Border Fences and the Mexican Drug War

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Abstract

The Secure Fence Act resulted in the construction of 649 miles of fencing along the US-Mexico border. At the same time, violence in the Mexican drug war spiked as drug cartels fought to control territory. I hypothesize that construction of the border fence caused fighting between drug cartels by changing the value of territory for smuggling, undermining agreements between cartels. I use novel fine-grained data on violence from death certificates, engineering maps of the border fence, and a difference in differences research design to show that construction of the fence caused at least 2,000 additional deaths in the border region. The entire effect of border fence construction is due to escalation of violence in areas where smuggling routes were not blocked by new border fence construction—territories that became relatively more valuable for smuggling.

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1 Introduction

The US government built 649 miles of fence on the border with Mexico between 2007 and 2011 (Borkowski, Fisher and Kostelnik, 2011). As the fence was being built the drug war in Mexico escalated, reaching a peak of over 25,000 homicides in 2011 as drug cartels fought to control territory. One of the goals of the Secure Fence Act was to reduce drug smuggling into the US (Bush, 2006). If successful, this would change the value of territory to drug cartels. I investigate whether the construction of the border fence caused drug war violence by changing the value of territory for smuggling, undermining agreements between cartels.

An important theoretical literature expects powerful individuals or organizations to seek to control territory when expectations of future revenue from that territory are high (Olson, 1993; Acemoglu and Robinson, 2005; Konrad and Skaperdas, 2012). A nascent empirical literature provides evidence that attempts to control territory by states (Caselli, Morelli and Rohner, 2015) and insurgent groups (de la Sierra, 2014) are driven by changes in the economic value of territory. The construction of the fence on the US-Mexico border provides an opportunity to investigate whether criminal organizations also seek to control territory when the expected future value is higher and whether they will fight for that control.

The effect of economic shocks on rebellion by groups seeking to capture the state and its revenue is conceptually similar. However, the large literature on whether economic shocks affect the onset of civil war has mixed results. Some authors find a higher chance of rebellion when the value of that could be expropriated is higher (Collier and Hoeffler, 1998; Fearon, 2005; Besley and Persson, 2008, e.g.,). Other, more recent papers, find the there is less rebellion when economics shocks increase the value that can be captured by rebelling (Miguel, Satyanath and Sergenti, 2004; Brückner and Ciccone, 2010; Nielsen et al., 2011; Bazzi and Blattman, 2014).

I hypothesize that the construction of the border fence caused agreements between drug cartels about territorial control to break down by changing the value of territory. I expect fighting over territory where the new border fence was not constructed —territory that becomes relatively more valuable once the border fence is completed. Once the border fence is completed and cartels understand how it impacts smuggling and the value of territory, cartels can reach new agreements about territorial control and violence will fall.

To test this theory, I use novel fine-grained data on violence from death certificates, engineering maps of the border fence and a difference in differences research design. I show that construction of the fence caused at least 2,000 additional deaths in the border region. The entire effect of border fence construction is due to escalation of violence in areas where smuggling routes were not blocked by the new border fence—territories that became relatively more valuable for smuggling.

We know very little about the effects of increased border security.[1] Yet the construction of border fences and walls around the world is widespread and accelerating (Hassner and Wittenberg, 2015; Carter and Poast, 2017; Vallet, 2014). The U.S. government is again planning a major expansion of border security infrastructure by building a large wall.

The paper proceeds as follows. The next section provides more information on the border fence constructed due to the Secure Fence Act. Section 3 develops a theory of fighting for territorial control by drug cartels and contrasts it with other explanations for the Mexican drug war. Section 4 explains the data and section 5 outlines the empirical strategy used to find the effect of the border wall construction on drug cartel violence. Section 6 overviews and results and finally section 7 concludes.

2 The Secure Fence Act

The Secure Fence Act was signed on October 26, 2006, requiring the US Department of Homeland Security (DHS) to construct double layered fencing along 850 miles of the US-Mexico border in five specific areas, but no funds were initially appropriated. Even after the passage of the Secure Fence Act, it was not clear the fence would actually be built as intended. Previous border security construction had been haphazard and plans were often proposed and not implemented.

In fact, the requirements of Secure Fence Act itself were relaxed by the time funding was appropriated a year later. The initial requirement of double fence was dropped, the mandated length was reduced to 700 km and the Secretary of Homeland Security was given authority to use his discretion as to the type and location of fencing. Initial plans for the fence were quickly stymied by environmental lawsuits, numerous landowners on the border refusing to sell their land, and multiple tracts of land for which the owner could not be determined.

[1] One important exception is Getmansky, Grossman and Wright (2017), who investigate the effect of border walls on property crime.

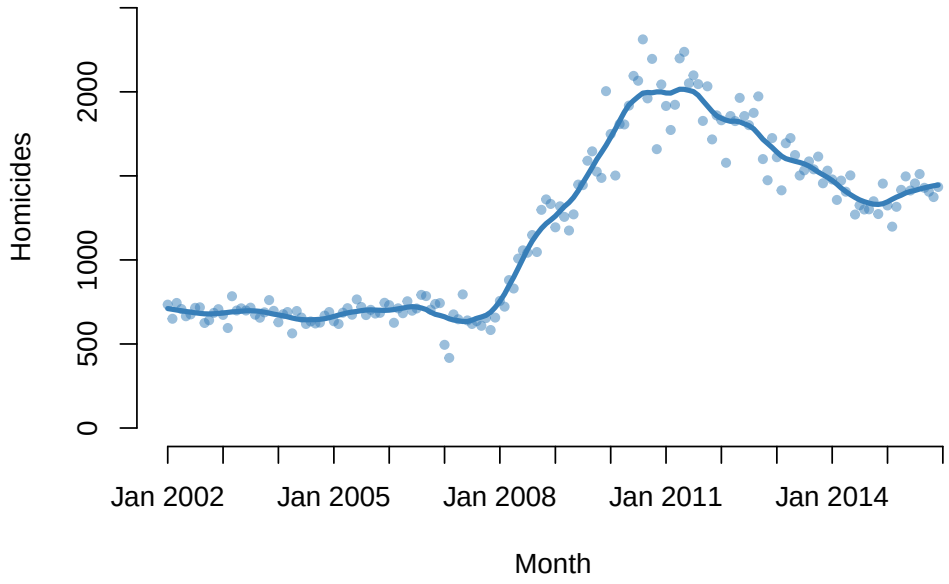

Figure 1: Violence in Mexico over time.

