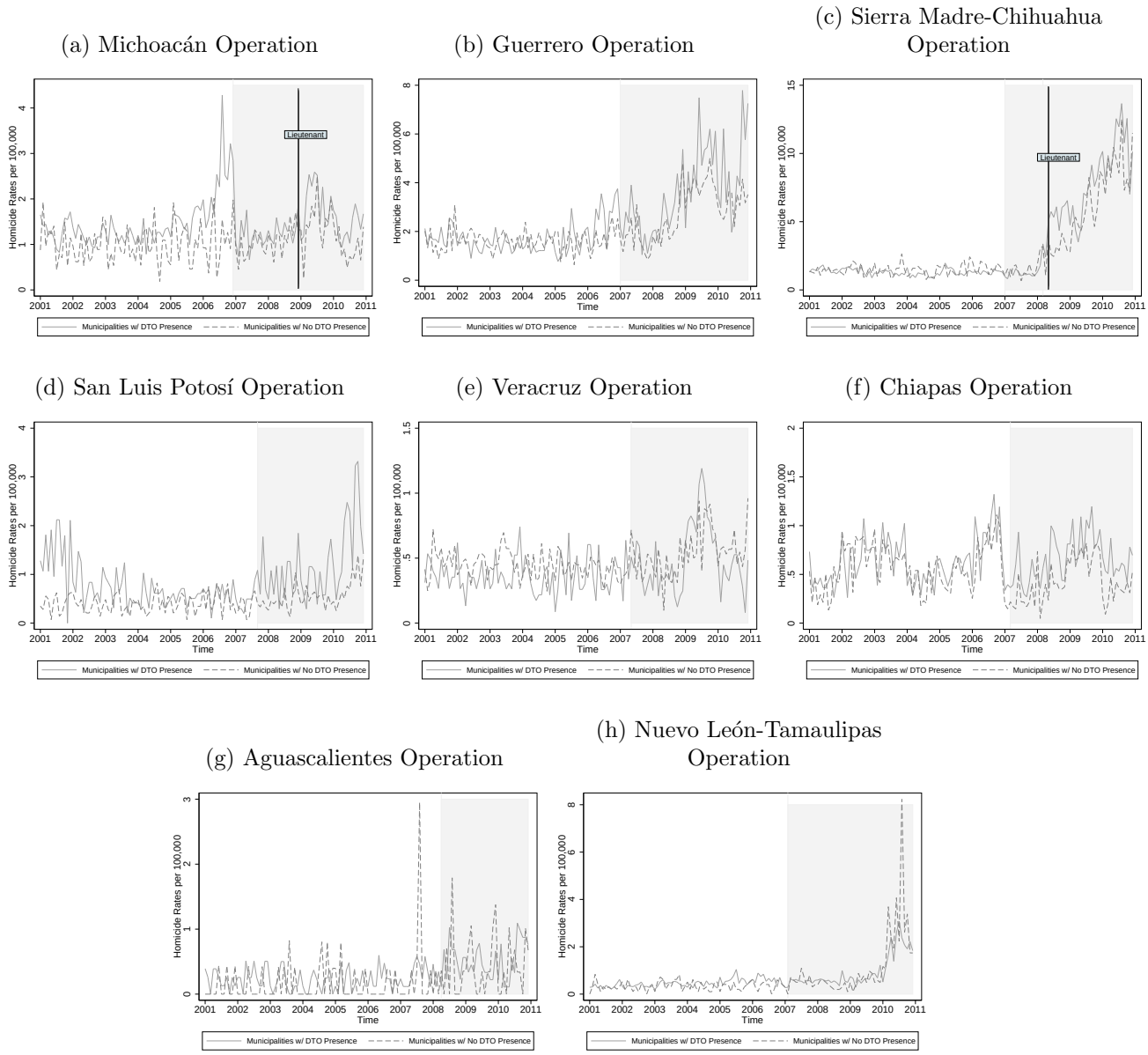


(d) Neighboring municipalities where captured leader's DTO does not have a presence



Notes: Each panel shows the average difference over time between homicide rates in the highlighted municipalities and the other municipalities in their states that have no DTO presence (and do not neighbor a municipality of capture). The time scale is adjusted to address the fact that different municipalities were affected by first captures taking place at different times—it is centered on months from such a capture. Municipalities with and without a DTO presence prior to the war on drugs are shown in Figure 3. Homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

