Profits and Violence in Illegal Markets: Evidence from Venezuela

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Abstract

Some theories predict that profits facilitate peace in illegal markets, while others predict that profits fuel violence. I provide empirical evidence from drug trafficking in Venezuela. Using original data, I compare lethal violence trends in municipalities near a major trafficking route to trends elsewhere, both before and after counternarcotics policy in neighboring Colombia increased the use of Venezuelan transport routes. For thirty years prior to this policy change, lethal violence trends were similar; afterward, outcomes diverged: violence increased more along the trafficking route than elsewhere. Together with qualitative accounts, these findings illuminate the conditions under which profits fuel violence in illegal markets.

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1 Introduction

Life without property rights seldom devolves into war of all against all. In medieval England, for example, rural landholders often farmed in peace, without centralized enforcement of land claims (Bates et al., 2002, p. 601–602). In colonial South America, smugglers rarely killed each other, although they could not appeal disputes to the Crown (Grahn, 1997).

Even in today's notoriously violent illegal drug markets—the subject of this article—traffickers sometimes find nonviolent ways to do business, notwithstanding the fact that they cannot take each other to court (e.g. Duran-Martinez, 2015, p. 1378). Researchers have studied this variation, asking why violence in illegal markets is common but inconstant. Part of the answer is well understood. Violence generally rises with the number of competing traffickers (Castillo and Kronick, 2017; Calderón et al., 2015, p. 1472–1474) and with unconditional government crackdowns (Lessing, 2018).

But one key determinant of conflict—the magnitude of the contested profits—is the subject of debate. Some theories predict that booms in illegal markets facilitate peace, while others predict that booms fuel violence. There is qualitative evidence on both sides (e.g., Duran-Martinez, 2015a, p. 123; 2015b, p. 1393–6). How violence responds to profits in illegal markets thus remains an empirical question.

In this paper, I find that the growth of illegal drug trafficking increased lethal violence in Venezuela. Using an original data set constructed from Ministry of Health records, I compare lethal violence trends in Venezuelan municipalities near a major trafficking route, the Panamerican Highway, to trends in other municipalities, both before and after 1989, when counternarcotics operations in neighboring Colombia increased the use of Venezuelan transport routes.

I find that, for thirty years prior to 1989, violent death rates and trends were nearly identical in these two groups of municipalities. After 1989, the trends and rates diverged: violence increased more in municipalities along the Panamerican Highway ($N = 80$) than elsewhere in the country ($N = 251$). I estimate the unconditional difference-in-differences at approximately 16 violent deaths per 100,000; after accounting for municipality-specific time trends and other factors, I estimate the difference-in-differences at 7 violent deaths per 100,000—approximately half of the overall pre-1989 violent death rate.

Together with qualitative accounts, I interpret this result as evidence that the trafficking boom—rather than some other concurrent event—drove the divergence in violent death rates. Shifts in the age distribution of victims (Section 4) and placebo tests (Section 3.3) are consistent with this interpretation. For example, I find no difference-in-differences in infant death rates, an outcome unlikely to have been affected by trafficking-related violence but plausibly affected by economic conditions that, had they changed differentially across groups, might account for the divergence in violent death rates. Moreover, as I discuss in Section 4, trafficking along the Panamericana predated 1989; what changed was not the *presence* of traffickers but rather their profits.

While trafficking profits are unobservable, I draw on newspaper articles, Venezuelan sociological literature, and interviews with government officials to describe two links between the trafficking boom and trafficking profits. First, because Colombia's crackdown increased demand for Venezuelan trafficking routes, it raised the fees paid by international drug cartels to locals who controlled those routes; Sections 2 and 4 present examples of the associated violent conflict. Second, these fees were sometimes paid in kind—i.e., in illicit drugs—and then sold to consumers within Venezuela; the consequent "increase in microtrafficking has been a major contributor to homicide rates" (ICG, 2011).

These sources also suggest why the Venezuelan case appears more consistent with models in which trafficking profits fuel violence than with models in which profits facilitate peace. Uncertainty about Colombian policy or Venezuelan government responses might have led traffickers to expect that the boom would be short-lived. And relative to, say, the Mexican trafficking industry in the 1990s, the Venezuelan business was much more fragmented; fragmentation generally hampers peaceful pacts among traffickers (Castillo and Kronick, 2017). Section 4 discusses these and other potential mechanisms.

These findings contribute to the empirical literature on violence in illegal markets (Dube et al., 2015; Dell, 2015; Chimeli and Soares, 2011; Mejia and Restrepo, 2011; Owens, 2014; Adda et al., 2014). The Venezuelan setting provides a number of inferential advantages. First, conflict did not predate the growth of the trafficking market (as it did in, e.g., Colombia); lethal violence was no more prevalent in Venezuela than in the United States in the 1980s. This makes the Venezuelan case more relevant for the many countries without recent epidemics of lethal violence. Second, the growth in trafficking in Venezuela did not coincide with major, unobserved shifts in domestic security policy (as it did in Mexico).[1] Moreover, relative to these cases (Colombia, Mexico) and others (such as Brazil), violence in Venezuela is poorly understood. To the best of

[1] In particular, the concern for empirical studies of the drug war in Mexico is that military deployments (during the government of Felipe Calderón) are unobserved.

my knowledge, this is the first study of Venezuelan violence in the quantitative empirical literature.

The results also speak to research on the determinants of violence in Latin America. The Venezuelan case provides little support for the notion that demographic trends (De Mello and Schneider, 2010) or inequality (Soares and Naritomi, 2010) explain shifts in homicide rates; however, it is consistent with recent evidence that counternarcotics operations in one country can dramatically affect homicide rates along supply routes in other countries (Yashar, 2018; Castillo et al., 2018). And within the qualitative literature, whether drug trafficking fuels violence in Venezuela remains an open question (compare, e.g., ICG, 2011; Antillano, 2009). The results presented here suggest that it does.

2 Context: Trafficking and violence in Venezuela

2.1 Drug trafficking moves into Venezuela

In the early 1990s, government officials and journalists sounded alarms about a surge in drug trafficking through Venezuela. A U.S. drug official announced that Venezuela had become the second-biggest transshipment point (after Colombia) (Brooke, 1992). The Venezuelan president called trafficking "a cancer sapping the body of the nation" (Andrés Pérez, 1992). A reporter summarized the change by recalling that, as recently as 1989, no one had thought about inviting Venezuela to the anti-drug summit in Cartagena—but that by 1992, "few anti-narcotics experts [were] overlooking [the country]," which had become "a major operations center for the cocaine trade" and a participant in that year's anti-drug summit (Yarbro, 1992).

While there are no direct measures of illegal drug shipments, the U.S. government does estimate the volume of cocaine moving through each major trafficking country. These figures are consistent with the accounts quoted above: the estimates document a substantial increase in cocaine trafficking through Venezuela in the early 1990s (see Appendix C.1 for data and discussion). Drug-related arrests in Venezuela increased, too (Appendix C.1). And prosecutors convicted numerous Venezuelan and Colombian traffickers for moving large shipments of cocaine through Venezuela during this period.[2]

[2]As an example of large-scale cocaine transshipment through Venezuela in 1990–1991, consider the case of Tranca. This Venezuelan company packed at least 50 tons of cocaine into hollow cement posts and shipped them to the United States; six of the traffickers were

Contemporary observers proposed two explanations for the new use of Venezuelan trafficking routes: increased pressure on traffickers within Colombia, and bilateral trade liberalization between Colombia and Venezuela.

In 1989, the Colombian government intensified counternarcotics operations, enabled in part by counternarcotics assistance from George H. W. Bush's Andean Initiative, enacted that year (Appendix C.1; Serafino, 2003, p. 1). In addition to the pursuit of high-profile traffickers such as Pablo Escobar, the campaign involved the interdiction of large quantities of cocaine, the destruction of cocaine laboratories, the seizure of small aircraft, and the arrest of thousands of traffickers, among other activities that "[threw into disarray] the operations of the country's cocaine mafias" (U.S. Department of State, 1990, p. 123). The International Narcotics Control Strategy Report identified 1989 as "by far the best year ever for Colombia's anti-drug effort" (ibid, p. 125).

Politicians on both sides of the border cited this campaign as one of the factors pushing drug trafficking through Venezuela. Carlos Andrés Perez, then the president of Venezuela, told The New York *Times* that "the intensified struggle against drug trafficking in Colombia undoubtedly means the threat of an increase in Venezuela;" the interview appeared under the headline "Colombian Drug Cartels Push into Venezuela" (Brooke, 1991). In Colombia, an advisor to the Foreign Affairs committee (*Comisión Segunda*) of the House of Representatives said that "they did not anticipate how traffickers, persecuted in Colombia, would look for an exit. That exit was Venezuela" (El Tiempo, 1991).

The second proposed explanation for the surge in trafficking through Venezuela was bilateral trade opening with Colombia. Liberalizing reforms in 1990 and 1991 preceded a 1992 customs union, all of which increased (legal) trade flows (Gutiérrez, 2002, p. 49). Government officials and journalists claimed that illegal flows rose, too, arguing that more and bigger trucks crossing the border made it harder for customs agents to catch drug shipments, "showing free trade's underside" (Brooke, 1992; El Tiempo, 1991).

By a similar logic, the implementation of Plan Colombia and President Álvaro Uribe's Democratic Security policy in the early and mid-2000s likely contributed to a second jump in the volume of cocaine transiting Venezuela (Figure C.3a). Consider, for example, the August 2003 implementation of an aggressive campaign targeting suspicious aircraft in Colombian airspace.[3] According to radar

arrested in Venezuela (UPI, 1991; El Tiempo, 1995).

[3] Technically, this campaign was the resumption of an earlier effort—the Air Bridge Denial Program—that was suspended in 2001 after the fatal shootdown of a small plane carrying five U.S. citizens who were serving as missionaries in Peru (GAO, 2005, p. 1; United States Senate,

data, traffickers responded by shifting to airstrips on the Venezuelan side of the border (GAO, 2009, p. 10; Figure C.4).

Domestic (Venezuelan) policy certainly also affected trafficking, but academic reviews do not identify clear and coincident shifts in local counternarcotics enforcement.[4] In my view, the policies summarized here constitute the most plausible explanations for changes in trafficking flows through Venezuela in the early 1990s and the early 2000s (Figure C.3a).

2.2 A connection between trafficking and violence?

As drug trafficking through Venezuela increased, the violent death rate rose from approximately 12 per 100,000 in the mid-1980s to 30 per 100,000 in the mid-1990s, 60 per 100,000 in the mid-2000s, and then 69 per 100,000 in 2012. Appendix Figure C.1 compares this trend both to the homicide wave in the United States in the 1970s and 1980s and to the Mexican drug war that began in late 2006.[5]

Journalists, historians, and government officials have suggested two general mechanisms linking drug trafficking to trafficking profits and to violence in Venezuela.[6]

2001, p. 1). However, prior to 2001, the Air Bridge Denial Program focused on stemming the flow of coca paste from Peru to Colombia (C.I.A., 2008, p. 1–3, 30–118). Only after the resumption of the program in August 2003 did the Air Bridge Denial program focus on flights departing from Colombia (GAO, 2005, p. 1–2).

[4]For example, while many observers criticized Chávez's 1999 decision to prohibit D.E.A. surveillance flights in Venezuelan airspace, Antillano (2009) points out that Chávez's predecessor, Rafael Caldera, did the same (p. 217). Similarly, Antillano describes counternarcotics policy in the early Chávez administration as broadly consistent with Washington's prescription, if ineffective (p. 236–237). High-profile scandals have exposed support for trafficking among Venezuela's political and military elite since at least the late 1980s; on the earliest scandals, see Azocar Alcala (1994); on General Ramón Guillén Dávila, Venezuela's anti-drug czar in the late 1980s and early 1990s, who was indicted in Miami on trafficking charges, see the reporting of Frank Davies for the Miami Herald (1997a, 1997b, 1997c), as well as Malaver (1999); on the Chávez administration, see Mayorca (2012) for a partial review.

[5]See González Mejías and Kronick (2017) for discussion of the measurement of homicide rates in Venezuela.

[6]In a related study, Castillo et al. (2018) argue that a *decrease* in the supply of Colombian cocaine *increases* the revenues of Mexican cartels (because demand is inelastic), whereas here I argue that an *increase* in the supply of Colombian cocaine *increases* the revenues of Venezuelan traffickers. The difference is straightforward. In Castillo et al. (2018), Mexican cartels supply *all* of the cocaine to global consumer markets; here, Venezuelan traffickers capture an increasing *share* of global revenues. Moreover, demand *within* Venezuela shifts outward (see Appendix C.2), such that the supply shock need not lower prices in domestic

First, observers such as Mildred Camero, the former head of Venezuela's anti-drug agency, have linked the increase in trafficking to fighting over trafficking routes, and also to violent *tumbes*, or attempts to seize rival traffickers' drug shipments (Landaeta, 2014, p. 20–21).

Second, international trafficking may have fueled the growth of local retail drug markets. The International Crisis Group reported in 2011 that, "As the flow of drugs in transit has increased, more drugs have also entered the domestic market, leading to a significant increase in microtrafficking, which has been a major contributor to the homicide rates in poor urban neighbourhoods" (ICG, 2011, p. 8; Camero, 2017, p. 48).[7]

Qualitative research also provides evidence of the growth of microtrafficking—and associated violence—in the 1990s. For example, a study of the Caracas neighborhood of San Agustín del Sur found that retail drug sales became more prevalent in the 1990s (Grajales Pineda and González Plessmann, 2014, p. 16). A neighborhood resident recalled, "There were many more points of distribution of drugs. Honorable families from the neighborhood were now selling ... before, people around here were cautious around dealers, you greeted them, but warily, but then the wariness became camaraderie ... we've become a whole society of accomplices in dealing and that's what's supported the violence" (p. 17).

One explanation for the link between drug transshipment and the growth of local retail markets is that international drug trafficking organizations sometimes pay local affiliates in kind.[8] In an interview conducted for this study, former D.E.A. Chief of Operations Mike Braun explained, "In Venezuela, security forces that are paid in-kind for their part in supporting the trade are selling drugs to street gangs. And it's the drug trafficking activity at a local level that is fueling much of the explosive violence in Venezuela."

This pattern recalls descriptions of the connection between transshipment and microtrafficking in other Latin American countries. For example, Rodgers (2006) traces the birth of microtrafficking in a poor neighborhood of Managua, Nicaragua to the growth of cocaine transshipment through the country: "Those

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consumer markets; in Castillo et al. (2018), the size of the consumer market is fixed.

[7]The first nationally representative drug-use survey in Venezuela was conducted in 2005; neither survey data nor other data provide a reliable time series on drug use in Venezuela. See Appendix C.2 for discussion.

[8]Crime journalist Javier Ignacio Mayorca attributes this behavior in part to Venezuela's restrictive currency controls. "Because of the currency controls in place since 2003, there's a tendency to pay for drug transport operations with parts of the cargo ... the compensation is 10% of the shipment ... and a great part of those drugs stay in the country" (Mayorca, 2015, p. 40).

conveying the drugs take a cut to distribute it locally" (p. 279). Dowdney (2002) describes a similar process in Rio de Janeiro, where microtrafficking followed the arrival of international cocaine transshipment (p. 22). As in the Venezuelan case, trafficking in Rio (e.g., in marijuana) predated the cocaine boom (p. 22–23); what mattered was not the presence of traffickers but their profits: "the profitability of cocaine resulted in the excessive militarization of armed groups in order to control and defend" territory for drug sales (p. 23).