By September 30, 2007 only 2.32 miles of fencing had been constructed. Thus, it would not have been obvious to leaders of drug cartels that the Secure Fence Act would have a major impact on them. Only the actual construction of the fence indicated that a border fence of any significant size would actually be built. The exact location of the fence remained a secret. During construction plans continued to change due to cost overruns. The plans for the border fence were only released in 2011—after the fence was complete—after a long Freedom of Information Act lawsuit.

3 Explaining Violence in the Mexican Drug War

The intensity of the Mexican drug war increased dramatically in 2007, especially near the US border. Numerous explanations for the escalation of the drug war have been offered. These include the election of PAN mayors (Dell, 2015), the killing or arrest of cartel leaders (Calderón et al., 2015), uncertainty about government corruption(Zachary and Spaniel, 2015), and events in Colombia (Castillo, Mejia and Restrepo, 2013). I present another explanation: the construction of the border fence on the US-Mexico border changed the value of territory to drug cartels.

It is well known that inter-cartel violence is driven by competition between drug cartels over territory (Beittel, 2015). Territorial control is valuable to cartels as locations to grow and process

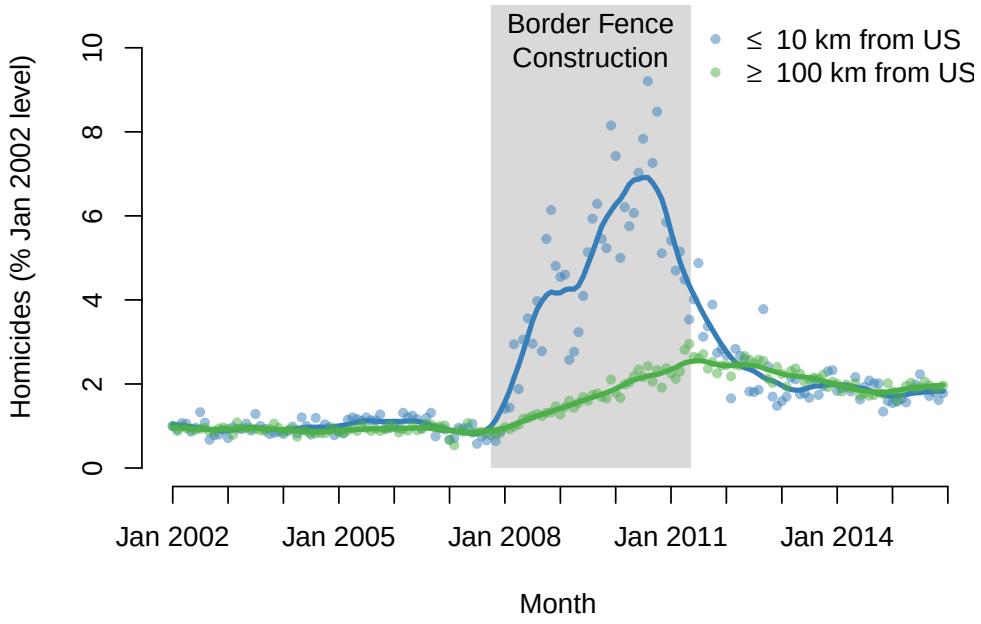

Figure 2: Violence in Mexico near and far from the U.S. border.

drugs, remain safe from the government, and smuggle drugs into and out of Mexico. The border region is especially valuable for its smuggling routes into the US. Physical border security, including walls and fences, changes the cost of smuggling by drug cartels. Often cartels make significant investments into circumventing border security. Multiple tunnels crossing the border between Tijuana and San Diego have been discovered.

Constructing a border wall changes the relative value of territory near the border for drug cartels, which upsets the equilibrium of territorial control. Fighting over territory can be limited by agreements between cartels about territorial control. This is ideal for cartels for the same reason it is for states: because negotiating agreements over territorial control is less costly than fighting (Fearon, 1995). This is not unusual. Non-state actors reaching agreements about territorial control and fighting when those agreements break down has be identified in organized crime (Klein, 1997; Gambetta, 1996, 7) and insurgent groups (Mampilly, 2011; Staniland, 2012).

Territory near the border is used by drug cartels to smuggle drugs across the border. Border fences directly affect the costs of smuggling. When a fence blocks a smuggling routes from a particular area, smuggling from that area becomes more costly and smuggling from other areas where routes across the border have not been blocked by the new fence become relatively less

costly. The change in the cost of smuggling directly affects the value of territory near the border to drug cartels. Areas near the new fence become less valuable to cartels and other areas with alternative smuggling routes become relatively more valuable. This shock to the value of territory controlled by drug cartels may cause cartels to fight over nearly more valuable territory.[2] If the fighting is actually caused by changes in the value of territory caused by the border fence, there should be increased competition over territory where smuggling routes were not blocked by the construction of the border fence.

Not only were there changes in the expected future value of territory to drug cartels it was unknown how they would be affected when the border fence was complete. When construction of the border fence began, there was some uncertainty about exactly where it would be located. Even when cartels could guess where the fence was likely to be built, uncertainty about how construction of the fence would affect smuggling revenues—both their own and the revenues of competing cartels. This uncertainty about future power and resources can lead to fighting.[3] However, fighting reveals which cartels are stronger, enabling them to reach agreements that were previously impossible due to differing beliefs about the balance of power (Fearon, 1995; Reiter, 2003; Powell, 2006). I hypothesize that cartels will fight over territory in the border region only while uncertainty about the long-term value of territory near the border remains—while the fence is being constructed. Once the relative value of territory is known and stops changing, new agreements can be reached, limiting the violence.

This implies both partial equilibrium and general equilibrium hypotheses. The partial equilibrium hypothesis is that near the border, violence will be displaced from territories where smuggling routes are blocked by the newly constructed border fence to areas where the value of the territory for smuggling has not been reduced by the border fence. The general equilibrium hypothesis is that the overall effect of the border fence on violence—combining areas where smuggling routes are blocked by the new border fence and other areas where smuggling could be displaced—will be positive while the fence is under construction.