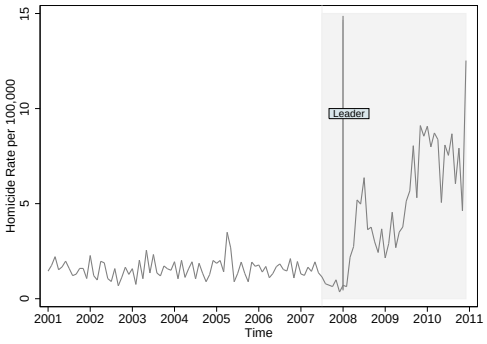
Figure 6
Homicide Rates for Areas Targeted in Major State-Level Operations



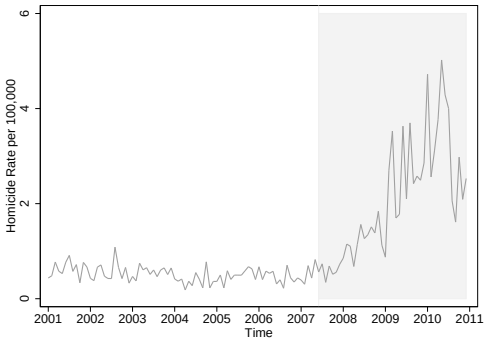
Notes: Each panel shows the homicide rates in the state(s) corresponding to the operation, with separate lines for municipalities with a DTO presence and municipalities without a DTO presence. The shaded region begins when the operation began and ends when the operation ended (where known). The Sierra Madre operation includes the states of Chihuahua, Durango, and Sinaloa. Where applicable, vertical lines show the capture of a kingpin considered in our analysis. Municipalities with and without a DTO presence prior to the war on drugs are shown in Figure 3. Homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

Figure 7
Homicide Rates for Areas Targeted in Major Municipality-Level Operations

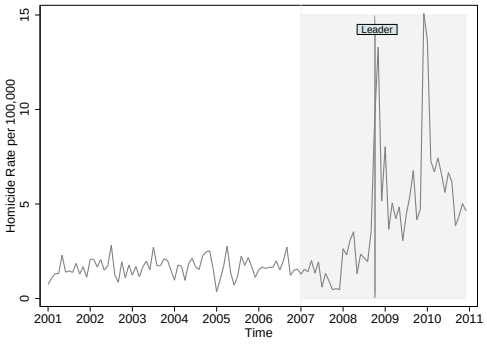
(a) Marlin-Culiacán-Navolato Operation



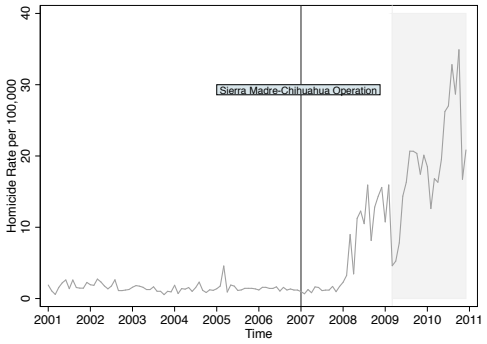
(b) Laguna Segura Operation



(c) Tijuana Operation



(d) Juárez Operation



Notes: Each panel shows the homicide rates in the municipality or municipalities corresponding to the operation. The shaded region begins when the operation began and ends when the operation ended (where known). The Marlin Operation includes the municipalities of Mazatlán and Culiacán while the Laguna Segura Operation includes the municipalities of Saltillo, Torreón, San Pedro de las Colinas, Lerdo, and Gómez Palacio. Where applicable, vertical lines show the capture of a kingpin considered in our analysis. Municipalities with and without a DTO presence prior to the war on drugs are shown in Figure 3. Homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

Table 1
First Capture of a Kingpin For Each DTO During the War on Drugs

DTO	Name	Position	Date	Municipalities w/ DTO Presence (2004-2006)	Fraction of Population in These Municipalities
Sinaloa-Beltrán-Leyva	Alfredo Beltrán Leyva	Leader	1/21/08	166	0.36
Tijuana	Eduardo Arellano Félix	Leader	10/25/08	47	0.18
Gulf	Juan Carlos de la Cruz Reyna	Lieutenant	8/29/07	277	0.44
Juárez	Pedro Sánchez Arras	Lieutenant	5/13/08	65	0.15
La Familia	Alberto Espinoza Barrón	Lieutenant	12/29/08	68	0.09

Notes: Information of first captures is based on a compendium of press releases of the Army (SEDENA), the Navy (SEMAR), and the Office of the Attorney General (PGR). Municipalities with a DTO presence prior to the war on drugs are shown in Figure 3. The proportion of the population is estimated based on population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).