Government officials and journalists in Venezuela have suggested that drug trafficking revenues amount at least to hundreds of millions of dollars. For example, the former president of the congressional Commission against the Drug Trafficking and Drug Use, Vladimir Gessen, stated in 1993 that traffickers in Venezuela earned about 1.4 billion U.S. dollars (Azocar Alcala, 1994). Mayorca (2015) estimated that Venezuelan dealers' revenue from microtrafficking *alone* amounted to 1.3 billion U.S. dollars at the official exchange rate (288 million at the black market exchange rate) in 2013 (p. 41).[9]

In the accounts summarized above, drug trafficking through Venezuela created two types of revenue: fees paid by international trafficking organizations to Venezuelan couriers, and sales in local retail drug markets. Control of territory close to international trafficking routes likely determined access to both types of income—in the former case because facilitating transshipment depends on controlling trafficking routes; in the latter case because, given the cost of transporting illegal goods, nearby markets may well have been the most profitable.[10] If municipalities close to transshipment routes were differentially exposed to drug trafficking, they were also differentially exposed to trafficking profits. Some models would then predict that the trafficking boom would *increase* violence in these municipalities, while other models would predict the opposite.

[9] There are also many examples of personal fortunes made in Venezuelan trafficking. Walid Makled, perhaps the country's best-known trafficker, claimed a net worth of more than one billion U.S. dollars (Ellsworth, 2012); Mildred Camero, former head of Venezuela's anti-drug office, has said that the National Guard's involvement in drug trafficking explains "the proliferation of so many millionaire generals" (Landaeta, 2014, p. 43). The name *Cartel of the Suns* emerged following the indictment of National Guard general Ramón Guillén Dávila in 1996, because National Guard generals wore sun insignia on their uniforms. However, a number of authorities have suggested that this name is a misnomer, in that in that it implies more organization and hierarchy than the trafficking ring possessed" (Mayorca, 2012; Landaeta, 2014, p. 18).

[10] Indeed, one of the first convicted Venezuelan traffickers sold drugs in three cities along the highway from the Colombian border to Caracas (Azocar Alcala, 1994, p. 24).

3 Empirical analysis

To evaluate these predictions, I investigate whether the Venezuelan cities and towns closest to international trafficking routes experienced differential changes in violent death rates in the post-1989 period.

This analysis requires identifying trafficking routes. Unfortunately for this purpose, drug-seizure data at the local level—or other law-enforcement data that would map trafficking flows—are not available (Camero, 2015). Instead, I rely on journalistic accounts and government reports that identify the *Panamericana* highway—which leads from San Cristobal, Táchira, near the Colombian border, to Caracas and then through eastern Venezuela—as an important conduit for cocaine (e.g. Miroff, 2014; Mayorca, 2014; Wells, 2013; GAO, 2009, p. 7–11). While drug shipments do leave Venezuela on small aircraft flights from rural areas near the Colombian border, these accounts indicate that large quantities move through the country on the *Panamericana* and then exit at Maiquetía, the port outside Caracas (the capital); Puerto Cabello, a major port in the neighboring state of Carabobo; and Puerto La Cruz, further east, largely destined for markets in Europe.

I therefore compare violent death rates in municipalities adjacent to the *Panamericana* ($N = 80$ municipalities) to levels and trends in municipalities not adjacent to the *Panamericana* ($N = 251$).[11] To do so, I use an original panel data set constructed from the national death registry, which is maintained by the Venezuelan Ministry of Health. These data report the number of deaths by cause of death (using the International Classification of Diseases) in each parish (*parroquia*), a geographic unit smaller than the municipality, which allows me to construct stable geographic units over time even as new municipalities form. For details, see Appendix A and González Mejías and Kronick (2017) for additional discussion; for summary statistics on the distribution of violent death rates across municipalities in each year, see Appendix Table A.2.

[11] Note that these two groups comprise 331 units of analysis, even though Venezuela currently has 335 municipalities. The reason is that, in order to construct stable geographic units—that is, geographic units that do not change over the fifty-five years of the panel—I cannot avoid combining several present-day municipalities into single units. For details, see Appendix A.

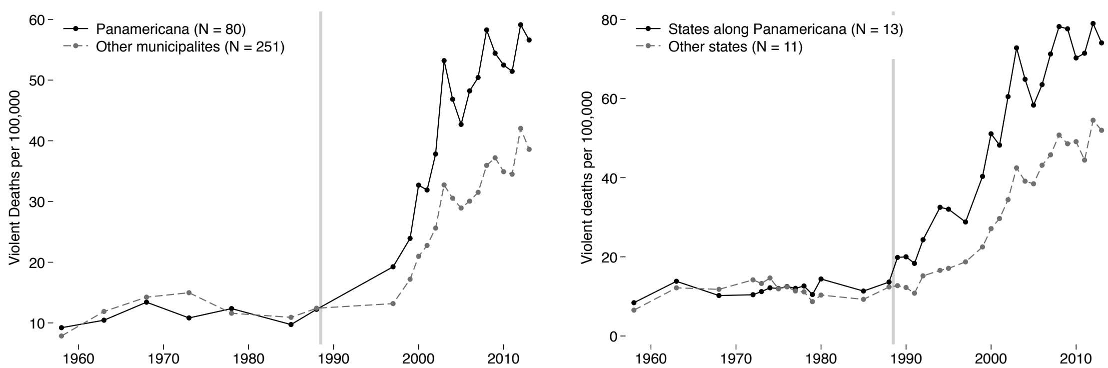
3.1 Graphical analysis

Figure 1a plots the average violent death rate in municipalities on and off the *Panamericana*, both before and after 1989. Before 1989, average violent death rates in these two groups were similar, and the violent death trends were largely parallel. After 1989, both the levels and the trends diverged, with violent death rates in municipalities along the *Panamericana* rising faster than rates in municipalities elsewhere.

Figure 1: Divergence in Violence Trends Post-1989

Figure (a) plots mean violent death rates in municipalities along the *Panamericana* highway and municipalities elsewhere, both before and after 1989–1990. For population-weighted means, see Figure D.8. Because municipality-level data are not available for 1989–1996, Figure (b) plots mean violent death rates in two groups of states.

(a) Two groups of municipalities (b) Two groups of states



Municipality-level violent death data are not available for the years 1989–1996, hence the gap in the time series in Figure 1a (see Appendix A). Therefore, Panel 1b presents an analogous comparison at the state level, for which data are available in many more years.[12] This comparison indicates that the divergence between treatment and control areas indeed began in the years immediately following 1989. Figure F.2j provides additional evidence; it plots violent death rates in two municipalities along the Panamericana that also constitute states

[12]In the municipality-level results presented in Panel 1a, I plot unweighted averages of the violent death rates in the municipalities in each group. In the state-level results presented in Panel 1b, I weight the violent death rates in the 13 states along the *Panamericana* by the proportion of the state population residing in municipalities adjacent to the road. For example, the *Panamericana* highway passes through one corner of the state of Zulia; however, only 1% of the Zulian population lives in municipalities along the road. I therefore downweight Zulia's violent death rates in constructing Figure 1b. In any case, alternative weighting choices produce similar results and can be found in Figure D.8 of Appendix D.

in and of themselves (and therefore appear in the state-level data). In these two municipalities, violence increased sharply in the early 1990s.

Three regional trends underlie the divergence in Figure 1a, as well as the nationwide increase in violence:

(1) Between 1988 and 1998, the increase in violence was almost entirely confined to the capital region of the country (c.f. Briceño-León and Pérez Perdomo, 2000); violence rose in nearly all municipalities in that region, and especially in the municipalities along the *Panamericana*. Appendix Figure F.1 graphs violence trends by region, on and off the *Panamericana*.

(2) In 1999, violence jumped nationwide; this global increase—in both groups of municipalities—is visible in Figure 1a, and Kronick and Hausman (2019) attribute this in part to a rewriting of the national criminal procedure code.

(3) Beginning in 2004, municipalities along the Panamericana again grew violent faster than municipalities elsewhere. This time, the divergence was driven not only by the capital region but also by municipalities elsewhere along the *Panamericana* (Appendix Figure F.1).

Some of the jump in the violent death rate in 1989—and some of the divergence observed in Figure 1—derives not from trafficking-related violence but from the *Caracazo*: five days of protest and looting in 1989 during which the police and the military killed hundreds of civilians in Caracas (Coronil and Skurski, 1991, p. 291; Velasco, 2015, Ch. 7). Political unrest continued after the *Caracazo*, but protests produced fatalities only "on occasion" (López-Maya, 2002, p. 208), and even two coup attempts accounted for no more than (approximately) 5% of all violent deaths in 1992.[13] Discussing the surge in violence in Venezuela's capital region in the early 1990s, Briceño-León and Pérez Perdomo (2000) focus not on political turmoil but rather on "expressive violence" and "instrumental violence" associated with illegal markets (p. 285–286).

To provide a visual check that the post-1989 divergence in Figure 1 is not driven by one or a few municipalities in either group, Figure 2 plots the full distribution of municipality-level changes in violent death rates. For each municipality, I calculate the pre-post change as: (Mean violent death rate, years post-1989) − (Mean violent death rate, years pre-1989); Figure 2a reveals that, in municipalities away from the *Panamericana*, the distribution is more concentrated

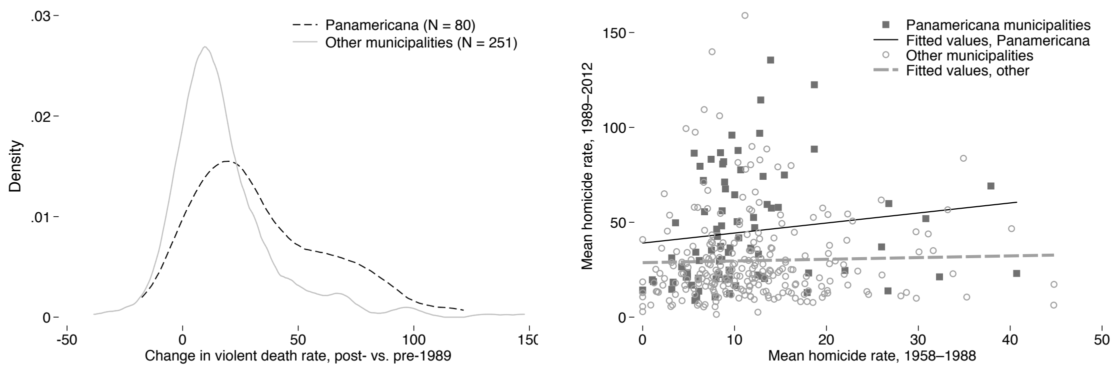
[13] In addition to protests and the coup attempts, the 1990s saw a string of massacres in prisons. While available data do not allow direct comparison to the 1980s, neither the total number of inmate deaths nor the trend suggest that prison violence drove violence overall (see Figure D.1a). The same is true of deaths at the hands of security forces (Figure D.1b).

around values close to zero. Similarly, Figure 2b plots the post-1989 mean violent death rate in each municipality against the pre-1989 violent death rate in each municipality. Here, too, the divergence between municipalities on and off the *Panamericana* does not appear driven by a small subset of municipalities.

Figure 2: Full distribution of pre-post changes in each group

Fig. (a) plots the distribution (across municipalities) of the pre-post change in violent death rates: (Mean violent death rate, 1989–2012) − (Mean violent death rate, 1973–1988). Fig. (b) plots mean post-1989 violent death rates against mean pre-1989 violent death rates.

(a) Distribution of change in violence (b) Post vs. pre violent death rate



3.2 Estimating the difference-in-differences

To test the null hypothesis of no divergence between municipalities on and off the *Panamericana*, I estimate:

$$y_{mt} = \alpha_m + \gamma_t + \beta \cdot \big(\text{Panamericana}_m \times \text{Post1989}_t\big) + \psi X_{mt} + \epsilon_{mt} \qquad (1)$$

where y_{mt} is the homicide rate in municipality m in year t, α_m are municipality fixed effects, γ_t are year fixed effects, ($\text{Panamericana}_m \times \text{Post1989}_t$) is an indicator taking a value of one if municipality m is on the highway and the year is 1989 or later, and X_{mt} are a number of time-varying controls, included in only some specifications and described in more detail in discussion of the results. β is the difference-in-differences between municipalities on the *Panamericana* and municipalities elsewhere, before and after 1989.

Because the municipalities along the *Panamericana* share an important geographic feature, the ϵ_{mt} are likely correlated within the treatment group (in addition to being correlated within a given municipality over time). This means that standard errors clustered at the municipality level (estimated using the cluster-robust variance estimator) may not correctly reflect the precision of estimates of Equation 1. In addition to reporting standard errors clustered by municipality, therefore, I report p-values calculated under the assumption that errors might be correlated within *states* (N=24), using the Wild cluster bootstrap-t estimator proposed by Cameron et al. (2008).

Table 1 presents estimates of Equation 1. Column (1) records the results of predicting the violent death rate only on municipality fixed effects, year fixed effects, and the treatment indicator ($\text{Panamericana}_m \times \text{Post1989}_t$), without including any time-varying controls. In this specification, the difference-in-differences is estimated at 16 homicides per 100,000, a magnitude approximately double the pre-1989 national violent death rate, and approximately 70% of the within-municipality standard deviation of violent death rates. Column (2) presents the same specification, using natural log of the violent death rate as the dependent variable. This result confirms that the difference-in-differences is positive and significant not only in absolute terms, but also in relative terms.

Column (3) adds two time-varying controls, the first of which is log municipal population. The literature provides a number of reasons to expect a correlation between population growth and crime, quite apart from any connection between population growth and the illegal drug market (e.g. Glaeser and Sacerdote, 1999, p. 243).

The second additional control in Column (2) is a set of interactions between year indicators and log 1990 municipal population. These interaction terms allow time trends to vary by 1990 population, and they accomplish a different goal than including log population as a regressor. While including log population allows crime to increase with population growth, interacting year fixed effects with 1990 population essentially allows large cities to follow a different violence trend than towns or smaller cities, regardless of local population changes.

It is the inclusion of these trend terms, rather than controlling for log population, that reduces the magnitude of the estimated difference-in-differences from 16 deaths per 100,000 in Column (1) to 6.8 per 100,000 in Column (3): overall, violence increased more in big cities than in smaller cities and towns, and places along the *Panamericana* tend to be more populous.[14] One interpretation of this result is that cities became (relatively) more violent for reasons unrelated to drug markets; another interpretation is that proximity to the *Panamericana* was not the only determinant of growth in trafficking-related violence. If cities provided the most profitable local retail markets for dealers, for example, growth

[14]For a specification including log population but omitting the time-trends-by-population term, and vice versa, see Columns (1) and (2) of Table D.2 in Appendix D.