[2]Changes in revenue to non-state actors has been shown to affect the production of violence in numerous other contexts (Berman et al., 2011; Dube and Vargas, 2013; Wright, 2016).

[3]In other contexts, it has been shown that expectations about the future matter for territorial control by non-state actors (Sánchez de la Sierra, 2015) and uncertainty has been linked to instability and increased risk of violence (Acharya and Lee, 2016).

4 Data on Drug War Violence and Construction of the Border Fence

I construct a locality-month panel dataset of violence and the border wall, combining data on the border fence released through a Freedom of Information Act (FIOA) lawsuit and coded from satellite imagery, data on violence compiled from death certificates, and locality characteristics compiled from a variety of sources.

Maps of the location of the border fence produced by Michael Baker Jr., Inc, the engineering firm that planned and managed the construction of the fence, were obtained through a Freedom of Information Act (FIOA) lawsuit against the U.S. Department of Homeland Security, U.S. Customs and Border Protection, and the U.S. Army Corps of Engineers and provided by the plaintiffs.[4] These maps show where the fence authorized by the Secure Fence Act was constructed, but do not indicate whether the fence replaced a prior border fence in the same location or if it was built in a location that never had a border fence. A newly constructed fence and a replaced existing fence are expected to affect smuggling routes and violence differently, so satellite imagery from 2006, the year before construction began, was used to code border fence that existed before the SFA.

To measure drug war violence I use data from death certificates for more than $200,000$ localities in Mexico. Previous studies of the Mexican drug war use data on violence at the municipality-level. However, only 39 municipalities are adjacent to the US border and, because of the large size of Mexican municipalities, the construction of the border fence has different impacts on different parts of the same municipality. The National Institute of Statistics and Geography has made available mortality microdata from death certificates issued by the Ministry of Health. This shows homicides in Mexico by locality—cities, towns, or villages—the smallest territorial unit in Mexico. Homicides related to drug trafficking organizations are not distinguished from other homicides, but drug related violence accounted for the vast majority of homicides in Mexico during this period.

Locality characteristics are compiled from a variety of sources. Locality-level population figures are from the 2005 census. Data on the local presence of drug cartels is from Coscia and Rios (2012), who machine code mentions of drug cartel activity from newspapers. Data on mayoral elections is from Dell (2015).

[4]Gilman v. U.S. Department of Homeland Security, No. 1:09-CV-00468 (D.D.C.)

Table 1: Summary Statistics Near US Border

Statistic	N	Mean	St. Dev.	Min	Max
New Fence					
Population 2005	150,696	108.450	1,071.428	0	22,007
Mean educational attainment 2005	150,696	8.847	0.651	6.440	9.230
Literacy rate 2005	150,696	98.665	0.577	97.000	99.600
Human development index 2005	150,696	0.811	0.008	0.783	0.820
Running water 2005	150,696	0.936	0.059	0.772	0.979
Sewer 2005	150,696	0.880	0.027	0.778	0.972
Electricity 2005	150,696	0.967	0.021	0.913	0.986
Urban	150,696	0.008	0.088	0	1
Criminal charges per 1000 pop. 2005	150,696	7.638	2.650	1.831	20.216
Gun charges percent 2005	150,696	13.482	4.364	2.890	30.556
Drug charges percent 2005	150,696	14.192	5.707	4.818	35.857
Number of cartels 2005	150,696	1.847	0.692	0	3
PAN mayor 2005	150,696	0.061	0.240	0	1
PRI mayor 2005	150,696	0.939	0.240	0	1
PRD mayor 2005	150,696	0.000	0.000	0	0
No New Fence					
Population 2005	192,192	2,142.095	43,242.800	0	1,286,187
Mean educational attainment 2005	192,192	8.241	0.557	6.290	9.230
Literacy rate 2005	192,192	98.268	0.840	97.000	99.600
Human development index 2005	192,192	0.805	0.008	0.783	0.820
Running water 2005	192,192	0.901	0.079	0.772	0.979
Sewer 2005	192,192	0.901	0.048	0.782	0.972
Electricity 2005	192,192	0.942	0.023	0.911	0.986
Urban	192,192	0.010	0.098	0	1
Criminal charges per 1000 pop. 2005	192,192	7.983	3.819	0.731	20.216
Gun charges percent 2005	192,192	11.578	6.667	0.000	30.556
Drug charges percent 2005	192,192	16.848	9.695	4.818	35.857
Number of cartels 2005	192,192	1.568	1.096	0	3
PAN mayor 2005	192,192	0.343	0.475	0	1
PRI mayor 2005	192,192	0.657	0.475	0	1
PRD mayor 2005	192,192	0.005	0.072	0	1
Fence Replaced					
Population 2005	15,288	178.956	1,201.676	0	10,061
Mean educational attainment 2005	15,288	7.982	0.617	6.290	9.180
Literacy rate 2005	15,288	98.811	0.671	97.000	99.600
Human development index 2005	15,288	0.800	0.007	0.789	0.820
Running water 2005	15,288	0.945	0.055	0.797	0.979
Sewer 2005	15,288	0.935	0.049	0.782	0.972
Electricity 2005	15,288	0.943	0.015	0.911	0.986
Urban	15,288	0.022	0.147	0	1
Criminal charges per 1000 pop. 2005	15,288	8.620	4.135	0.731	20.216
Gun charges percent 2005	15,288	7.457	4.597	0.000	18.327
Drug charges percent 2005	15,288	24.373	7.409	4.818	35.857
Number of cartels 2005	15,288	0.714	0.788	0	3
PAN mayor 2005	15,288	0.615	0.487	0	1
PRI mayor 2005	15,288	0.385	0.487	0	1
PRD mayor 2005	15,288	0.044	0.205	0	1
Port of Entry					
Population 2005	115,584	3,543.315	55,716.710	0	1,286,187
Mean educational attainment 2005	115,584	8.318	0.428	6.290	9.230
Literacy rate 2005	115,584	98.451	0.799	97.000	99.600
Human development index 2005	115,584	0.805	0.007	0.783	0.820
Running water 2005	115,584	0.918	0.079	0.772	0.979
Sewer 2005	115,584	0.907	0.049	0.782	0.972
Electricity 2005	115,584	0.947	0.021	0.913	0.986
Urban	115,584	0.015	0.120	0	1
Criminal charges per 1000 pop. 2005	115,584	8.018	3.329	0.731	20.216
Gun charges percent 2005	115,584	10.011	6.589	0.000	30.556
Drug charges percent 2005	115,584	17.278	8.702	4.818	35.857
Number of cartels 2005	115,584	1.593	0.968	0	3
PAN mayor 2005	115,584	0.455	0.498	0	1
PRI mayor 2005	115,584	0.545	0.498	0	1
PRD mayor 2005	115,584	0.006	0.076	0	1