Table 2
Estimated Effects of Kingpin Captures on Homicides

	(1)	(2)	(3)	(4)	(5)
Municipality of capture prior 7 to 12 months					0.012
					(0.124)
Municipality of capture prior 1 to 6 months				-0.044	-0.032
				(0.305)	(0.293)
Municipality of capture after 0 to 5 months	0.694***	0.473**	0.476**	0.469**	0.481**
	(0.248)	(0.213)	(0.226)	(0.216)	(0.230)
Municipality of capture after 6 to 11 months	0.622***	0.394***	0.392***	0.386***	0.397***
	(0.138)	(0.089)	(0.093)	(0.088)	(0.098)
Municipality of capture after 12 or more months	0.816***	0.525*	0.523*	0.516*	0.528*
	(0.300)	(0.288)	(0.302)	(0.272)	(0.308)
Neighbor w/ same DTO prior 7 to 12 months					0.004
					(0.108)
Neighbor w/ same DTO prior 1 to 6 months				-0.025	-0.019
				(0.128)	(0.133)
Neighbor w/ same DTO after 0 to 5 months	0.297*	0.097	0.101	0.098	0.105
	(0.178)	(0.119)	(0.121)	(0.115)	(0.134)
Neighbor w/ same DTO after 6 to 11 months	0.182*	-0.062	-0.066	-0.069	-0.062
	(0.103)	(0.055)	(0.073)	(0.076)	(0.085)
Neighbor w/ same DTO after 12 or more months	0.212	-0.132	-0.134	-0.138	-0.131
	(0.131)	(0.142)	(0.124)	(0.134)	(0.146)
Non-neighbor w/same DTO prior 7 to 12 months					0.051
					(0.040)
Non-neighbor w/same DTO prior 1 to 6 months				-0.014	0.021
				(0.042)	(0.042)
Non-neighbor w/same DTO after 0 to 5 months	0.008	-0.002	0.008	-0.002	0.032
	(0.025)	(0.022)	(0.024)	(0.055)	(0.050)
Non-neighbor w/same DTO after 6 to 11 months	0.066	0.046	0.040	0.030	0.064
	(0.041)	(0.031)	(0.039)	(0.078)	(0.062)
Non-neighbor w/same DTO after 12 or more months	0.175***	0.122***	0.115***	0.105	0.139**
	(0.061)	(0.040)	(0.044)	(0.083)	(0.065)
Other neighbor prior 7 to 12 months					0.031
					(0.021)
Other neighbor prior 1 to 6 months				-0.001	0.001
				(0.024)	(0.025)
Other neighbor after 0 to 5 months	0.003	-0.062*	-0.060**	-0.060*	-0.059**
	(0.028)	(0.032)	(0.030)	(0.033)	(0.027)
Other neighbor after 6 to 11 months	-0.025	-0.085**	-0.085**	-0.085**	-0.083*
	(0.028)	(0.042)	(0.042)	(0.040)	(0.044)
Other neighbor after 12 or more months	-0.025	-0.098	-0.098	-0.098	-0.096
	(0.035)	(0.088)	(0.090)	(0.089)	(0.087)
N	294480	294480	294480	294480	294480
State-by-year-by-month fixed effects	no	yes	yes	yes	yes
Additional controls	no	no	yes	yes	yes

Notes: Observations are at the municipality-month level, spanning January 2001 through December 2010. All estimates include month-by-year fixed effects and municipality fixed effects. The additional controls for columns 3–5 are indicator variables for 0–5, 6–11, and 12+ months after the beginning of the war for municipalities with DTO presence. Standard-error estimates in parentheses are two-way clustered at the state and DTO-combination levels. Homicide rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX). Areas of DTO operation for each DTO are based on Coscia and Rios (2012) as described in the text.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3
Estimated Effects on Other Outcomes