Table 1: Differential increase in violence along the *Panamericana*

Estimates of Equation 1; the dependent variable is the violent death rate (violent deaths per 100,000 population). Standard errors, clustered by municipality, appear in parentheses; p-values appear in brackets. The second p-value was estimated using the Wild cluster bootstrap (Cameron et al., 2008), allowing errors to be correlated within state ($N = 24$). See Section 3.2.

	(1)	(2)	(3)	(4)	(5)
		Logged DV	City-size t trends	m-specific t trends	Excluding neighbors
Panel A					
$\text{Panamericana}_m \cdot \text{Post1989}_t$	16.0	0.4	6.8	7.2	9.6
	(3.67) [.000]	(.12) [.000]	(2.9) [.02]	(3.01) [.017]	(2.95) [.001]
	[.002]	[.018]	[.032]	[.082]	[.032]
Population (ln)			8.1	-21.1	4.0
			(2.54)	(3.25)	(2.93)
Mean of DV	26.86	2.66	26.86	26.86	26.57
Within-muni SD of DV	23.03	1.38	23.03	23.03	22.34
Obs. (23 years, 331 units)	7613	7613	7613	7613	5474
Municipality & year FEs	✓	✓	✓	✓	✓
$(\ln \text{Population } 1990)_m \cdot \gamma_t$			✓		✓
m-specific linear trends				✓	
Panel B: Same specifications as above; weighted by population					
$\text{Panamericana}_m \cdot \text{Post1989}_t$	38.5	0.5	19	21.3	21.5
	(1.50) [.000]	(.08) [.000]	(6.09) [.002]	(14.14) [.133]	(6.02) [.000]
	[.002]	[.000]	[.022]	[.17]	[.012]

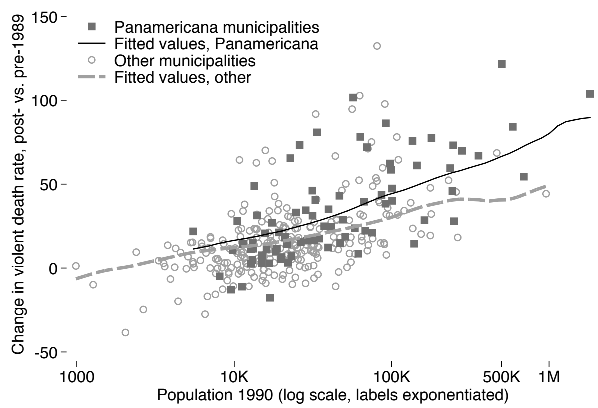
in trafficking could account for larger increases in violence in cities (see Appendix D.8 for additional analysis and discussion).

In any case, the result in Column (3) of Table 1 establishes that differences in city size do not fully account for the divergence in violent death rates between cities adjacent to and away from the trafficking route. To further substantiate this point, consider Figure 3, which plots the pre-post change in violent death rate against (log) municipal population in 1990.[15] This figure makes

[15] The unit of analysis in these data is the *municipality*. A number of cities—such as Caracas and Maracaibo—comprise more than one municipality, and thus it might be preferable to conduct the analysis at the level of the *metropolitan area*. Unfortunately, *metropolitan area* is not an administrative unit in Venezuela; there is no government-issued list of which municipalities form which metropolitan areas. Using an ad-hoc list to aggregate municipalities

clear that municipalities on the *Panamericana* generally have higher populations, that there is a clear positive relationship between city size and growth in violence—and also that, *conditional on city size*, "treated" municipalities generally experience larger increases in violence.

Figure 3: City size and growth in violence



Column (4) of Table 1 includes municipality-specific linear time trends, which produces an estimate similar to that obtained by allowing trends to vary by city size (Column 3). In recognition of potential spillovers across municipal boundaries, Column (5) excludes 93 municipalities adjacent to the municipalities along the *Panamericana*; this increases the estimate of the difference-in-differences to 9.6 violent deaths per 100,000.

Panel B presents the same six specifications as Panel A, but weighting the observations by population. Population weighting generally more than doubles the size of the difference-in-differences estimate, and generally increases precision. This reflects the fact that big cities along the *Panamericana* experienced larger *relative* violence increases (relative, that is, to big cities elsewhere) than did smaller cities or towns. Appendix D.8 presents a triple-difference specification that allows the pre-post change in violent death rates to vary by city size.

3.3 Did trafficking-related violence drive the divergence?

Together with the qualitative accounts in Section 2, I interpret the results of the previous section as evidence that rising revenues in drug trafficking markets—driven in part by intensified counternarcotics operations in neighboring Colombia—increased violence in Venezuela. Of course, places adjacent

into metropolitan areas does not substantially change the pattern in Figure 3.

to the *Panamericana* highway differ from other places along a number of social, economic, and political dimensions. Could these differences, together with events other than the increase in drug trafficking, have produced the observed divergence in violent death rates?

Table 2: Additional specifications, differential increase along the *Panamericana*

Estimates of Equation 1; the dependent variable is the violent death rate (violent deaths per 100,000), except in column (5), in which it is the number of deaths of children under one year per 1,000 population. Standard errors, clustered by municipality, appear in parentheses; p-values appear in brackets. The second p-value was estimated using the Wild cluster bootstrap (Cameron et al., 2008), allowing errors to be correlated within state ($N = 24$). See Section 3.3.

	(1) Pre-1999 only	(2) Local police	(3) Mayoral politics	(4) m-specific t trends	(5) IMR† (placebo)
$\text{Panamericana}_m \cdot \text{Post1989}_t$	6.9	6.5	6.4	7	0.0
	(2.61) [.009]	(2.86) [.024]	(2.88) [.026]	(3.04) [.021]	(.14) [.796]
	[.052]	[.040]	[.048]	[.086]	
Population (ln)		7.3	8	-20.8	-0.6
		(2.40)	(2.47)	(3.61)	(0.50)
Local police (0/1)		6.8	6.8	1.5	
		(2.63)	(2.66)	(1.86)	
Pro-Chávez mayor			-.7	-.3	
			(1.44)	(1.14)	
Mean of DV	12.14	26.86	26.93	26.93	0.58
Within-muni SD of DV	21.12	23.03	23.09	23.09	1.26
Obs. (23 years, 331 units)	2648	7613	7544	7544	7282
Municipality & year FEs	✓	✓	✓	✓	✓
$(\ln \text{Population } 1990)_m \cdot \gamma_t$		✓	✓		✓
m-specific linear trends				✓	

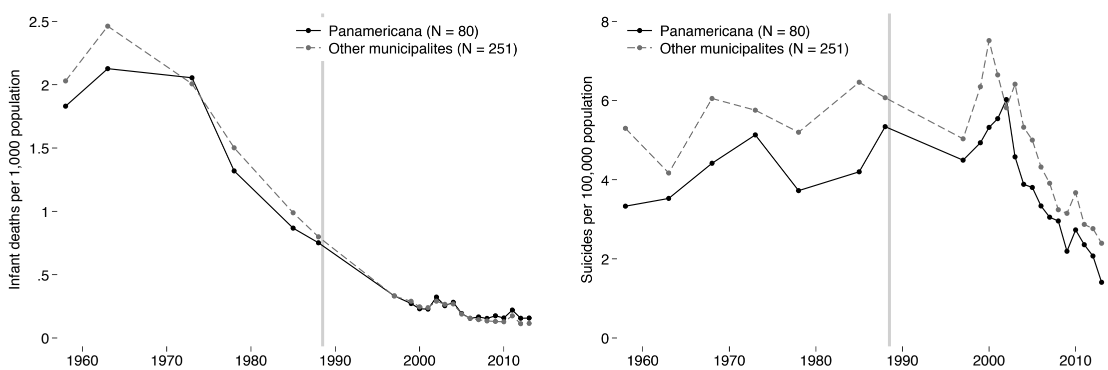
As a first step toward answering this question, I consider the possibility that, due to any number of underlying differences, social or economic conditions post-1989 declined faster in municipalities along the *Panamericana* than in other municipalities. If this were the case, we might expect to observe differential trends in infant mortality—an outcome unlikely to have been affected by an increase in drug trafficking, but plausibly affected by economic shocks or declining infrastructure (e.g., Baird et al., 2011; Bhalotra, 2010). Figure 4a presents graphical results of this placebo test, and Column (5) in Table 2 presents estimates of

Equation 1, but with infant mortality as the dependent variable.[16] That infant mortality declined at similar rates in treatment and control groups throughout the period is inconsistent with the notion that a general deterioration of conditions along the *Panamericana* accounts for the results presented above.

Figure 4: Placebo outcomes: Child mortality and suicide

This figure plots mean infant death rates and mean suicide rates in treated and control municipalities, both before and after 1989–1990. These outcomes would not likely be affected by the drug-trafficking treatment, but might well be affected by time-varying confounders such as divergent economic trends or differential access to small arms.

(a) Infant Deaths (b) Suicide



Second, decentralization in 1989 included the partial devolution of law enforcement responsibilities to municipal governments; after 1989, municipalities began to establish their own local police forces.[17] If municipalities along the trafficking route were any more or less likely to found local police forces, and if the presence of a municipal police force were to affect violent death rates, these events might explain the patterns observed above. Figure D.9 shows that, indeed, municipalities along the *Panamericana* were more likely to establish local police forces than other municipalities,[18] and the results reported in Column (2) of Table 2 suggest a positive within-municipality relationship between violent death rates and the establishment of a municipal police force. However, with

[16]More specifically, the outcome used in the analysis is deaths of children under one year per 1,000 population. Infant mortality is usually defined relative to the number of live births, not relative to population; however, problems with the measurement of live births in Venezuela preclude using this definition. For more on infant and child mortality data, see Appendix A.

[17]The Metropolitan Police in Caracas, established in 1969, were one exception.

[18]The results presented in Table D.5 suggest that city size—rather than *Panamericana* proximity or violence trends—predict the timing of a municipality's decision to establish its own police force. This echoes the U.S. case, where the establishment of municipal police forces "swept down the size hierarchy of U.S. cities, from large to small, in a forty-year period" (Monkkonen, 2004).

the inclusion of municipality-specific linear time trends—Column (4) of Table 2—this relationship is estimated close to zero, while the difference-in-differences of interest remains positive and of a similar magnitude and precision.

Third, Hugo Chávez took office as president of Venezuela in 1999. A number of Venezuelan scholars have attributed the violence wave to "the institutional destruction that broke out when President Chávez took power [in 1999]" (Briceño-León, 2012) or "the voluntary weakening of Leviathan [during the 15 years of the Bolivarian revolution initiated by the late Hugo Chávez]" (Hausmann, 2014). These accounts point to a broad range of policies, including "restriction of police action," "speeches of uprising," (Briceño-León, 2012) and permissions granted to armed pro-government groups known as *colectivos* (Hausmann, 2014).[19] If Chavista mayors were able to influence this "institutional destruction," differential political trends on and off the *Panamericana* might account for part of the observed divergence in violence trends.

I address this concern in two ways. First, Column (1) of Table 2 presents a version of Equation 1 that excludes 1999 and all subsequent years. Because of gaps in the municipal-level time series (see Section 3.1), this restricted analysis includes only *one* year of data in the post-1989 period (1997); even with such limited data, the result in Column (1) of Table 2 indicates that the pre-1999 divergence was statistically distinguishable from zero.[20] Second, I control for mayoral political affiliation. Column (3) of Table 2 indicates that the within-municipality correlation between violence and pro-Chávez control of the mayoralty is small and statistically indistinguishable from zero.[21] And a comparison of violent death rates in very close mayoral elections suggests no effect of mayoral party affiliation; for details, see Figures D.4 and D.5.

The Venezuelan sociology literature emphasizes the diffusion of small arms as a driver of Venezuela's crime wave (e.g., Chacón and Fernández-Shaw, 2013), and evidence from other contexts suggests that a shock to the gun supply can increase conflict (Dube et al., 2013). If small arms trafficking were to occur

[19]It is not clear that "restriction of police action" is a good description of policing in the Chávez era. On the one hand, there are examples of police exiting certain neighborhoods (e.g., Universal, 2005). On the other hand, the Chávez administration rolled back many of the protections for suspects and defendants put in place by the criminal procedure code passed under the previous administration (Alguíndigue and Pérez Perdomo, 2008; Alguíndigue and Pérez Perdomo, 2013).

[20]In a related exercise, I artificially vary the treatment date, re-assigning the beginning of the *post* period to every year of data between 1968 and 2013; the actual estimate (in which the last year of the *pre* period is 1988) is the largest (see Appendix D.5).

[21]Moreover, the two groups of municipalities elected similar proportions of pro-Chávez mayors in each mayoral election (Table B.2).

primarily along the *Panamericana*, and if the 1989 policy changes in Colombia also affected the gun supply, this could account for the divergence in violence between the two groups of municipalities.

I therefore consider two outcomes that have been found to correlate with gun prevalence, but which would not likely be affected by an increase in trafficking-related violence. The first is the proportion of suicides that are committed by firearm (c.f. Azrael et al., 2004); Figure D.3 indicates that, in Venezuela, the proportion of suicides committed by firearm declined somewhat over time, at similar rates in treatment and control municipalities in recent years (these data are not available for earlier years).[22] The second outcome is the overall suicide rate, which some studies have found to correlate with gun prevalence (Miller, 2006; Miller and Hemenway, 2008); in Venezuela, suicide rates show no evidence either of divergence or of secular increase post-1989 (Figure 4b). If indeed a shock to the gun supply drove the divergence in violent death rates, it did so without affecting two outcomes tied to gun prevalence.

Finally, empirical work from elsewhere in Latin America has suggested a relationship between demographic structure and violent death rates. De Mello and Schneider (2010) find that demographic trends—in particular, the shrinking of the 15-to-24 age group as a percent of the population—help explain the decline of violent death rates in São Paulo.[23] If the size of Venezuela's 15-to-25 cohort increased at the same time as the violent death rate, and if the increase were larger in municipalities close to the trafficking route, demographic trends might in part explain the difference-in-differences in violent death rates. However, as Figure D.2 makes clear, the percent of the population aged 15 to 24 peaked in the early 1980s, nearly a decade before the start of Venezuela's violence wave. Moreover, demographic trends were similar across treatment and control states (age profiles at the municipal level are not available before 1990) (Figure D.2).

4 Discussion

Section 2 cited Venezuelan policymakers and journalists who connected the growth of drug trafficking through Venezuela to higher profits and more violence. I interpret the differential increase in violence along the *Panamericana*

[22]The printed volumes from which data were drawn for earlier years report *gun suicides* separately from *all suicides* only at the national level; see Appendix A.

[23]Levitt (1999) establishes a limited role for demographic trends in explaining the crime decline in the United States in the 1990s.

highway, documented in the previous section, as one piece of quantitative evidence consistent with these assertions.

Another quantitative pattern linking violence to the growth of drug trafficking is that, post-1989, violent death rates increased much faster among young men than in other groups. In Appendix E, I use police data from one Venezuelan state to document the fact that gang violence—often tied to control of drug markets—has a very different age profile than other types of violence (such as domestic violence or insurgency). I then use age-at-death to estimate the proportion of victims who died in gang violence (following Owens 2011). The results indicate that, indeed, this proportion jumped from near zero pre-1980 to approximately 20% in the 1990s and then 35% by 2012.