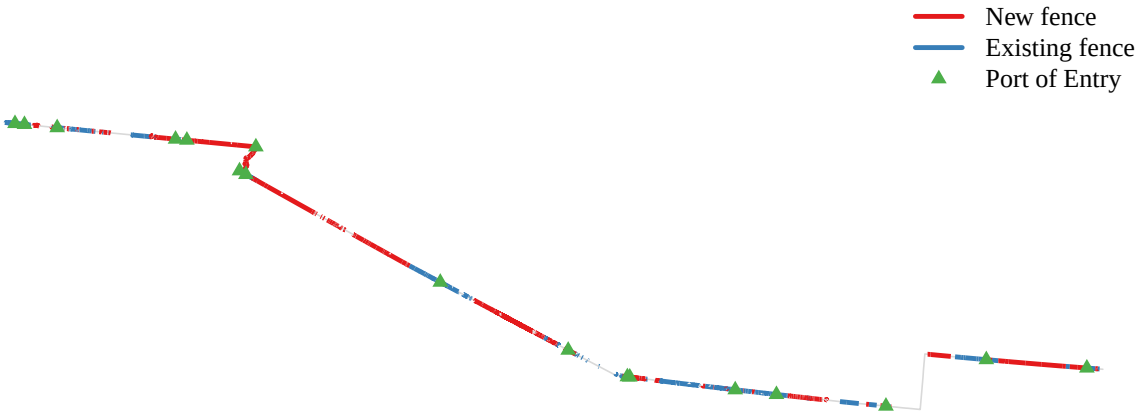

Figure 3: Fencing along the Mexican border in California, Arizona, and New Mexico both before the Secure Fence Act and locations of fence construction between 2007 and 2011.

5 Empirical Strategy

In order to assess the effect of the construction of the border fence on violence in the Mexican drug war, I use a difference in differences design to compare changes in violence in localities affected by construction of the border fence to changes in violence in localities not directly affect by construction of the border fence. In order to test the hypothesis that violence is displaced from areas where the border fence is built to other areas near the border I restrict the sample to localities within 10 km of the border. To find the general equilibrium effect of the construction of the border fence, combining direct and spillover effects, I compare localities within 10 km of the U.S. with localities greater than 100 km from the U.S. to prevent the potential for spillovers between treatment and control groups.

Both local and general equilibrium analyses are estimated with the same difference in differences specification,

$$log(y_{i,t}) = \alpha(T_i \times Construction_t) + \beta(T_i \times Post_t) + \delta_i + \gamma_t + \epsilon_{i,t} \quad (1)$$

where $y_{i,t}$ is the number of homicides in locality i at time t, T_i is a treatment indicator, $Construction_t$

indicates the period during fence construction, $Post_t$ indicates the period after construction was complete, and δ_i and γ_t represents locality and month fixed effects. The locality fixed effects will remove time-invariant characteristics correlated with homicide rates and treatment status. Time fixed effects remove trends in violence common to all localities. I use a conditional fixed effects Poisson model because the count of homicides in a locality month is clustered at low values and left censored. As suggested by Cameron and Trivedi (2009), I cluster standard errors at the locality level to account for possible violations of the assumption that the conditional mean is equal to the variance. A Negative Binomial model is an alternative that explicitly allows for over-dispersion, but its consistency is more sensitive to the assumption of the distribution of the error term.

The unit of analysis is the locality-month from the beginning of 2002 to the end of 2015. A geographically fine-grained unit of analysis is important because the border fence is made up of many, often small, unconnected segments, so larger geographic units are partially treated. Municipalities, the administrative unit above localities, have areas along their borders with the U.S. where there is newly constructed border fence, no border fence, and previously existing fence. September 30, 2007 to May 10, 2011 is the construction period. September 30, 2007 is the first date the Government Accounting Office lists any construction progress on the border fence.[5] May 10, 2011 is the day Barack Obama announced the completion of the border fence (Obama, 2011). The post-construction period is after May 11, 2011.

To estimate the displacement effect of the construction of the border fence, the treatment indicator, T_i, indicates whether a shortest-path smuggling route from a locality into the U.S. is blocked by a newly constructed border fence. A locality near the U.S. border is coded as directly affected by the border fence if a straight line from the locality reaching 5 km into the U.S. passes through a border fence.[6] This is done because the border fence is sometimes over 1 km into the U.S. There may be alternative smuggling routes, but for localities near the U.S. border, blocking the most direct route into the U.S. with a fence will increase the travel distance and therefore the costs of smuggling from that locality. Due to the high density of localities, alternative smuggling routes will involve travel through other localities where the best path into the U.S. is not blocked

[5] See http://www.gao.gov/new.items/d09244r.pdf

[6] An alternative used by Dell (2015) is to calculate optimal smuggling routes on road networks. This is not possible in this context because the type of drug smuggling potentially blocked by a border wall is not along roads, which cross the border only at official ports of entry.

by a border fence.

The set of localities potentially affected by construction of the border fence is conservatively restricted to localities within 10 km of the border with California, Arizona, and New Mexico. Localities very close to the U.S. border are likely to be the most valuable for smuggling, as smugglers must cross these areas to reach the U.S. It is less clear how small changes in the border fence might affect smuggling from localities farther from the U.S. Localities near the Texas border are not considered for three reasons. First, less than 15 km of the SFA fence was constructed along the Texas border because the Rio Grande provides a natural barrier. These localities are a poor control group because DHS's strategic decision not to build a border fence in these areas indicates differences that might affect trends. With the exception of Juarez, areas of Mexico bordering Texas are much more rural and poorer than areas in Mexico bordering California, Arizona, and New Mexico. Second, the border fence that was built in Texas was delayed by cost overruns and lawsuits. All of the border fence built in California, Arizona, and New Mexico was built between September 30, 2007 and May 10, 2011, but fence construction in some parts of Texas did not start until 2013. It is unclear from the data DHS has released exactly when different border fences in Texas were built, which is necessary to code the construction and post-construction period indicators. Third, because of the huge distance, the Texas border would be an unlikely location to displace smuggling routes from localities near California, Arizona, and New Mexico. Nearer areas where no new border fence was built are likely to be better alternative smuggling routes.