	(1) Homicide Male	(2) Homicide Female	(3) Domestic Violence	(4) Infant Mortality
Municipality of capture after 0 to 5 months	0.460**	0.107	0.145	0.007
	(0.229)	(0.221)	(0.368)	(0.036)
Municipality of capture after 6 to 11 months	0.365***	0.223	0.168	0.046
	(0.062)	(0.198)	(0.192)	(0.042)
Municipality of capture after 12 or more months	0.496*	0.337	0.080	-0.021
	(0.290)	(0.267)	(0.272)	(0.035)
Neighbor w/ same DTO after 0 to 5 months	0.085	-0.060	-0.050	0.071
	(0.114)	(0.119)	(0.166)	(0.044)
Neighbor w/ same DTO after 6 to 11 months	-0.096	-0.094	-0.007	0.093***
	(0.071)	(0.102)	(0.141)	(0.031)
Neighbor w/ same DTO after 12 or more months	-0.159	-0.092	0.004	0.066*
	(0.145)	(0.068)	(0.092)	(0.038)
Non-neighbor w/same DTO after 0 to 5 months	0.002	0.003	-0.025	-0.023
	(0.024)	(0.016)	(0.037)	(0.018)
Non-neighbor w/same DTO after 6 to 11 months	0.038	-0.001	-0.046	-0.022
	(0.038)	(0.022)	(0.042)	(0.021)
Non-neighbor w/same DTO after 12 or more months	0.103**	0.023	-0.077*	0.007
	(0.043)	(0.024)	(0.041)	(0.022)
Other neighbor after 0 to 5 months	-0.047*	-0.020	0.033	-0.025
	(0.026)	(0.039)	(0.051)	(0.043)
Other neighbor after 6 to 11 months	-0.071	0.005	0.064	-0.056
	(0.044)	(0.015)	(0.070)	(0.046)
Other neighbor after 12 or more months	-0.082	-0.012	0.041	-0.028
	(0.087)	(0.035)	(0.038)	(0.030)
N	294480	294480	235584	294357

Notes: See Table 2. Additionally note that all models control for municipality fixed effects, state-by-year-by-month fixed effects, and indicator variables for 0–5, 6–11, and 12+ months after the beginning of the war for municipalities with DTO presence. Domestic violence data begin in January 2003 and are based on administrative records of individuals arrested for the crime of domestic violence from Estadśticas Judiciales en Material Penal de INEGI. Infant mortality rates are calculated based on the universe of death certificates from the vital statistics of the National Institute of Statistics and Geography (INEGI) and population counts from the National Council of Population (CONAPO) and El Colegio de México (COLMEX).
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4
Estimated Effects on Male Homicide Rates by Age

Age group:	(1) 0-14	(2) 15-29	(3) 30-44	(4) 45-59	(5) 60-74	(6) 75-89	(7) 90+
Municipality of capture after 0 to 5 months	0.085	0.474***	0.436**	0.143	0.075	0.007	-0.001
	(0.101)	(0.165)	(0.174)	(0.208)	(0.165)	(0.077)	(0.060)
Municipality of capture after 6 to 11 months	0.010	0.220	0.505***	0.196	0.076	-0.064	-0.007
	(0.052)	(0.189)	(0.131)	(0.163)	(0.057)	(0.052)	(0.058)
Municipality of capture after 12 or more months	0.008	0.527*	0.523***	0.299	0.122	-0.051	0.010
	(0.074)	(0.276)	(0.191)	(0.233)	(0.154)	(0.044)	(0.050)
Neighbor w/ same DTO after 0 to 5 months	-0.006	-0.033	0.130	-0.122	-0.060	-0.017	-0.013
	(0.044)	(0.103)	(0.082)	(0.105)	(0.054)	(0.033)	(0.022)
Neighbor w/ same DTO after 6 to 11 months	-0.046	-0.007	-0.145**	-0.137*	-0.078	-0.009	-0.008
	(0.062)	(0.083)	(0.060)	(0.080)	(0.068)	(0.032)	(0.022)
Neighbor w/ same DTO after 12 or more months	-0.009	-0.093	-0.116	-0.126	-0.064	-0.016	0.005
	(0.038)	(0.139)	(0.152)	(0.105)	(0.045)	(0.027)	(0.027)
Non-neighbor w/same DTO after 0 to 5 months	-0.007	-0.003	-0.002	0.002	-0.009	-0.006	0.009
	(0.006)	(0.026)	(0.021)	(0.025)	(0.010)	(0.007)	(0.009)
Non-neighbor w/same DTO after 6 to 11 months	-0.011	0.025	0.016	0.018	0.001	-0.007	0.011
	(0.008)	(0.036)	(0.028)	(0.032)	(0.013)	(0.009)	(0.012)
Non-neighbor w/same DTO after 12 or more months	-0.008	0.087**	0.062*	0.037	-0.010	-0.017	0.000
	(0.009)	(0.041)	(0.034)	(0.035)	(0.011)	(0.010)	(0.014)
Other neighbor after 0 to 5 months	0.020	-0.008	-0.035	-0.006	-0.007	-0.003	-0.008
	(0.013)	(0.025)	(0.041)	(0.022)	(0.013)	(0.013)	(0.009)
Other neighbor after 6 to 11 months	0.022	-0.015	-0.045	-0.002	0.001	-0.003	-0.008
	(0.015)	(0.026)	(0.036)	(0.019)	(0.013)	(0.013)	(0.011)
Other neighbor after 12 or more months	0.024	-0.042	-0.035	-0.005	-0.006	0.005	-0.002
	(0.015)	(0.066)	(0.063)	(0.025)	(0.025)	(0.015)	(0.022)
N	294480	294480	294480	294429	294480	293938	252559