If money in illegal markets in Venezuela fueled violent conflict, why? This finding is in keeping with some theoretical results but at variance with others; empirically, while some studies document a positive relationship between trafficking booms and violence (e.g. Angrist and Kugler, 2008; de la Sierra, 2014; Castillo et al., 2018), others point to the peaceful growth of international and domestic trafficking markets (e.g. Duran-Martinez, 2015; Lessing, 2018).

The qualitative record suggests several potential explanations. First, traffickers may have expected the boom to be temporary: international counternarcotics operations could close Venezuelan routes, just as Caribbean routes were closed in the 1980s. Second, in local retail markets, community organization could matter; Antillano and Zubillaga (2014) point out that some Venezuelan communities designed mechanisms for limiting the violence associated with micro-trafficking. For example, one community instituted motorcycle home delivery of illegal drugs to "inhibit territorial fights for valuable sale points (*plazas*)" (p. 136).

A third potential explanation is market fragmentation. In Venezuela, many small groups—rather than a few large groups—controlled the market; in most theoretical models, violence grows with the number of competitors. According to Mayorca (2017), small and violent neighborhood gangs with few members dominated Venezuela's criminal scene for decades (p. 6).[24]

The image of fragmentation in trafficking markets might seem at odds with the case of Venezuelan trafficker Walid Makled, "a king among kingpins" (U.S. Attorney, 2010). But while Makled briefly "controlled almost the entire drug

[24] Of course, the concentration of the trafficking market is endogenous; one might expect the emergence of larger, more peaceful cartels over time, and indeed, Mayorca (2017) and Cedeño (2015) document the post-2013 emergence of "mega-gangs" composed of more than fifty members and with presence in multiple geographic communities in Venezuela.

industry in the center of the country" (Landaeta, 2014, p. 29–30), his reign was short-lived. A 2005 Venezuelan law extended counternarcotics responsibility to the army, the air force, and the navy, where previously only the National Guard had jurisdiction (Landaeta, 2014, p. 42–43). This led to "generals from other components of the armed forces becoming actively involved in drug trafficking" (p. 45), sparking a "fight to the death" between Makled, who worked primarily with the National Guard, and traffickers in the army, as both groups vied for control of key transshipment routes (p. 41).

In this account, fragmentation (induced by the 2005 law) intensified the relationship between profits and violent conflict among traffickers. Consistent with this hypothesis, I find that municipalities along the Panamericana grew even more violent (relative to municipalities elsewhere) after 2005—that is, the difference-in-differences widens in the post-2005 period (Appendix D.7).

5 Conclusion

Do booms in illegal markets fuel violence or facilitate peace? This is an open question. Some claim that money fuels violence by making it more difficult for traffickers to sustain low-violence agreements, while others claim the opposite. As Lessing (2018) summarized, on the one hand, "the larger the pie, the more there is to fight over;" on the other, "lower profits make for more vicious competition and less pacting among [drug] cartels" (p. 23).

The question applies to other illegal markets, too. Some studies of alcohol prohibition in the United States, for example, claim that higher profits encouraged peace: that "prosperity seemed to breed content" among competing gangs (Funderburg, 2014, p. 229). Others claim instead that profits provoked conflict: "To secure a cash flow like [3.6 billion untaxed dollars], murder could seem like bookkeeping" (Okrent, 2010, p. 274).

The relationship between profits and violence in illegal markets is difficult to study empirically. I provide evidence on this relationship from drug trafficking in Venezuela. Using an original data set on violent death rates in 331 Venezuelan municipalities over fifty-four years, I compare municipalities adjacent to a major trafficking route to municipalities elsewhere in the country. When trafficking volumes were negligible, violent death rates and trends were similar in these two groups of municipalities. As trafficking expanded, violent death rates increased much faster in municipalities along the trafficking route than elsewhere.

Together with qualitative accounts, original interviews, and additional quantitative analysis, I interpret these results as evidence that the drug trafficking boom fueled lethal violence among traffickers and dealers in Venezuela. In addition to informing the debate about profits and conflict in illegal markets, this finding helps explain one of the largest and least-studied criminal violence episodes on record.

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Online Appendix

A Construction of the Venezuelan Municipal Mortality Data Set

This appendix describes the construction of the Venezuelan Municipal Mortality Data Set (henceforth, VMD) used in this project.

A.1 The Vital Statistics System in Venezuela

The data used to construct the VMD derives from Venezuela's vital statistics system. Upon the death of a person within Venezuelan territory, or of a Venezuelan national abroad, a medical professional fills out a death certificate (form EV-14) (MPPS, 2012).[25] A Venezuelan government study estimated the death registry coverage at 96% in 1991; in 2008, the World Bank estimated coverage at 96.8%; and a more recent by Venezuela's National Statistics Institute indicates slightly higher coverage by including late registration (OCEI, 1991; Danel and Bortman, 2008; INE, 2013b).

González Mejías and Kronick (2017) describe how the Venezuelan Ministry of Health (MOH) (a) codes causes of death according to the International Classification of Diseases, (b) digitizes paper death certificates to create the mortality microdata, and (c) tabulated deaths by cause of death prior to the use of computers.[26]

González Mejías and Kronick (2017) also describe public and researcher access to the MOH mortality data. In short, the pre-1990 data were published in printed volumes, which I digitized for the VMD; for 1997 and subsequent years, I obtained and processed the microdata. As noted in the main text, municipal-level data are unavailable for 1990–1996. In 1990, the Ministry stopped publishing local data in printed yearbooks, instead making the disaggregated data available in a computer file; unfortunately, neither the Ministry archive nor local researchers (whom I contacted) were able to locate copies of these files for years prior to 1997.

[25] For deaths in remote areas without medical services, officials at the municipal health office (Dirección de Epidemiología Municipal) are responsible for filling out the death certificate.

[26] The Venezuelan MOH has changed names several times. When founded in 1936 the name was *Ministerio de Sanidad y Asistencia Social*. In 1999, the name was changed to Ministerio de Salud y Desarrollo Social; in 2007, the name changed again, to *Ministerio del Poder Popular para la Salud*. In this document I use the acronym MOH (Ministry of Health) to refer to all three agencies.

A.2 Defining *violent death*

In the original MOH mortality data, two aspects of cause-of-death reporting change over time. First, the World Health Organization periodically revised the International Classification of Diseases (ICD), which the Venezuelan MOH (and other governments) use to code causes of death. Second, the physical Epidemiology Yearbook volumes reported death counts by clusters of causes rather than by individual ICD codes.

To create a count of violent deaths that is comparable over time, I include the following four broad categories of violent death (the specific codes change with ICD revisions; see González Mejías and Kronick (2017) for details):

- Homicide
- Injury (i.e., external cause of death) undetermined whether accidentally or purposely inflicted (excluding motor vehicle deaths)
- Accident caused by firearm
- Legal intervention

The inclusion of *undetermined intent* deaths, as well as police killings (*legal intervention*) and gun-related accidents, motivates the names *violent deaths* and *violent death rates* rather than *homicides* and *homicide rates* for the principal series in the VMD. Because of the way that reporting categories and coding practices change, excluding any one of these categories would make violent death counts incomparable over time. See González Mejías and Kronick (2017) for additional discussion.

A.3 Constructing stable geographic units

The geographic boundaries of Venezuelan municipalities have changed over time. To construct units of analysis that remain stable over the entire period of the VMD (1958–2013), I use data from a smaller geographic unit: the parish (*parroquia*), of which municipalities are composed. This section describes the construction of stable geographic units from parish-level data.

In 1950, according to the census of that year, Venezuela had 198 municipalities and 660 parishes (OCEI, 1983). By 2013, there were 335 municipalities and 1,140 parishes (INE, 2013a). New municipalities were generally formed from parishes or groups of parishes, elevated to municipality status; new parishes were generally carved from old ones. Confusingly, the units now called *municipalities* were formerly called *districts*, and what are now called *parishes* were called *municipalities* (see Table A.1). Because data are not available in a geographic unit smaller than the parish, and because only 301 (26%) of parishes maintained their borders through the entire period of the VMD, it is not possible to construct a parish-level panel data set.

Table A.1: Administrative Division of Venezuela

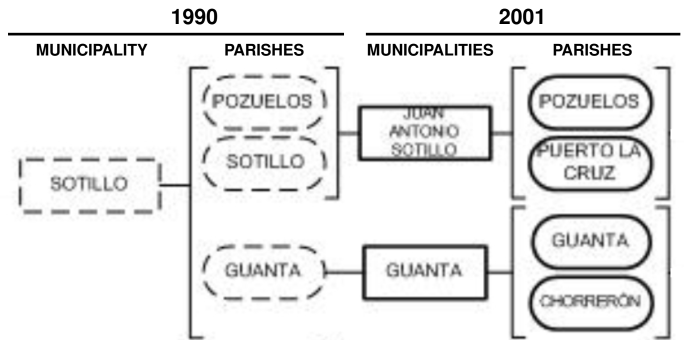
Old name	New name	N, 1950	N, 2013	N, VMD
State	State	23	24	24
District	Municipality	189	335	331
Municipality	Parish	660	1,140	—

Note: The count of 24 states in 2013 includes the Federal District, which is not technically a state. In addition, the count of 23 states in 1950 includes two units that were then considered *federal territories* and later became states. The switch from old to new names occurred in 1989.

Of the 146 new municipalities created between 1950 and 2013, 135 (92%) were drawn from entire parishes. The remaining 11 (8%) were created from portions of parishes (i.e., part of a parish ended up in one municipality, while part ended up in another municipality). In both cases, creating stable units of analysis relies on the information in *División Político Territorial de Venezuela 2013* (INE, 2013a), a report created by Venezuela's National Statistics Institute that documents changes in the administrative division of Venezuela since 1936.

Figure A.1 presents an example of the creation of new municipalities from entire parishes (this example is from the state of Anzoátegui). In cases like these, the VMD for all years assigns the sum of values from *Pozuelos* and *Sotillo* parishes to the municipality *Juan Antonio Sotillo*, even though that municipality did not yet exist. Likewise, values from the parish *Guanta* appear under municipality *Guanta* for all years in the data, even those prior to the creation of Guanta, when the parish was part of a municipality with a different name. In other words, municipality names in the VMD data refer to the geographic area contained in the 2013 municipality, *not* to municipalities as they existed in a given year in the data.

Figure A.1: Parishes Elevated to Municipalities



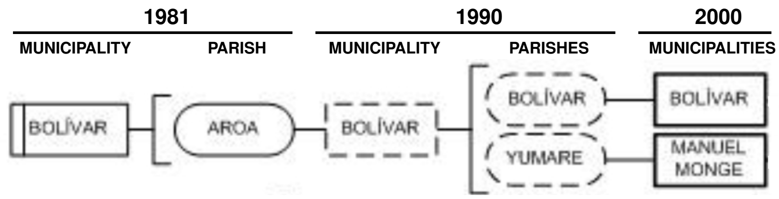
Source: INE (2013a).

Figure A.2 presents an example—one of 11 total—of the creation of new municipalities from portions of parishes. These cases are more problematic. In this example from the state of Yaracuy, a parish called *Aroa* splits into two parishes, *Bolívar* and *Manuel Monge*, both of which later become their own municipalities.[27] How, then, to create a unit in 1981 that corresponds to the present-day *Bolívar* and *Manuel Monge* municipalities? To do this, I (a) take the ratio of the populations of the two child parishes, Bolívar and Yumare, in the first year in which both are observable, and then (b) use this ratio to assign a fraction of the Aroa deaths to each 1981 municipality unit. (I do the same with population data, as described in Appendix B below.) Continuing with the example in Figure A.2, in the 1990 census, the population of the Bolívar parish was 20,227 and the population of the Yumare parish was 7,981. For years prior to the division of the Aroa municipality, I therefore assign 71.7% $(= 20,227/(20,227 + 7,981))$ of Aroa deaths (and population) to Bolívar municipality and 28% of Aroa deaths to Manuel Monge municipality. This approach assumes homogeneous death rates across the parish, an assumption that is likely violated. However, the assumption of parish homogeneity strikes me as superior to assumptions implied by other potential imputations.[28]

[27] Note, it is quite common for parishes to split into multiple parishes. What is uncommon (i.e., what happens only in eleven cases) is that a parish splits into multiple parishes that then end up in different 2013 municipalities.

[28] For example, consider the following alternative. Rather than dividing death counts between sub-units according to the future population ratio, I could divide death counts between sub-units according to the future violent death count ratio. This approach would assume that, if Bolívar were much more violent than Yumare in 1990, the same was true of the respective portions of Aroa parish in 1981.

Figure A.2: Portions of Parishes Elevated to Municipalities



Source: INE (2013a).

For two states, Amazonas and Delta Amacuro, both of which were formerly territories, parishes did not exist prior to the 2001 census. Therefore, it is impossible to create historical analogues of the seven municipalities in Amazonas or the four municipalities in Delta Amacuro. In these two states, then, I construct stable geographic units by re-aggregating the present-day municipalities to pre-2001 units: Amazonas's seven municipalities become the four that existed between 1936 and 1990; Delta Amacuro's four municipalities become the three original municipalities. This re-aggregation explains why the VMD has 331 units of analysis, even though there were 335 municipalities in Venezuela in 2013 (see Table A.1 and INE (2013a)).

A.4 Summary statistics

Table A.2 presents summary statistics on the distribution of violent death rates in each year used in the analysis in this paper. (Note, this appendix describes only the construction of a data set of death *counts*; calculating *rates* requires municipality-level population data, the sources of which are described in Appendix B). Table A.2 indicates, first, that the increase in the national violent death rate over time was driven not by one or a few municipalities but by an overall rightward shift in the distribution. A second takeaway is that, while the distribution is indeed right-skewed, with a mean consistently above the median, the distribution is not characterized by a very long tail as it might be in countries with smaller municipalities (such as Mexico or Colombia).

Table A.2: Municipal Violent Death Rates

Year	N	Min	10^{th}	Median	Mean	90^{th}	Max
1958	331	0	0	0	8.2	24.0	118.0
1963	331	0	0	7.1	11.5	27.9	153.3
1968	331	0	0	9.9	14.0	32.1	124.7
1973	331	0	0	10.3	14.0	33.5	125.2
1978	331	0	0	10.1	11.8	26.8	75.1
1985	331	0	0	8.2	10.6	24.1	92.6
1988	331	0	0	9.9	12.4	25.8	98.1
1997	331	0	0	10.8	14.6	32.1	92.9
1999	331	0	0	12.7	18.8	40.2	133.3
2000	331	0	0	16.5	23.8	53.9	132.8
2001	331	0	0	17.8	25.0	54.6	216.0
2002	331	0	0	21.3	28.6	64.4	212.9
2003	331	0	4.6	29.7	37.7	80.2	319.2
2004	331	0	5.6	26.3	34.5	74.9	155.1
2005	331	0	5.7	24.9	32.3	73.2	149.0
2006	331	0	5.0	26.4	34.4	76.9	196.5
2007	331	0	4.8	25.7	36.1	82.2	200.2
2008	331	0	7.2	31.3	41.3	89.6	189.4
2009	331	0	7.2	32.3	41.4	94.1	182.6
2010	331	0	5.2	31.7	39.2	87.5	173.5
2011	331	0	6.5	29.5	38.6	87.0	172.8
2012	331	0	10.0	34.1	46.2	102.6	246.8
2013	331	0	5.6	34.5	42.9	94.7	225.7

The analysis in Appendix E relies on counts of violent deaths by age group by year, at the national level. To construct these age-specific counts, I use the (national-level) mortality microdata published by the WHO (WHO, 2015).