To estimate the general equilibrium effect of the construction of the border fence it is necessary to compare the change in violence both in areas directly affected by the border fence and and areas where smuggling might have be displaced and which become more valuable to drug cartels to violence in areas unaffected by construction of the border fence. This means the treatment group should be all localities near the U.S. border, control of which is either relatively more or less valuable to drug cartels after construction of the border fence. Therefore, the treatment indicator for the general equilibrium analysis, T_i, indicates whether a locality is within 10 km of the border with California, Arizona, or New Mexico. Texas is again excluded, for the reasons given above and for consistency.

6 Results

The theory presented in section 3 implies that the shock to the value of territory controlled by drug cartels due to the construction of the border fence will cause competition between drug cartels for territorial control. This leads to the hypotheses that construction of the border fence will (1) displace violence from localities where border fence construction increases the costs of smuggling and thus lowers the value of territorial control to areas where the relative value of territorial control has increased and (2) increase the overall level of violence in the border region. These effects are expected during the period when the border fence is under construction because the construction plans—and therefore the final value of territorial control—were unknown. Once construction was complete the relative value of different territories became know to the drug cartels and agreements over territorial control between cartels could reduce fighting, so violence is expected to be lower after construction is complete compared to the period when the border fence was being constructed.

6.1 Displacement Effects of Border Fence Construction

In this section I examine the hypothesis that construction of the border fence displaced violence from areas where the new fence increased the difficulty of smuggling and lowered the value of the territory to drug cartels to other areas near the border where border security was not increased. Areas not next to newly constructed border fence are alternative smuggling routes, so the relative value of these territories to drug smugglers will increase. Violence is expected to increase these alternatives due to competition between drug cartels for control of these territories.

All localities near the border where a new fence is not constructed are alternatives to localities where smuggling is more costly due to border fence construction. These include areas where no fence is constructed, areas where a prior border fence existed, and ports of entry into the U.S. The cost of using these smuggling routes has not changed, but alternatives are more costly after the SFA fence is built, so these areas become relatively more valuable to drug cartels.

Table 2 shows difference in differences estimates of equation 1 for localities within 10 km of the U.S. Column (1) shows that Mexican localities next to a newly constructed fence along the U.S. border experienced an additional 1.282 log-point, or 72.3 percent, decrease in violence compared to localities where no new fence was built during the period of fence construction and a 0.727

log-point, or 51.6 percent, reduction in violence in the period after construction of the fence was completed.

The identifying assumption of the difference in differences estimator is that trends in homicides in in treated and untreated groups would be parallel in the absence of the treatment. The trends do appear parallel prior to construction of the SFA fence, but the locations chosen for new fence construction but the DHS strategic, which has an interest in reducing drug smuggling into the U.S. Because of these strategic decisions as to the location of the border fence, it is possible that the fence was more likely to be built in areas where the exceptions of future violence were higher. It could also be that the presence of nearby construction crews affected violence. If that is the case, the counterfactual trends may not have been parallel, resulting in a biased estimate in model (1). A solution to this concern is to compare areas where the fence was newly constructed to areas where existing border fence was replaced. Both areas where strategically chosen by DHS as locations where a border fence should be built, but in areas where border fence was replaced, rather than newly constructed, the value of the territory to drug cartels has not decreased. In these localities the additional cost of smuggling across a border fence should have existed prior to the SFA fence. This provides a more stringent test of the hypothesis that violence will be displaced from areas where the border fence is constructed. Model (2) shows that localities near the U.S. border affected by a newly constructed fence experienced an additional 2.312 log-point, or 90.1 percent, decrease in violence compared to localities where existing border fence was replaced during the construction period and a 1.960 log-point, or 85.9 percent, decrease in violence after the fence was constructed.

The border fence may increase the cost of smuggling drugs across parts of the border that are not authorized crossings, but does not directly affect the ease of smuggling through official ports of entry into the U.S. Control of territory near these official border crossings is expected to become increasingly valuable when fence is constructed along more of the border, so violence is expected to be displaced from areas where the border fence is constructed to areas near U.S. ports of entry. Localities are identified as near U.S. ports of entry if they are within 10 km of an official port of entry. Model (3) shows that localities near the U.S. border affected by a newly constructed fence experienced an additional 1.285 log-point, or 72.3 percent, decrease in violence compared to localities near U.S. ports of entry and a 0.729 log-point, or 51.8 percent, decrease in violence after the fence was constructed.

Analyses comparing localities near the border cannot distinguish overall changes in the level of violence caused by construction of the border fence from the displacement of violence within the area near the border. Using only localities near the U.S. border, as in table 2, it is impossible to distinguish whether construction of the border fence reduced violence or just displaced it to areas more valuable to for smuggling, as hypothesized.

Table 2: Displacement of Violence near US Border

	(1)	(2)	(3)
$T_i \times Construction_t$	-1.282^{***}	-2.312^{***}	-1.285^{***}
	(0.281)	(0.320)	(0.281)
$T_i \times Post_t$	-0.727^{***}	-1.960^{***}	-0.729^{***}
	(0.259)	(0.747)	(0.259)
Treatment group	New fence	New fence	New fence
Control group	No new fence	Replaced fence	Port of entry
Observations	342,888	165,984	266,280

Note: Standard errors clustered at the locality level.