Notes: See Table 2. Additionally note that all models control for municipality fixed effects, state-by-year-by-month fixed effects, and indicator variables for 0–5, 6–11, and 12+ months after the beginning of the war for municipalities with DTO presence.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5
Sensitivity Analysis for Estimated Effects of Kingpin Captures on Homicides

	(1)	(2)	(3)	(4)	(5)	(6)
DTO-controlled municipalities omitted from analysis:	none	Sinaloa-Beltrán-Leyva	Tijuana	Gulf	Juárez	Familia
Municipality of capture after 0 to 5 months	0.476**	0.529**	0.458*	0.888***	0.228	0.444
	(0.226)	(0.240)	(0.271)	(0.129)	(0.312)	(0.292)
Municipality of capture after 6 to 11 months	0.392***	0.419***	0.394***	0.573***	0.298**	0.464***
	(0.093)	(0.103)	(0.108)	(0.130)	(0.116)	(0.121)
Municipality of capture after 12 or more months	0.523*	0.517	0.440	1.253***	0.317	0.594*
	(0.302)	(0.318)	(0.353)	(0.036)	(0.428)	(0.352)
Neighbor w/ same DTO after 0 to 5 months	0.101	0.195**	0.084	0.261***	0.125	0.080
	(0.121)	(0.081)	(0.094)	(0.095)	(0.111)	(0.130)
Neighbor w/ same DTO after 6 to 11 months	-0.066	0.024	-0.080	-0.070	-0.011	-0.051
	(0.073)	(0.069)	(0.061)	(0.149)	(0.082)	(0.111)
Neighbor w/ same DTO after 12 or more months	-0.134	-0.058	-0.199	-0.058	-0.139	-0.095
	(0.125)	(0.167)	(0.134)	(0.041)	(0.181)	(0.131)
Non-neighbor w/same DTO after 0 to 5 months	0.008	0.017	0.005	0.042	-0.000	0.013
	(0.024)	(0.025)	(0.018)	(0.030)	(0.026)	(0.033)
Non-neighbor w/same DTO after 6 to 11 months	0.040	0.047	0.022	0.086	0.018	0.073
	(0.039)	(0.049)	(0.035)	(0.056)	(0.055)	(0.045)
Non-neighbor w/same DTO after 12 or more months	0.115***	0.107**	0.096**	0.149***	0.091	0.142***
	(0.044)	(0.046)	(0.039)	(0.042)	(0.063)	(0.051)
Other neighbor after 0 to 5 months	-0.060**	-0.050***	-0.046***	-0.052**	-0.038	-0.084
	(0.029)	(0.011)	(0.013)	(0.023)	(0.039)	(0.078)
Other neighbor after 6 to 11 months	-0.085**	-0.094***	-0.077**	-0.117***	-0.048	-0.095
	(0.042)	(0.023)	(0.032)	(0.025)	(0.051)	(0.143)
Other neighbor after 12 or more months	-0.098	-0.071**	-0.095	-0.124*	0.010	-0.171
	(0.090)	(0.033)	(0.077)	(0.072)	(0.036)	(0.178)
N	294480	274560	288840	260760	285960	284880
State-by-year fixed effects	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

Notes: See Table 2. Additionally note that all models control for municipality fixed effects, state-by-year-by-month fixed effects, and indicator variables for 0–5, 6–11, and 12+ months after the beginning of the war for municipalities with DTO presence.
* significant at 10%; ** significant at 5%; *** significant at 1%