B Sources and definitions for data other than the mortality data

Appendix A describes the construction of the Venezuelan Municipal Mortality Data (VMD) used in this project. This appendix describes sources and variable definitions for other data sets.

B.1 Population

Venezuela measures municipal- and parish-level population at the decennial censuses. To construct decennial population figures for the 331 municipal units of analysis in the VMD, I follow the same method described in Section A.3 above ("Constructing stable geographic units"). To interpolate population values for years between censuses, I assume a constant growth rate. (To estimate population for 2012 and 2013, I extend the 2001–2011 growth rate). Table B.1 describes the original sources of population data at the parish level.

Table B.1: Sources of Parish-Level Census Population Counts

Census Years	Source
1950, 1961, 1971, 1981	*Población Total por Entidades Federales Distritos y Municipio Sexo y Grupos de Edad* OCEI (1983), Digitized for the VMD
1990	Available from *Universidad de los Andes Venezuela*, iies.faces.ula.ve/censo90/caract_gener.htm
2001, 2011	Available from INE via Redatam, 2001: redatam.ine.gob.ve/Censo2001 2011: redatam.ine.gob.ve/Censo2011

I also use population by age group at the state and national levels. State-level tables of population by sex and age group at each census are available on the website of the National Statistics Institute (INE, 2015, http://bit.ly/1Eo1Lg7); again, I use a constant growth rate interpolation to obtain population for each age group in the intercensal years.

B.2 Mayoral elections

The first direct election of mayors in Venezuela was held in 1989. However, since the analysis in this paper is concerned only with whether a municipality is governed by a pro-Chávez mayor, or whether a pro-Chávez candidate won or lost a close election, I consider only data from the mayoral elections after Chávez came to power in 1999. These mayoral elections were held in 2000, 2004, and 2008, with a few additional special elections in 2005, 2006, and 2010.[29] Mayoral election returns for 2000 and 2004 were obtained privately from the National Electoral Council (CNE) via José B. Huerta; for 2008 and for the special elections, results were obtained directly from the CNE website (CNE, 2015).[30]

Venezuelan mayoral elections typically feature more than two candidates. The analysis conducted in this paper requires identifying (a) the pro-Chávez candidate and (b) the candidate associated with the incumbent party. The first task, identifying the pro-Chávez candidate, is simple. The electoral returns data include a list of the parties supporting each candidate; prior to 2007, Chávez's party was the MVR (Fifth Republic Movement, or *Movimiento V República*), after 2007, Chávez's party was the PSUV (United Socialist Party of Venezuela, or *Partido Socialista Unido de Venezuela*). In each election, I therefore code the pro-Chávez candidate as the candidate endorsed by the MVR or of the PSUV, depending on the year.

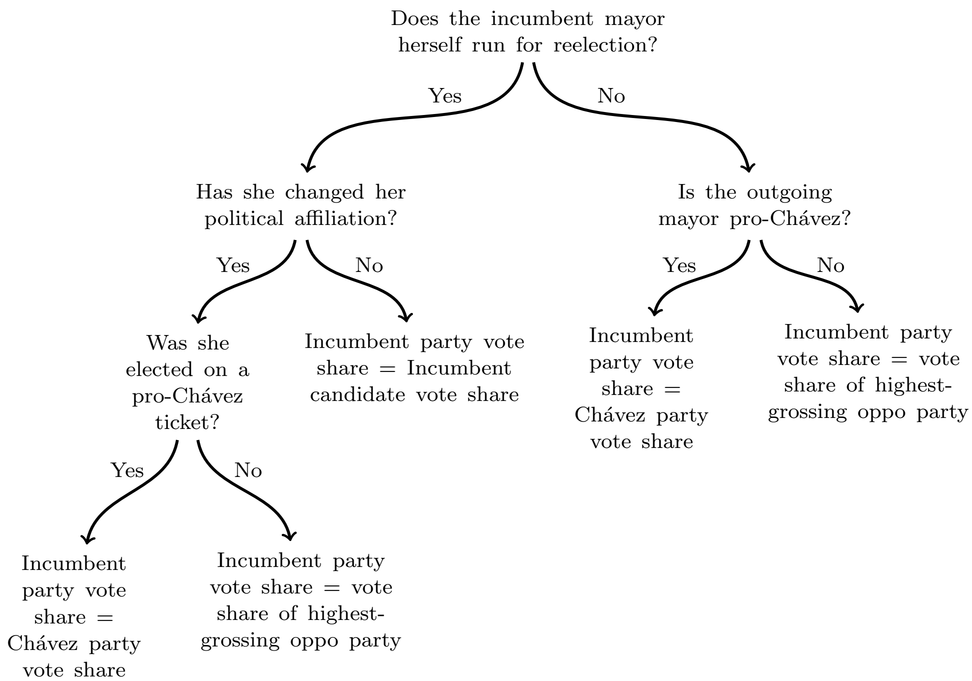
Identifying the candidate associated with the incumbent party is more difficult, at least when the incumbent party is not the pro-Chávez party (which, as explained above, is easy to identify). The difficulty is twofold. First, there are many opposition parties, and every serious candidate is supported by multiple parties; coalitions almost always shift between elections, so that two parties who supported the winner in one election might endorse different candidates in the next election—in this case, who is the incumbent party candidate? Second, many mayors change political affiliations during the course of the term. If a candidate wins a mayorality on the pro-Chávez ticket but then defects to the opposition and runs for reelection, who is the candidate of the incumbent party? To deal with these issues, I identify the candidate (and thus vote share) of the incumbent mayoral party according to the rules laid out in Figure B.1.

As Figure B.1 indicates, I first separate elections in which the incumbent mayor

[29] Mayoral elections were also held in 2013, but they were held in December, and 2013 is the final year of data in this study.

[30] Much of the electoral data on the CNE website is also available—in a friendlier format—from ESDATA (http://esdata.info/).

Figure B.1: Identifying the candidate of the incumbent party



is herself participating (i.e., running for reelection) from elections in which the incumbent does not run for re-election. If the mayor herself runs for re-election and has not changed her political affiliation, I consider her vote share the vote share of the incumbent party. If the mayor herself runs for re-election and *has* changed her political affiliation, and if she was originally elected on a pro-Chávez ticket, I consider the vote share of the Chávez's party the vote share of the incumbent party. In other words, if a pro-Chávez mayor defects during her term to the opposition, the incumbent *party* in the next election is Chávez's party. If the mayor herself runs for re-election and changes her affiliation in the other direction—i.e., she was elected on an opposition ticket and then runs for re-election under Chávez's party—then the vote share of the incumbent *party* is coded as the vote share of the highest-grossing opposition candidate.[31] Similarly,

[31] An alternate approach would be to try to match the exact parties that supported the incumbent to the parties supporting current candidates, e.g., if AD (a major opposition party) supported the 2000 winner, identify the AD candidate in 2004 as the candidate of the incumbent party. However, coalitions change too much during this period: AD and COPEI (another major opposition party) might have supported the same candidate in 2000 but different candidates in 2004. Another approach would be to use the vote share of the candidate supported by the largest national opposition party in that election (say, AD). However, this would be very strange in an era of extreme opposition fragmentation and the

if the mayor herself does not run for re-election, and if she was and remains pro-Chávez, the vote share of the Chávez-party candidate is coded as the vote share of the incumbent party (this is an easy case). Finally, if the incumbent does not run for re-election and if she was and remains in the opposition, I code the vote share of the highest-grossing opposition candidate as the vote share of the incumbent party.

Table B.2 lists the proportion of municipalities won by pro-Chávez mayors in each of the mayoral elections: 29% in 2000, 68% in 2004, and 81% in 2008. These proportions are somewhat higher than those reported in summary tables elsewhere (e.g. Nunes, 2013; Huerta, 2010) because of differences in defining *pro-Chávez candidate*. In my definition, any candidate endorsed by Chávez's party (the MVR before 2007, the PSUV afterward) counts as pro-Chávez. Other definitions depend on where Chávez's party ranks among the coalition of parties backing a given candidate. If, for example, both the MVR and the PPT parties support the same mayoral candidate, I define that candidate as pro-Chávez no matter what. Other analysts define that candidate as pro-Chávez only if she wins more votes through the MVR endorsement than through the PPT endorsement. (On Venezuelan ballots, voters choose a candidate-party combination: It is possible to vote for the same candidate under different parties.)

To illustrate this distinction, consider the mayoral elections held in October of 2004. In that election, candidates who obtained the plurality of their votes through the MVR won mayoral elections in 191 municipalities (Huerta, 2010). Candidates who were endorsed by the MVR—but who obtained the plurality of their votes through a different, aligned party—won mayoral elections in an additional 32 municipalities. Thus I count 223 total pro-Chávez elected mayors in 2004 (Table B.2), rather than the 191 reported in other analyses.

proliferation of local oppo parties; this approach would produce many places in which the incumbent gets just a few percentage points.

Table B.2: Partisan affiliation of elected mayor (1 = Pro-Chávez, 0 = Other)

	All		Treatment		Control	
	0	1	0	1	0	1
Regular elections						
2000	233	95	38	24	195	71
	71.0%	29.0%	61.3%	38.7%	73.3%	26.7%
2004	105	223	18	44	87	179
	32.0%	68.0%	29.0%	71.0%	32.7%	67.3%
2008	64	264	10	52	54	212
	19.5%	80.5%	16.1%	83.9%	20.3%	79.7%
Special elections						
2005	1	1			1	1
2006	2	0			2	0
2010	4	7	1	1	3	6

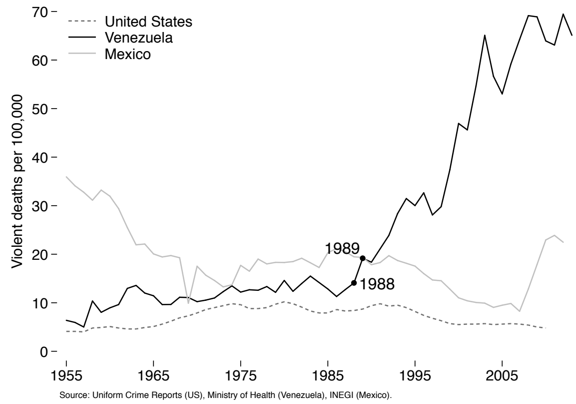
B.3 Dates of establishment of local police forces

Dates of establishment of municipal police forces were obtained from the *Atlas Policial de Venezuela*, available at www.unes.edu.ve/atlaspolicialvenezuela.

C Measuring trafficking, counternarcotics efforts, and drug use

These tables and figures are referenced in the main text.

Figure C.1: The Venezuelan Violence Wave in Comparative Perspective



C.1 Trafficking and counternarcotics in Colombia and Venezuela

Figure C.2 plots (a) U.S. military and counternarcotics assistance to Colombia between 1952 and 2011 and (b) cocaine seizures in Colombia between 1980 and 2014. In both cases, the largest increases are those associated with Plan Colombia in the early 2000s, but the increase associated with the Andean Initiative post-1989 is also visible. The GAO (1991, p. 1–2) discusses the Andean Initiative funding for Colombia, as does Serafino (2003), who summarizes, "While the United States has been providing counternarcotics assistance to Colombia at least as far back as the mid-1970s, former President George H.W. Bush dramatically increased counternarcotics aid to Colombia through his 1989 Andean Initiative" (p. 1).

The 1990 International Narcotics Control Strategy Report identified 1989 as "by far the best year ever for Colombia's anti-drug effort" (p. 125). Brooke (1991), among many others, linked this effort to the assassination of Luis Carlos Galán, writing, "In August 1989, responding to the assassination of a presidential candidate, the Colombian Government began cracking down on drug cartels . . ."

(p. 1).

Figure C.2: Counternarcotics Operations in Colombia

(a) U.S. Military and Counternarcotics Assistance to Colombia

(b) Cocaine Seizures in Colombia

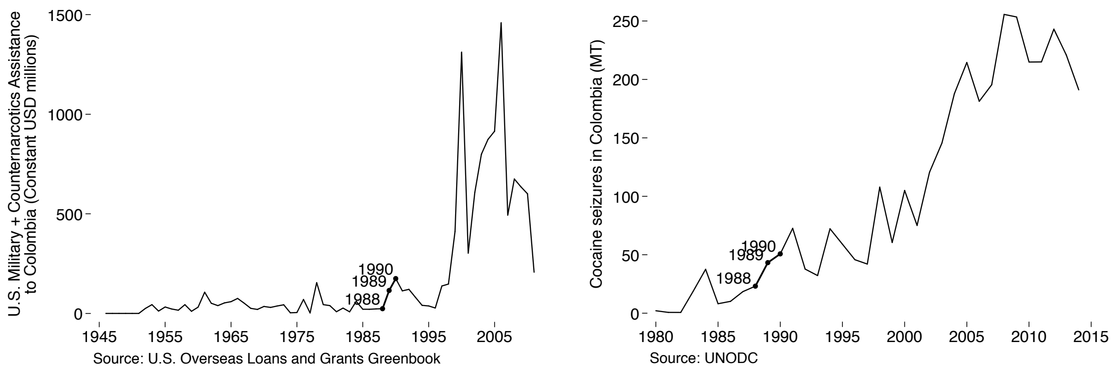


Figure C.3a plots estimates of "quantities of cocaine moved through Venezuela en route to the U.S. and Europe" (International Narcotics Control Strategy Report, 1990, p. 157); the estimates suggest that trafficking through Venezuela indeed increased substantially between 1987 and 1992.

I compiled these figures from the International Narcotics Control Strategy Reports, published by the U.S. Department of State, but beyond that their provenance is unclear. In some years, the reports cite the Drug Enforcement Administration ("the DEA believes"); other years cite the Interagency Assessment of Cocaine Movement, and still other years cite no source at all. A 1994 RAND report that attempted to create reliable, transparent estimates of the volume of cocaine moving through major trafficking countries in 1989 came up with numbers quite similar to the INCSR figures for that year (Dombey-Moore et al., 1994); on the other hand, the INCSR reports themselves are sometimes internally inconsistent.[32]

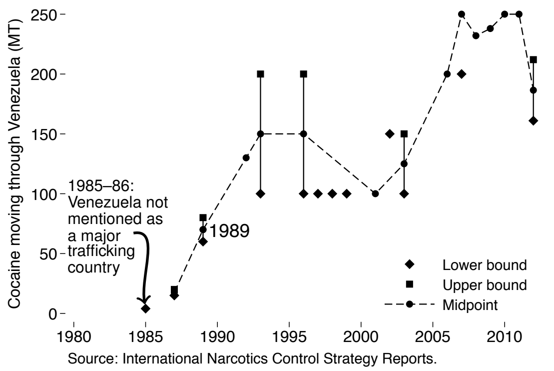
Both drug-related arrests and drug-related police cases in Venezuela increased in the early 1990s, though not beginning in 1989 (Figure C.3c).[33] While neither arrests nor cases is an ideal indicator of trafficking activity (since they reflect

[32]For example, the 2003 INCSR report stated that "at least 150 metric tons" of cocaine transited Venezuela in 2002 (p. 49), while the 2009 report stated that trafficking "has increased five-fold since 2002, from 50 MT to an estimated 250 MT in 2007" (Venezuela chapter, Section III).