6.2 General Equilibrium Effects of Border Fence Construction

Comparing changes between localities near the U.S. border in the previous section only results in estimates of partial equilibrium effects. These results cannot determine whether the construction of the border fence affected violence in Mexico because of the potential for violence to be displaced to relatively more valuable territory where the border fence was not built. The only way to find the general equilibrium effect of the construction of the border fence is to compare areas near the U.S. border that were directly affected by the construction of the border fence to a control group that was not directly affected by the construction of the border fence. Violence could be displaced to any area that is newly more valuable for smuggling when the border fence is built. This could be any area near the U.S. border, so the treatment group to find the general equilibrium effect of

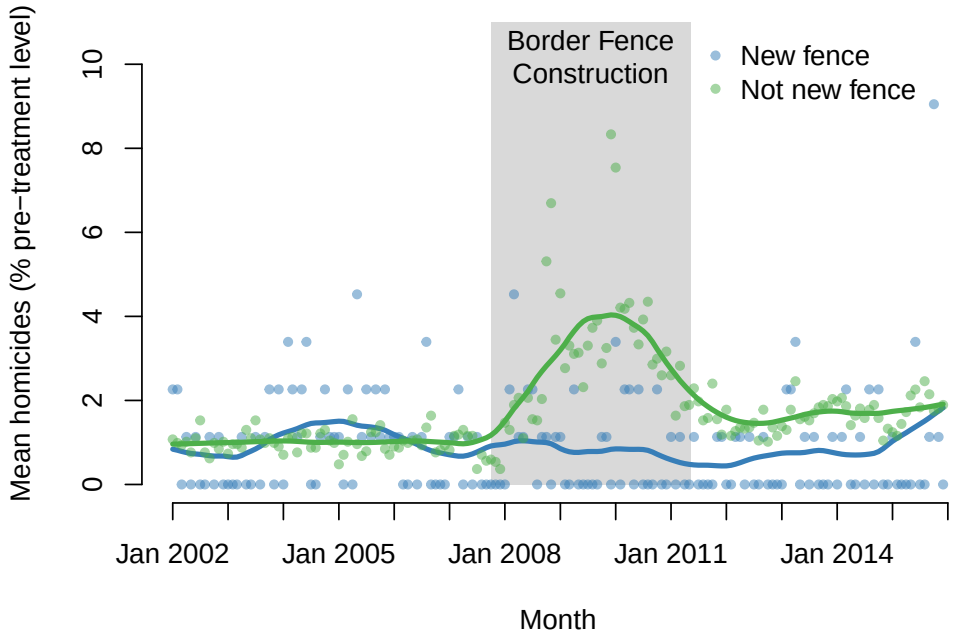

Figure 4: Homicides in localities with new border fence construction compared to homicides in all other localities.

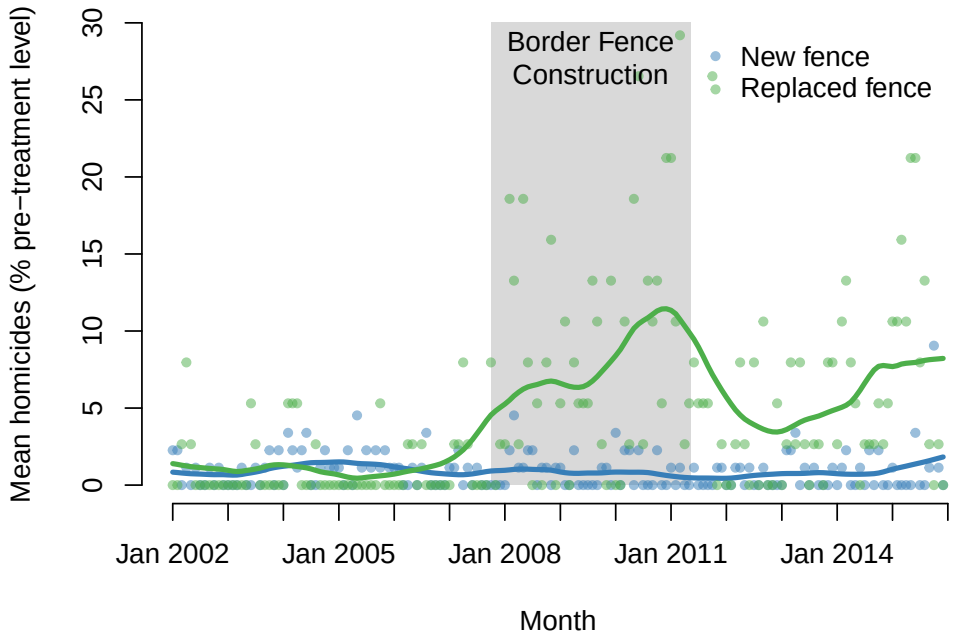

Figure 5: Homicides in localities with new border fence construction compared to homicides in localities with replacements of existing border fence.

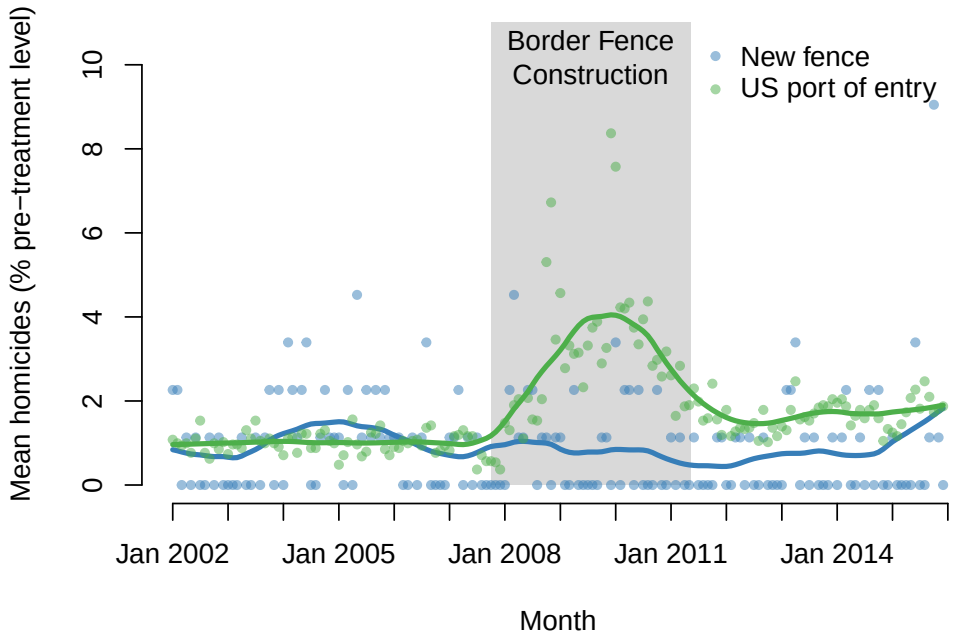

Figure 6: Homicides in localities with new border fence construction compared to homicides in localities near US ports of entry.

the border fence is all localities near the U.S. border. This treatment group combines localities near newly constructed fences that become less valuable to drug cartels and localities not near new border fences where violence could have been displaced. A control group unaffected by the border fence must not be near the U.S. border. I use localities in Mexico at least 100 km from the U.S. border as a control group to avoid the potential for displacement of violence from the treatment group near the border to the control group.

The general equilibrium effect of the border fence can be found by combining areas directly effected by fence and areas where violence might be displaced, which were the treatment and control groups in the previous section, to form the treatment group. If there is no displacement effect, of the displacement effect is smaller than the local reduction in violence caused by the border fence, the estimated effect should remain negative. However, if constructing the border fence causes more violence in localities that become relatively more valuable than it reduces in localities near the fence that become less valuable, there should be a positive effect.

Table 3 shows general equilibrium difference in differences estimates of equation 1 comparing localities within 10 km of the U.S. to localities at least 100 km from the U.S. Column (1) shows that Mexican localities near the U.S. border experienced an additional 0.464 log-point, or 59.0 percent,

increase in violence compared to a 1 percent sample of localities not near the U.S. border during the period of fence construction and a 0.324 log-point, or 27.7 percent, reduction in violence in the period after construction of the fence was completed. An average of 36.3 homicides per month occurred within 10 km of the U.S. states of California, Arizona, and New Mexico, so an additional 59 percent increase represents an additional 942 homicides during the period that border fence was being constructed.

Difference in differences estimates relies on the assumption that if the border fence had not been built, violence in the border region and violence in the control region would have had the same trends over time. The main concern in selecting a control group is that border localities and control localities may differ in ways related to the trends in violence over time. There is a concern that all localities in Mexico far from the border is not an ideal control group for localities near the border that may have been affected, directly or through displacement, by the construction of the border fence. Pre-treatment trends appear parallel, but it may be the that areas near the border are unique because of the value of the territory for cross-border smuggling and that this affects trends. This suggests localities near Mexico's southern border with Guatemala and Belize as a control group. Drugs are smuggled across this border by cartels, but no border fence was build along Mexico's southern border. Column (2) in table 3 shows that Mexican localities near the U.S. border experienced an additional 0.880 log-point, or 141.1 percent, increase in violence compared to localities near Mexico's southern border. This represents an additional 51 homicides per month near the U.S. border or 2252 additional homicides during the period that border fence was being constructed.

It may be that localities near the U.S. border differ in ways that affect trends in homicides from localities that are not near the border. Localities near the U.S. border differed prior to construction of the border fence from those far from the border in ways previous research has indicated may affect drug war violence. Localities near the border are on average richer, better educated, and differ in crime rates, drug cartel presence, and political parties elected. To alleviate the concern that the results may be driven by these differences, I construct control group from localities at least 100 km from the U.S border matched on pre-treatment covariates. I use nearest neighbor propensity score matching without replacement to match on pre-treatment population, average education level, literacy rate, the human development index, indices of access to running water, sewer, and

electricity, urban or rural status, criminal charges, gun charges, drug charges, the presence of drug cartels before the fence was constructed and the political party of the mayor. This substantially improves covariate balance. Column (3) in table 3 shows that Mexican localities near the U.S. border experienced an additional 0.904 log-point, or 146 percent, increase in violence compared to the matched localities. This represents an additional 53 homicides per month near the U.S. border or 2346 additional homicides during the period that border fence was being constructed.

Table 3: Overall Effect of Border Fence Construction

	(1)	(2)	(3)
$T_i \times Construction_t$	0.464***	0.880***	0.904***
	(0.159)	(0.185)	(0.224)
$T_i \times Post_t$	-0.324***	−0.101	−0.028
	(0.113)	(0.208)	(0.273)
Treatment group	Near US border	Near US border	Near border
Control group	Rest of Mexico	Southern border	Matched in rest of Mexico
Observations	6,082,104	643,440	685,776

Note: Standard errors clustered at the locality level.

7 Conclusion

In this paper I have shown that governments' decisions about border security can have profound effects beyond their own borders. Specifically, I study how shocks to the value of territory for drug smuggling caused by the U.S. construction of a fence on the Mexican border affects violence by drug cartels in Mexico.

I show that construction of the border fence displaced violence from areas in Mexico where territory became less valuable to drug smugglers—localities where the new fence blocked smuggling routes—to areas where the relative value of territorial control for smuggling increased. These include areas where no fence was constructed, where previous border fence was replaced, and ports

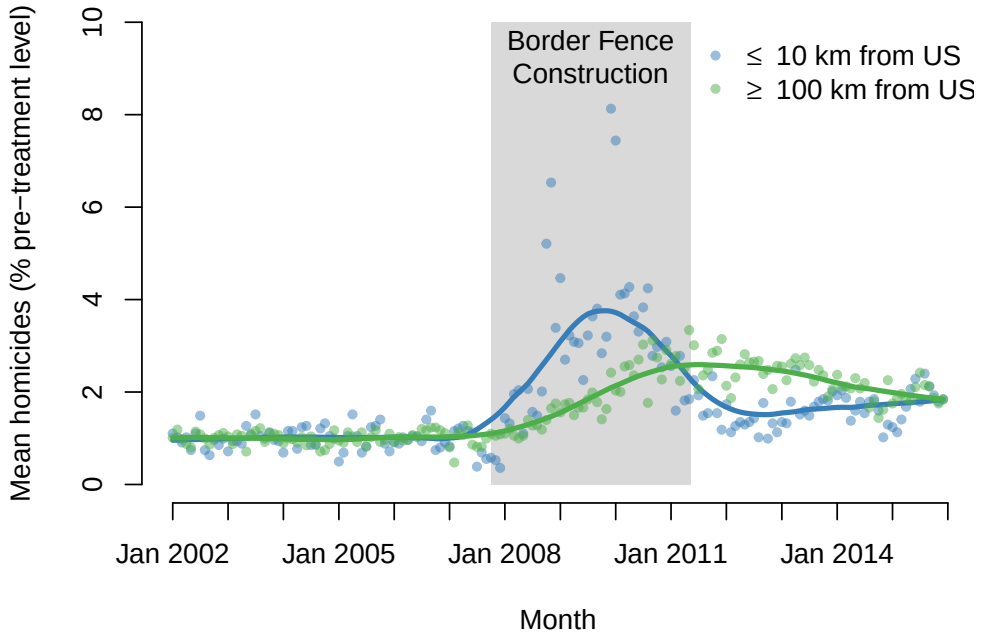

Figure 7: Homicides in localities near the border compared to homicides in a one percent sample of all localities not near the border.