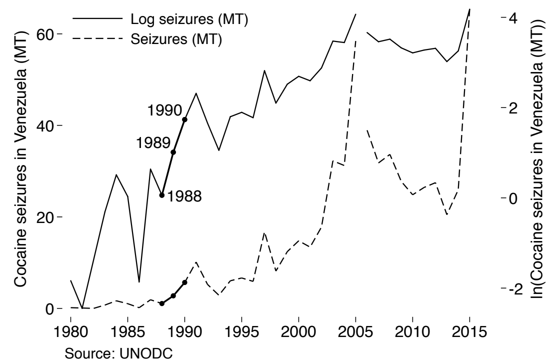
[33]These series are shown only through 1998 because a new criminal procedure code in 1999 caused a sharp drop in arrests of all types (Kronick, 2017).

Figure C.3: Cocaine trafficking in Venezuela

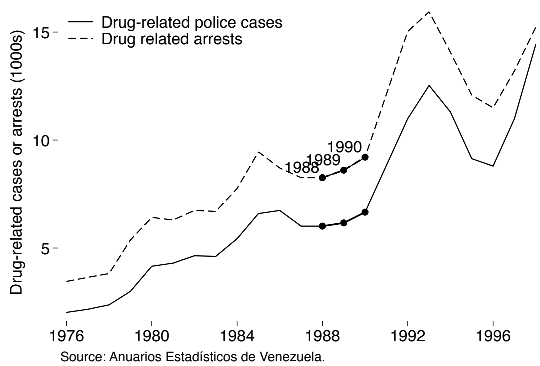
(a) Estimated cocaine trafficked through Venezuela



(b) Cocaine Seizures in Venezuela



(c) Drug-related cases and arrests

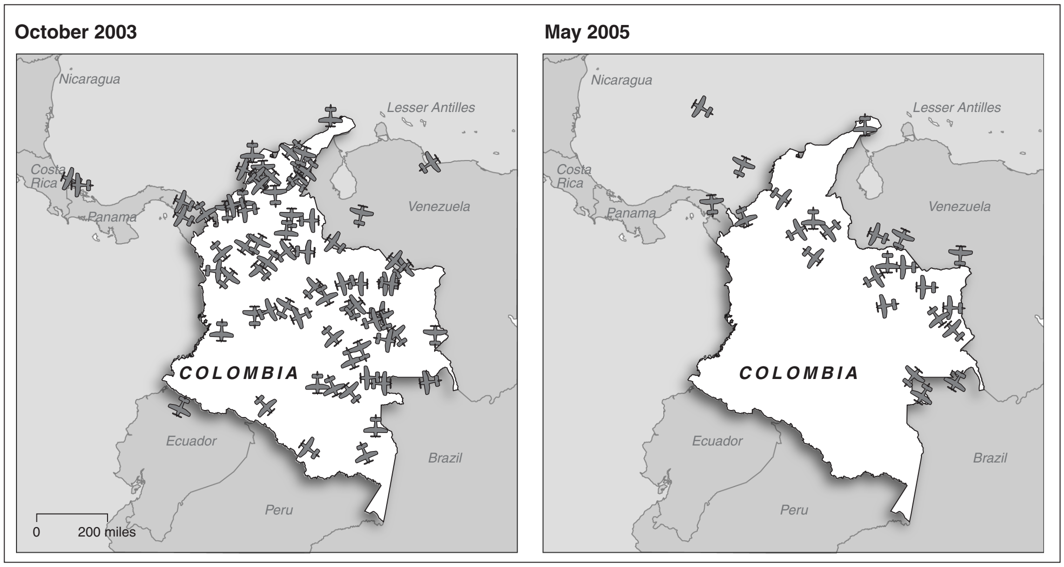


enforcement choices together with illegal activity itself); the trends in Figure C.3c are not inconsistent with an increase in trafficking in the early 1990s.

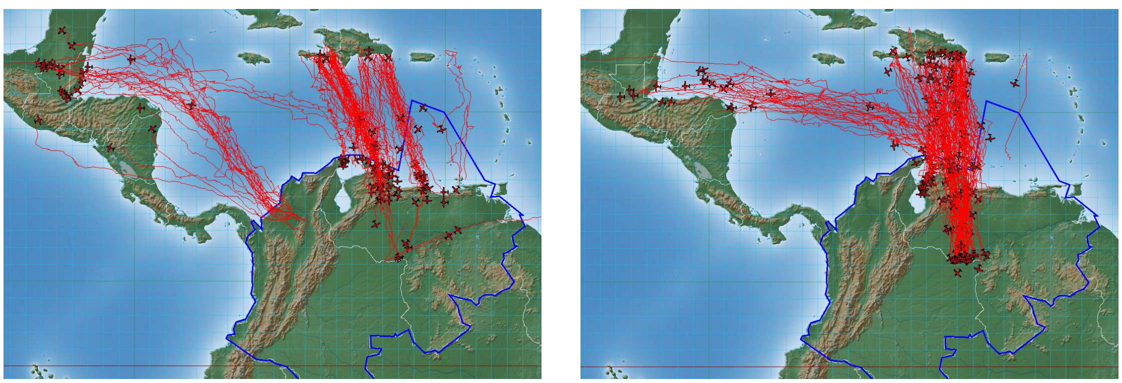
Section 3.1 of the text discusses why the resumption of the Air Bridge Denial Program in Colombia in August 2003 likely drove traffickers to fly small aircraft out of Venezuela rather than out of Colombia. Figure C.4a, from (GAO, 2005, p. 15), compares suspicious air tracks originating in Colombia in October 2003 (just after the resumption of the Air Bridge Denial Program) and in May 2005; the number of flights originating in Colombia declines, and the takeoff points move toward the Venezuelan border. Figure C.4b presents images that I obtained through a request to the Joint Interagency Task Force South. They were not able to provide any images from before August 2003, but comparing the image from 2005 with the image from 2007 suggests fewer flights from Colombia and more from Venezuela. The paths also indicate that flights originating in Venezuela attempt to avoid Colombian airspace.

Figure C.4: Suspicious Air Tracks and the Air Bridge Denial Program

(a) Suspicious tracks over Colombia (GAO, 2005, p. 15)



(b) Suspicious tracks over Colombia and Venezuela, **2005** and **2007**



Source: Joint Interagency Task Force South

C.2 Drug use in Venezuela

The qualitative accounts cited in Section 2 of the paper suggest that cocaine transshipment—the movement of cocaine from the Colombian border to Venezuelan ports and airstrips—fueled the growth of local retail drug markets, as drugs siphoned from the international shipments or paid to couriers as fees were sold to Venezuelan consumers.

Reliable time-series data on drug use would be helpful in assessing this claim.

Unfortunately for this purpose, the first nationally representative survey on drug use in Venezuela was conducted in 2005.[34] Despite this, the United Nations Office on Drugs and Crime (UNODC) has published estimates of national drug use prevalence in Venezuela for two previous years, 1995 and 2001, based on imputations of data from small surveys of subpopulations (UNODC, 2014). For example, the 2001 figure was imputed from a survey of 2,960 students (13–18 years) in Caracas (OAS, 2003).

One obvious concern with the UNODC estimates is the accuracy of the imputation, which involves "the identification of adjustment factors based on information from countries in the region with similar cultural, social and economic situations" (UNODC, 2014, p. iii). A second concern is the quality of the original surveys. The 2001 survey of students in Caracas—the basis for the UNODC estimate of national adult drug usage—was part of an Organization of American States (OAS) survey of students in seven Latin American capital cities (OAS, 2003). The OAS final report on the survey compares drug use across these cities. However, only 2.1% of students in the Venezuelan sample were in twelfth grade, compared to 14.3%–26.2% in the other cities (OAS, 2003, Table 69).[35] Since drug use generally increases with age among students in the study, and since the authors' calculation of overall use rates do not adjust for these sampling differences, overall cocaine or crack prevalence appears lower in Caracas than in other cities (OAS, 2003, Table 1), though twelfth-grade cocaine or crack prevalence appears higher in Caracas than elsewhere (OAS, 2003, Table 6). A related issue is that the survey covered only students, excluding out-of-school youth, further complicating comparison across cities.

These data limitations preclude a precise reading of drug use trends in Venezuela (c.f. Duran-Martinez, 2015, on measuring drug use in Colombia and Mexico). Nevertheless, it is perhaps worthwhile to restate the four available estimates of past-year prevalence of cocaine use: the 1995 and 2001 estimates imputed from surveys of subpopulations, the 2005 estimate from the first nationally representative survey of drug use, and a 2011 estimate from a second nationally representative survey (ONA, 2011). As a percentage of the population aged 15–64, these estimates are: 0.3% in 1995, 1.1% in 2001, 0.6% in 2005, and 0.69% in 2011 (published in, respectively, ODCCP, 1999; UNODC, 2007, 2009, 2012).

[34] This was the *Primera Encuesta a Hogares Sobre Consumo de Drogas en Venezuela*, financed in part by the European Union and conducted with the collaboration of the Venezuelan government's National Commission Against Illicit Drug Use (CONACUID) (Bescansa and Ortí, 2006)).

[35] The report refers to eighth, tenth, and twelfth grades as second, fourth, and sixth; the ages associated with each grade in the report are 12–14, 15–16, y 17+.

Given the caveats noted above, it is not clear what to make of these figures. The 2001 estimated prevalence is more than double the 1995 prevalence; 2005 and 2011 estimates are considerably lower. Certainly, use in Venezuela appears lower than in the United States ($\approx 2\%$) or the Southern Cone countries of Chile, Uruguay, or Argentina.[36]

On the other hand, survey respondents in Venezuela generally perceive high levels of drug availability and drug market presence. In a 2013 survey conducted in thirteen Latin American cities (CAF, 2013), 74% of Caracas residents reported observing drug use or drug sales in their neighborhoods "almost always" or "sometimes"—higher than any other city in the survey except São Paulo (77%).[37] Similarly, a national survey commissioned by the Venezuelan Observatory of Organized Crime found that, in 2013, 67% of respondents reported drug consumption in their neighborhoods; 58% reported drug sales; and 61% reported that it would be easy or very easy to buy drugs nearby (ODO, 2015).

In the view of Mildred Camero, former head of Venezuela's anti-drug agency, "the microtrafficking and consumption of drugs are so widespread that there is no state or region in the country where the phenomenon is not present" (Camero, 2017, p. 44). The 1990 International Narcotics Control Strategy Report noted an increase in crack (bazuco) seizures in the late 1980s: "The only hard information regarding incidence or patterns in drug abuse comes from the dramatic surge seen in National Guard bazuco seizures (coca paste used for smoking) between 1986 and 1989, with an increase from 51.4 kgs in 1986 to more than 454.9 kgs in 1989" (p. 159).

In short, available data do not allow a quantitative assessment of trends in drug use in Venezuela, even at the national level, and certainly not at the local level.

[36] Some authors attempt to draw inferences about addiction from the number of people treated in drug abuse centers. In Venezuela, the National Antidrug Office (ONA) published the number of people treated in centers that report to ONA. These numbers are quite low (ONA, 2006), though it is not clear what proportion of treatment centers report to ONA, nor is it clear whether the numbers reflect low demand for treatment services or low availability of treatment services.

[37] 45% answered "almost always"; this response was also higher than any other city in the survey except Sáo Paulo (53%).

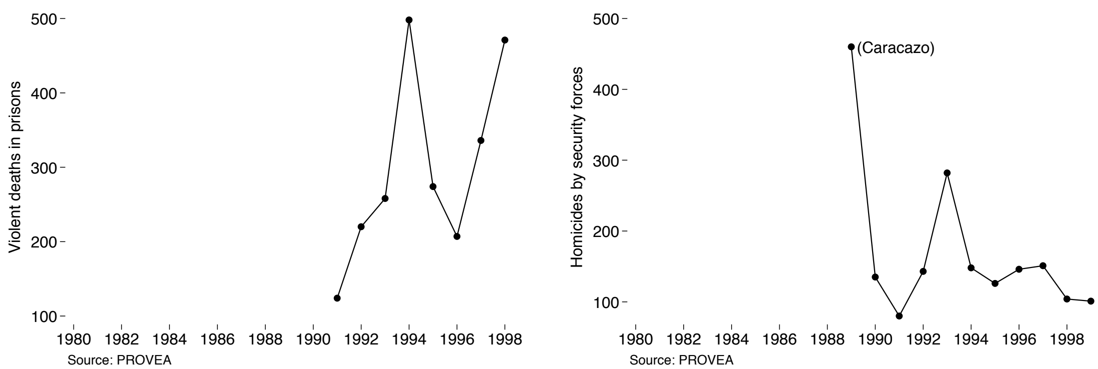
D Supporting figures for discussion of alternative explanations

D.1 Political unrest in the early 1990s

Section 4 of the text notes the possibility that political unrest following the *Caracazo* in 1989 might have driven the increase in violent death rates in the central region of the country. Violence in prisons was part of this unrest (Rosales, 1997), but, despite a series of massacres, neither the total death toll nor the trend suggests that these fatalities drove the increase in violent deaths in the 1990s. The same is true of deaths at the hands of security forces, though (to the best of my knowledge) available data do not allow a direct comparison to the pre-1989 period.

Figure D.1: Political unrest following the *Caracazo*

(a) Violent deaths in prisons (b) Homicides by security forces

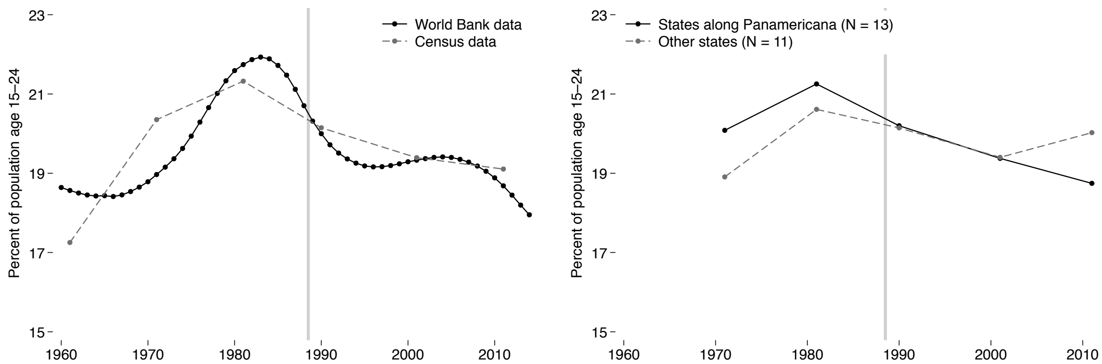


D.2 Demographic trends

Empirical work in contexts other than Venezuela has suggested a relationship between demographic structure and violent death rates: the relative size of the cohort between the ages of 15 and 25 is positively related to violent death rates (De Mello and Schneider, 2010). These figures indicate (a) that the relative size of the 15-to-25 cohort in Venezuela did not increase together with the violent death rate, and (b) that the relative size of this cohort did not much differ across treatment and control states (data are not available at the municipal level).

Figure D.2: Do demographic trends explain the results?

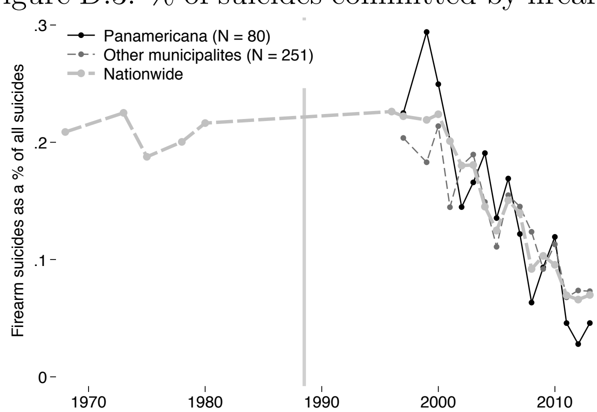
(a) Percent of population aged 15–24 (b) Similar demographic structure



D.3 Firearm proliferation

Did arms trafficking along the same route drive the divergence in homicide rates? If so, it did so without affecting the proportion of suicides committed by firearm, which has been found to be positively related to gun prevalence in other contexts (Azrael et al., 2004).

Figure D.3: % of suicides committed by firearm



D.4 Partisan political trends

Figure D.4: No evidence of manipulation in close mayoral elections

Following Grimmer et al. (2011), Eggers et al. (2015), and Caughey and Sekhon (2011), I check whether incumbents are (discontinuously) more likely than challengers to win close elections. These figures suggest that they are not. The data include all mayoral elections between 2000 and 2010.

(a) Incumbent party margin (b) Party incumbency and victory

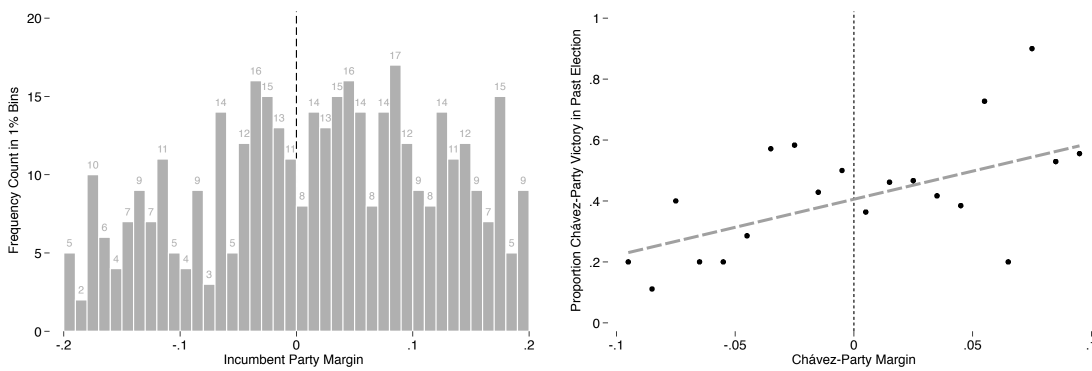
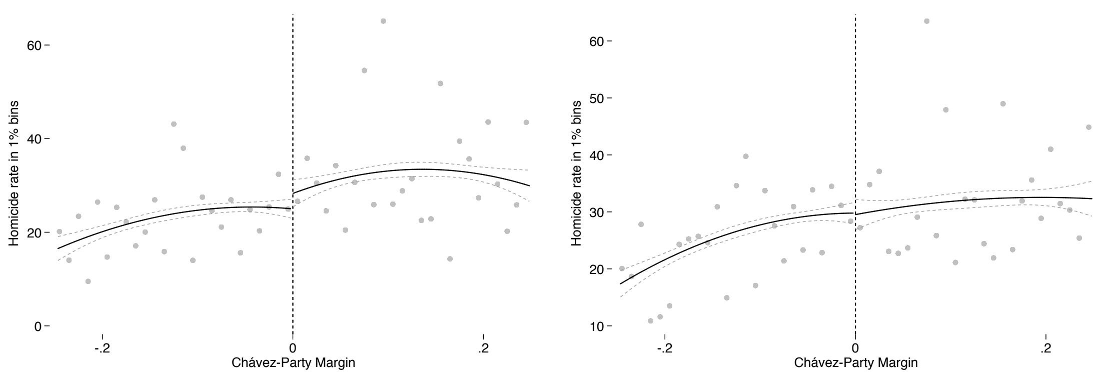


Figure D.5: No effect of Chávez-party control on violence

These figures plot violent death rates against the pro-Chávez party's margin of victory or loss in mayoral elections. Each point represents the mean viont death rate in vote-margin bins of one percentage point. The solid lines plot predicted values fitted on the raw data, with separate quadratic trends estimated on each side of the win–loss threshold. The dashed lines show 95% confidence intervals.

(a) Pre-election violent death rates (b) Post-Election violent death rates



D.5 Varying time windows

(These figures are referenced in the main text.) Figure D.6 graphs estimates and 95% confidence intervals for estimates of β in Equation 1, artificially varying the treatment date. Each estimate is graphed against the first year of data in the artificial *post* period; the estimate corresponding to the actual date is the largest, though it is nearly identical to the estimate in which the first *post* year is 1988. This is not surprising, given that the only differences between the two estimates are (a) whether 1988 is coded as *pre* or *post*, and (b) whether the 1950s and early 60s are included.

Figure D.6: Artificially varying treatment date

Estimates of Eq. 1, artificially varying the first year of the *post* period. The numbers above each point estimate note the number of years included in the panel; in order to maintain a balanced panel throughout, the number of years included is twice the time between the artificial treatment date and either the beginning (1958) or the end (2013) of the data—whichever is shorter. Because data are not available for all years, the number of *years* included $\neq$ the number of *years of data*.

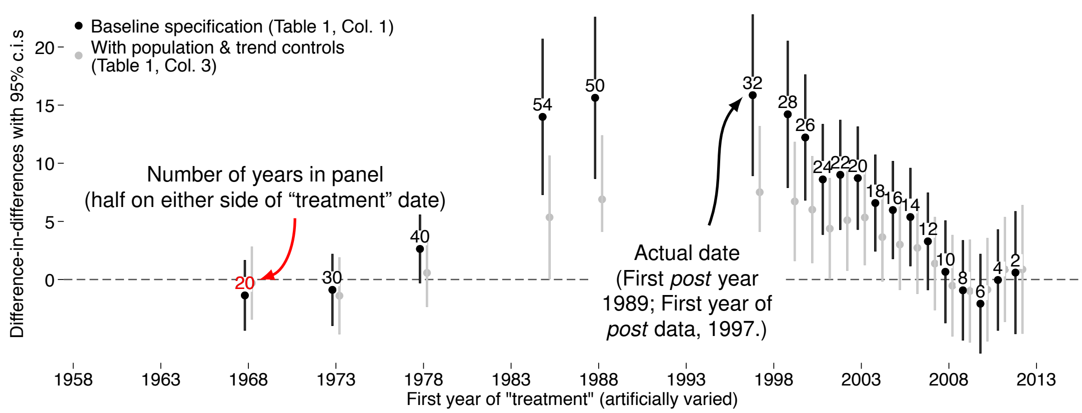


Table D.1 presents estimates of β from Equation 1 for various symmetric time windows around 1989. The shortest time window includes 18 years (nine *pre*, nine *post*), but note that this period only includes three years with data. The second-shortest window includes 22 years but only five years of data. Thus, though all point estimates are positive, estimates for shorter windows are imprecisely estimated—especially when allowing time trends to vary by 1990 population and including log population as a control, as in the second four columns.

Table D.1: Additional specifications

Estimates of Equation 1 (dependent variable is the violent death rate), varying the length of the panel. Note that the number of *years* included ≠ the number of *years of data*. The specification with population controls includes (a) log population and (b) time trends by 1990 population.

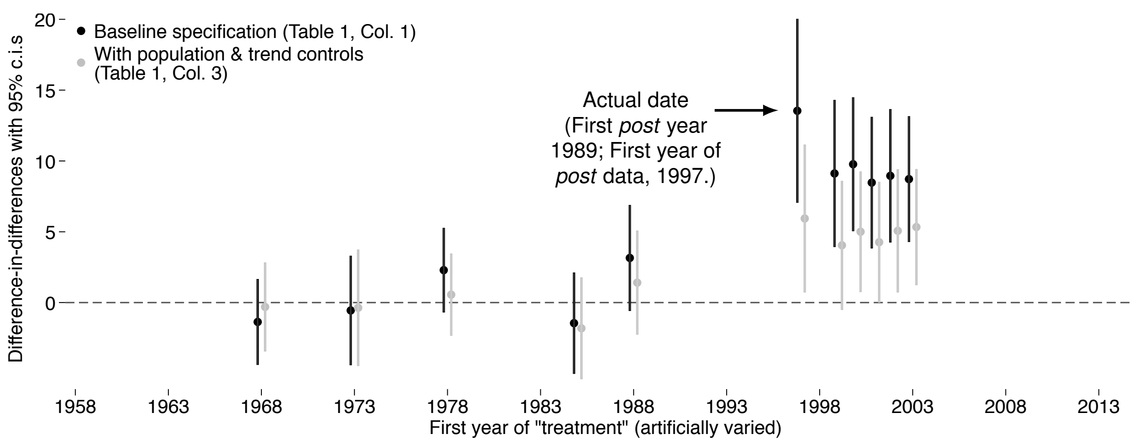
	Baseline				w/ Population controls			
	80–97	78–99	73–04	68–09	80–97	78–99	73–04	68–09
$\text{Panamericana}_m \times \text{Post1989}_t$	6.8	6.6	13.0	15.5	3.2	2.1	5.5	6.5
	(2.8)	(2.8)	(3.2)	(3.5)	(2.8)	(2.5)	(2.7)	(2.8)
Mean of DV	12.6	13.7	21.1	25.4	12.6	13.7	21.1	25.4
Within-muni SD of DV	17.8	17.8	19.9	21.3	17.8	17.8	19.9	21.3
Observations	993	1655	3641	5627	993	1655	3641	5627
Years of data	3	5	11	17	3	5	11	17
Municipality & year F.E.s	✓	✓	✓	✓	✓	✓	✓	✓
(Population 1990) $\times \gamma_t$					✓	✓	✓	✓

Standard errors in parentheses (clustered by municipality).

Figure D.7 provides a second view of what happens when I artificially vary the treatment date. It is similar to Figure D.6 except that, rather than including the longest possible (symmetric) time period around each artificial treatment date, Figure D.7 includes ten years on either side of each artificial treatment date. (This means that, since the last year of data is 2013, 2003 is the last "treatment" year for which this specification is estimable.)

Figure D.7: Artificially varying treatment date, twenty-year window

Estimates of Eq. 1, artificially varying first year of the *post* period (treatment period). Each estimate includes ten years on either side of the artificial treatment date. Because the data are not available for all years, the number of *years* included ≠ the number of *years of data*.



D.6 Additional difference-in-differences specifications

Table D.2: Additional specifications

Column (1) presents a version of Equation 1 that includes log population as a regressor but excludes time trends by 1990 population; Column (2) excludes log population but includes time trends by 1990 population. Column (4) allows the relationship between violent death rates and pro-Chávez mayoral control to depend on whether the election was close (margin < two p.p.). Column (5) allows the relationship between violent death rates and presence of municipal police to depend on the partisan affiliation of the mayor.

	Violent Death Rate				
	(1)	(2)	(3)	(4)	(5)
$\text{Panamericana}_m \cdot \text{Post1989}_t$	14.9	6.7	6.4	6.7	6.5
	(3.7)	(2.9)	(2.9)	(2.9)	(2.9)
Population (ln)	14.0		8.0	8.9	7.9
	(2.7)		(2.5)	(2.6)	(2.4)
Local police (0/1)			6.8		3.5
			(2.7)		(2.5)
Pro-Chávez mayor			-0.7	-0.6	-2.2
			(1.4)	(1.5)	(1.3)
(Pro-Chávez mayor) × (Close election)				-3.0	
				(4.3)	
Close mayoral election				0.6	
				(3.3)	
(Pro-Chávez mayor) × (Local police)					5.5
					(3.2)
Mean of DV	26.9	26.9	26.9	26.9	26.9
Within-muni SD of DV	23.0	23.0	23.1	23.1	23.1
Observations	7613	7613	7544	7544	7544
Municipality & year fixed effects	✓	✓	✓	✓	✓
(Population 1990) · (Year)		✓	✓	✓	✓

Standard errors in parentheses (clustered by municipality).

D.7 Difference-in-differences before and after the 2005 drug law

As explained in Section 4, a law promulgated in 2005 led to increased competition among Venezuelan traffickers; Venezuela's former drug czar (Mildred Camero) claimed that this new competition produced more violence. To evaluate this claim, I consider whether the gap in violent death rates (on and off the *Panamericana*) widened after 2005. Specifically, I estimate:

$$y_{mt} = \alpha_m + \gamma_t + \beta_1 (\text{Panamericana}_m \times \text{Post1989}_t) + \beta_2 (\text{Panamericana}_m \times \text{Post2005}_t) + \phi X_{mt} + \eta_{mt} \quad (2)$$

We can interpret β_1 as the difference-in-differences with 1989–2005 as the *post* period, and $\beta_1+\beta_2$ as the difference-in-differences with 2005–2013 as the *post* period. β_2 is thus the change in the size of the gap (on and off the *Panamericana*) in 2005–2013, relative to 1989–2005. X_{mt} are controls including log population and (in some specifications, as indicated) municipality-specific time trends.

Table D.3: Gap Widens After New Drug Law in 2005
Estimates of Equation 2. Standard errors (clustered by municipality) in parentheses.

	Unweighted			Population weighted	
	(1)	(2)	(3)	(4)	(5)
$\text{Panamericana}_m \times \text{Post1989}_t$	11.6	5	9	16.5	22.7
	(3.16)	(2.5)	(3.01)	(6)	(11.42)
$\text{Panamericana}_m \times \text{Post2005}_t$	6.8	3.5	3.8	4.8	1.6
	(2.23)	(2.03)	(2.09)	(3.15)	(3.80)
Observations	7613	7613	7613	7613	7613
Municipality & year FEs	✓	✓	✓	✓	✓
$(\ln \text{Population } 1990)_m \cdot \gamma_t$		✓		✓	
m-specific linear trends			✓		✓

The estimates reveal that the gap indeed widens further after 2005: municipalities along the Panamericana grow even more violent, relative to municipalities off the Panamericana. This could be driven by conflict over trafficking routes, like that described in Section 4.

D.8 Difference-in-differences by city size (triple difference)

The results presented in the main text indicate that, following 1989, violent death rates increased more in municipalities along the *Panamericana* than elsewhere—and that this difference is not driven by differential population growth, violence trends related to city size, or time-varying differences in mayoral political affiliation, among other factors.

I interpret this finding as evidence that more money in drug markets increased violent conflict among traffickers, both among rivals and in the domestic retail market (i.e., microtrafficking). If this interpretation is correct, we might also expect that the differential increase in violence in trafficking-route municipalities would be larger in cities than in small towns or rural areas, since cities might provide more attractive markets for domestic drug sales. Indeed, Figure 3 suggests that this was the case.