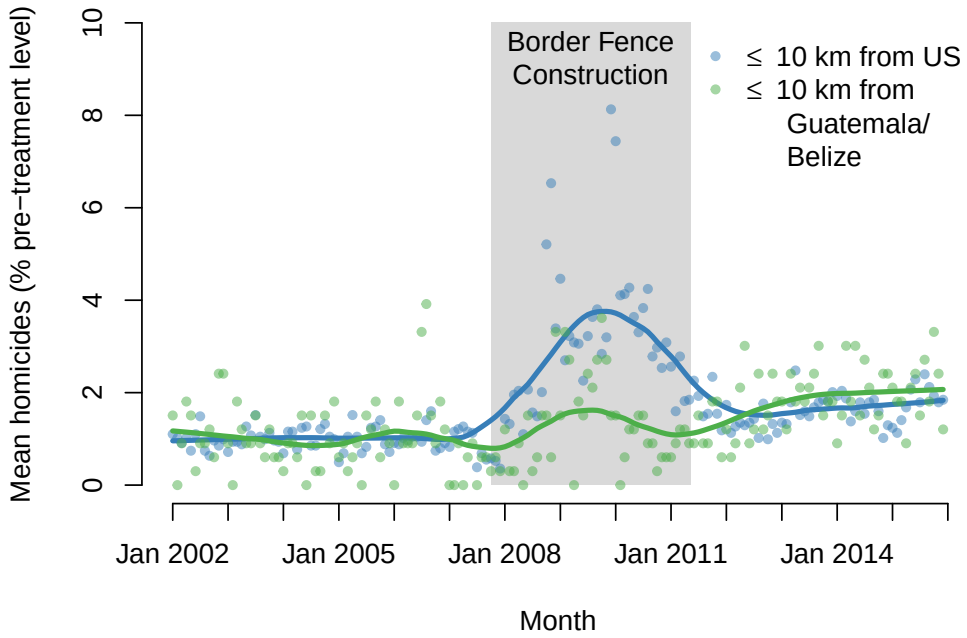

Figure 8: Homicides in localities near the border compared to homicides near the southern border with Guatemala and Belize.

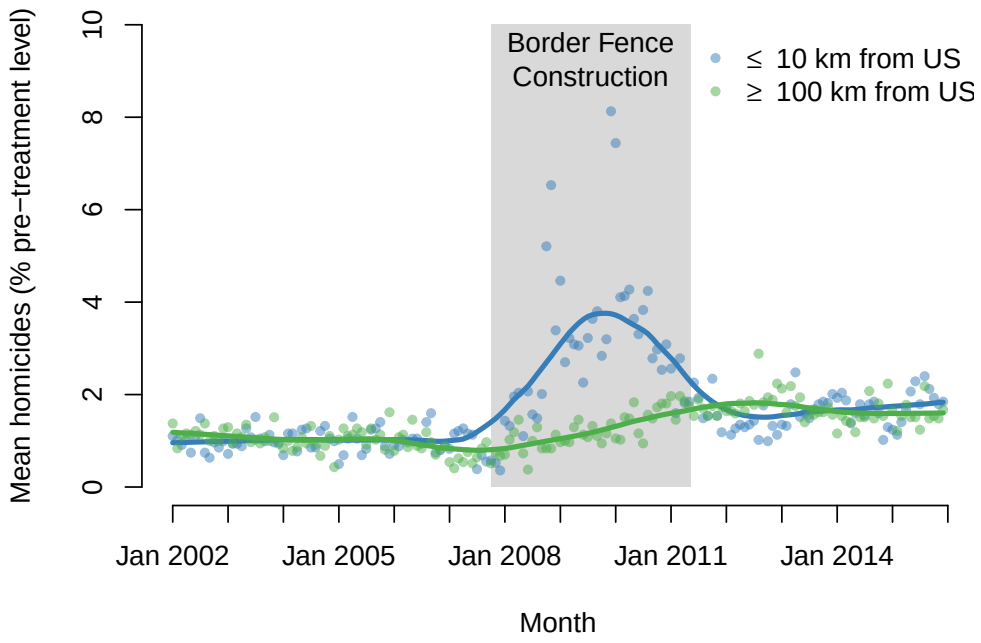

Figure 9: Homicides in localities near the border compared to homicides in a propensity score matched set of localities not near the border.

of entry into the U.S. Overall, construction of the border fence not only shifted the location of violence in Mexico, but caused increased violence in areas of Mexico near the U.S. border. The estimated effects are large and unrelated to differences in economic conditions, crime rates, the activities of drug cartels or electoral politics before the construction of the border fence.

Estimates suggest that in localities within 10 km of the US border the number of homicides increased by 146 percent. This is an additional 2,346 homicides during the construction of the border fence compared to similar localities at least 100 km from the border. The construction of the border fence accounts for 48.9 percent of the additional homicides near the U.S. border during this period.

These results speak to current proposals in the U.S. to expand the fence along the border with Mexico, which largely do not consider its potential to intensify the drug war in Mexico. Since increases in border security does not directly affect demand for drugs in the U.S., drug cartels in Mexico will continue to have incentives to control territory along the U.S. border in order to smuggle drugs into the U.S. Any change in border security, even a wall or fence along the entire border will change the relative value of this territory to drug cartels, which can upset prior agreements about territorial control and cause fighting between cartels.

By demonstrating that construction of the border fence caused drug cartel violence, I provide evidence that non-state actors fight to control territory and that the value of the territory affects their willingness to fight. The increase in violence persisted only while the fence was under construction—while exact location and effects on smuggling revenues remained uncertain. This suggests that uncertainty over the future value of territory for smuggling prevented drug cartels from reaching agreements about territorial control that would have prevented fighting between cartels.

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