To evaluate this, I estimate a triple-difference, allowing the post-1989 change in violent death rates to vary *both* by the indicator for whether a municipality is or is not adjacent to the Panamericana ($Panamericana_m$) *and* by the log of the municipality's population in 1990 ($Pop1990_m$).[38] Specifically, I estimate:

$$\begin{aligned} y_{mt} = \alpha_m + \gamma_t + \beta_1(Panamericana_m \times Post_t) + \beta_2(Pop1990_m \times Post_t) \\ + \beta_3(Panamericana_m \times Post_t \times Pop1990_m) + \phi X_{mt} + \epsilon_{mt} \quad (3) \end{aligned}$$

where, as before α_m are municipality fixed effects, γ_t are year fixed effects, X_{it} are time-varying controls (included only in some specifications, as noted in each table), and the β coefficients can be interpreted as follows:

- β_1: Differential increase in violence along trafficking routes in municipalities with zero population in 1990. This intercept is not of substantive interest; the smallest municipalities have population of $\approx$ 980 in 1990.
- β_2: Additional post-1989 increase in violence associated with a one-log-point increase in 1990 population, *in municipalities not on the trafficking route.*
- $\beta_2 + \beta_3$: Additional post-1989 increase in violence associated with a one-long-point increase in 1990 population, *in trafficking route municipalities.*

[38] As with the analysis in the main text, choosing a different year makes no appreciable difference for the results.

Table D.4: DDD (Estimates of Equation 3)

β_1 : Panamericana$_m$ · Post1989$_t$	-69.7 (23.5)
β_2 : Pop1990$_m$ · Post1989$_t$	10.0 (1.2)
β_3 : Panamericana$_m$ · Post1989$_t$ · Pop1990$_m$	7.3 (2.3)
Population (ln)	8.7 (2.4)
Mean of DV	26.9
Within-muni SD of DV	23.0
Obs. (23 years, 331 units)	7613
Municipality & year FEs	✓

Standard errors in parentheses (clustered by municipality). Dependent variable is the violent death rate (violent deaths per 100,000 population).

Table D.4 presents the estimates of Equation 3. The results indicate that, indeed, the difference in the pre-post increase in violence between municipalities on the trafficking route and other municipalities was greater in big cities than elsewhere; in municipalities off the route, the pre-post difference in violent death rates was approximately 10 deaths per 100,000 greater for every log point of 1990 population (β_2), while in trafficking-route municipalities the pre-post difference in violent death rate was approximately 17.3 deaths per 100,000 greater for every log point of 1990 population ($\beta_2 + \beta_3$).

This means that in larger municipalities, with population $\approx$ one million, the difference-in-differences of interest was approximately 31 per 100,000 (s.e. 8.77); in smaller municipalities, in contrast—for example, those with population $\approx$ 8,000—the difference-in-differences of interest was small and statistically indistinguishable from zero (-4.0, s.e. 3.9).[39] The triple difference ($31 - (-4.0) = 35.28$) is precisely estimated (s.e. 11.1).

Figure D.8 provides another view of larger divergence among higher-population

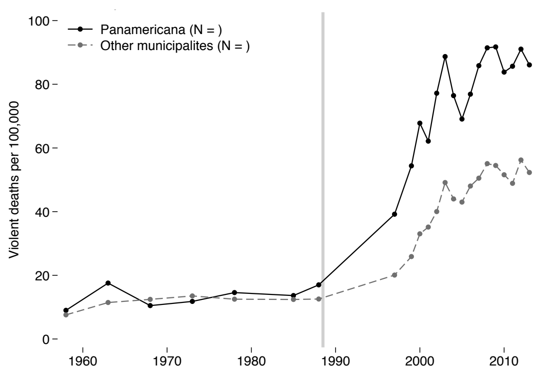
[39] The full range of 1990 municipality population is actually greater—from 1,000 to almost two million—but I consider here the minimum and maximum population values for which there are municipalities in both treatment groups. As Figure 3 indicates, municipalities on the trafficking route are generally larger.

municipalities; the difference-in-differences appears more dramatic when comparing weighted means than when comparing unweighted means.

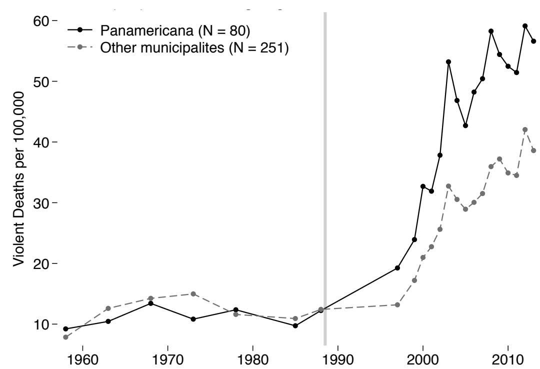
Figure D.8: Difference-in-difference graphs, unweighted and population weighted

Subfigures (b) and (d) appear in the main text and are repeated here only for comparison purposes. Figure (a) weights the observations in each group by municipal population; in this formulation, the post-1989 divergence is larger (see y-axis scale). Figure (c) weights states in each group by population, and Figure (d) weights as described in the main text (by proportion of the state population living along the route; in the control group, states are weighted equally. Lacking a clear theoretical reason for one or another weighting choice, I have included the more conservative estimates in the main text.

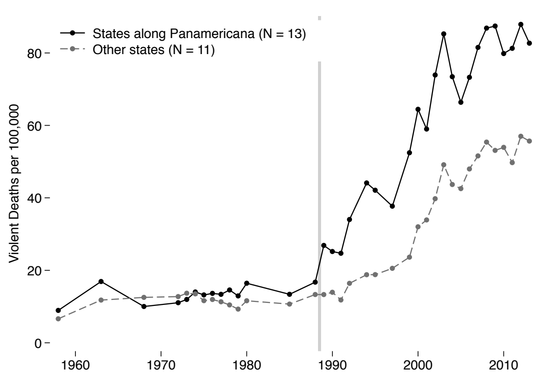
(a) Municipality, Population-weighted



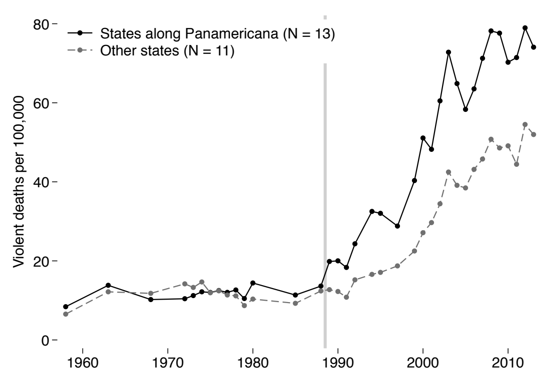
(b) Municipality, unweighted



(c) State, Population-weighted



(d) State, proximity-weighted



D.9 Police decentralization

These figures are referenced in the main text.

Figure D.9: Spread of local police forces
after 1989 decentralization

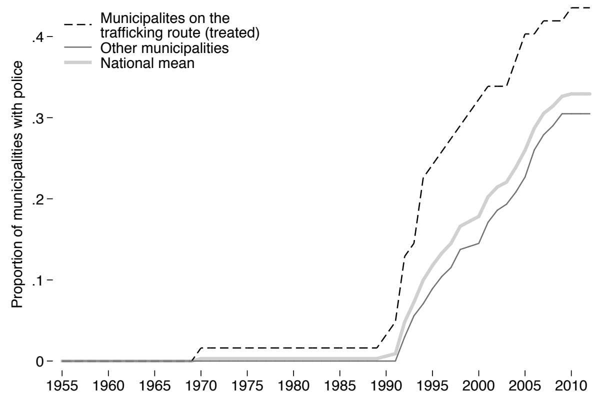


Table D.5: When do municipalities establish local police?

Estimates of: $y_{mt} = \alpha_m + \gamma_t + \beta(Route_m \cdot Post1989_t) + \gamma X_{mt} + \epsilon_{mt}$, where y_{mt} is an indicator for whether municipality m has its own local police force in year t, and X_{mt} are the reported time-varying controls.

	(1)	(2)	(3)
$\text{Route}_m \cdot \text{Post1989}_t$	0.2	0.04	0.03
	(0.06)	(0.05)	(0.05)
Population (ln)		0.1	0.1
		(0.04)	(0.04)
Violent death rate			0.0010
			(0.0003)
Observations	7613	7613	7613
Municipality & year fixed effects	✓	✓	✓
(Population 1990) · (Year)		✓	✓

Standard errors, clustered by municipality, in parentheses.

E Gang violence and the age of violence victims

A second way to evaluate whether shifts in international trafficking routes increased lethal violence in Venezuela is to consider the type or nature of violent deaths.

If indeed counternarcotics operations in Colombia increased lethal violence in Venezuela by pushing drug trafficking activity (and revenues) over the border, we would expect that it generated violent deaths related to the narcotics market—as opposed to, for example, domestic violence, robbery-related deaths, or insurgency. Owens (2011), writing about the United States, dubs this market-based or systemic violence. One empirical implication of the theory, then, is that, after 1989, we should observe a disproportionate increase in market-based violence (relative to other forms of violence).

Unfortunately for this purpose, the cause-of-death codes in the death-registry data used in the difference-in-differences analysis of Section 3 do not distinguish between market-based and other types of violent deaths, nor does the Venezuelan government separately estimate the number of drug-trafficking-related deaths.[40] In place of a direct measure along these lines, I use an indirect measure that exploits a substantial difference between the age distribution of victims of market-based violence and the age distribution of victims of other types of violence.

In one large Venezuelan state, the state of Miranda, police have maintained their own register of violent deaths since 2010. This register includes, among other details, the age of the victim and an open-text field called *motive*, in which the police write short descriptions like *gang conflict*, *robbery*, or *domestic violence*; the data include *motive* for 5,013 (42%) of deaths in the register (the remainder have missing values). The Miranda police data were acquired privately for the purposes of this project.

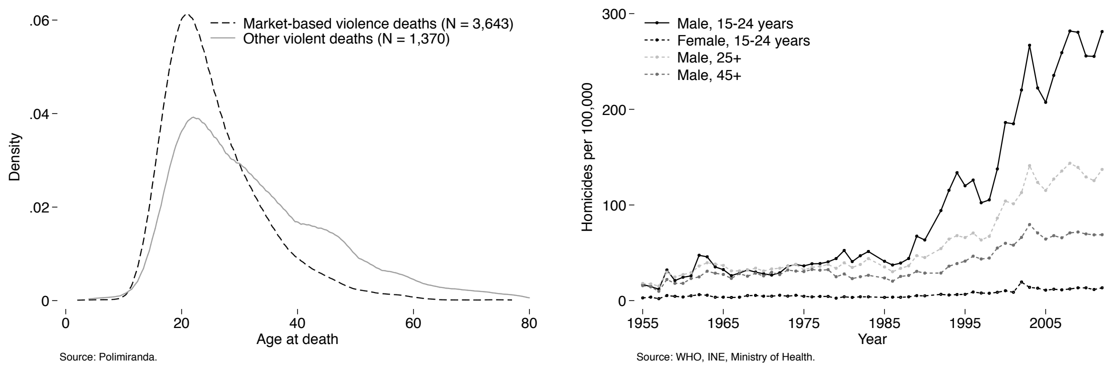
Using these data, I find that the distribution of age-at-death among victims of gang violence is much more concentrated than that of victims of other types of violence (Figure E.1a). In particular, victims of gang violence are much more likely to die between the ages of 15 and 25 than victims of other types of violence. Results from the United States show a similar pattern (Owens, 2011).

[40] Despite public statements along the lines of, "70% of homicides are linked to drugs" (from the Minister of the Interior, UnionRadio, 2014), to my knowledge, the Venezuelan government does not produce data analogous to Mexico's official estimates of trafficking-related deaths.

Figure E.1: Gang Violence, Homicide Wave Concentrated Among Young Men

In one large Venezuelan state, Miranda, police explicitly code deaths as gang-related or not. Figure (a) plots the distribution of age-at-death among victims of gang-related and other types of violence. Figure (b) plots age- and gender-specific violent death rates.

(a) Age at Death by Type of Violence (b) Larger Increase Among Men 15–24



This distributional difference, together with the national distribution of age-at-death for victims of all types of violence, allows me to estimate the proportion of violent deaths that derive from market-based violence. Effectively, I ask: what mixture of market-based and other violence would produce an age-at-death distribution that most resembles the one we observe? I model the distribution of age-at-death among violence victims ($P(a|v)$) as a mixture of the market-based ($P(a|m, v)$) and other distributions ($P(a|\neg m, v)$), adjusting for the underlying distribution of ages in the population (p):

$$P(a|v, t, p) = P(a|m, v, t, p) \cdot P(m|v, t, p) + P(a|\neg m, v, t, p) \cdot P(\neg m|v, t, p)$$

Where $P(a|v, t, p)$ is the density of age a among violence victims (v) in a given year (t) conditional on the demographic structure of the population (p), $P(a|m, v, t, p)$ is that density conditional also on dying in market-based violence, $P(m|v, t, p)$ is the proportion of violent deaths from market-based violence, $P(a|\neg m, v, t, p)$ is the distribution of age at death among victims of other violence, and $P(\neg m|v, t, p)$ is the proportion of violent deaths from other violence, or $(1 - P(m|v, t, p))$.

The quantity of interest is $P(m|v, t, p)$, or the proportion of violent deaths from market-based violence. To estimate this quantity, I let $\theta_t = P(m|v, t, p)$ and rewrite the above equation as:

$$P(a|v, t, p) = \theta_t \cdot P(a|m, v, t, p) + (1 - \theta_t) \cdot P(a|\neg m, v, t, p) \tag{4}$$

Which allows me to estimate θ_t as:

$$\underset{\theta}{\operatorname{argmin}} \sum_a \left(P(a|v,t,p) - \Big(\theta_t \cdot P(a|m,v,t,p) + (1-\theta_t) \cdot P(a|\neg m,v,t,p) \Big) \right)^2 \tag{5}$$

$$\text{subject to } \theta_t >= 0$$

In other words, $\hat{\theta}_t$ minimizes the distance between the observed distribution of age at death among all violence victims ($P(a|v,t,p)$) and the weighted sum of the market-based and non-market-based distributions. I estimate Equation 5 by GMM.

The data used to estimate Equation 5 are as follows. For the distribution of age-at-death among violence victims in the entire country, in each year between 1955 and 2012, I use the death registry constructed by the Venezuelan Ministry of Health. To adjust for changes in the age structure of the population, I standardize the distribution of age-at-death by calculating what this distribution would be if (a) the demographic structure of the population remained frozen in 1955, but (b) the age-specific death rates changed as observed (this is the term $P(a|v,t,p)$; Figure E.1b graphs these series for several age groups). For the distributions of age-at-death among victims of market-based and other violence, I use the distributions observed in the state of Miranda (Figure E.1), similarly standardized by population structure. This implies the assumption that the relationship between age and involvement in market-based violence changes little either over time or between Miranda State and elsewhere. This is a strong assumption, though the striking similarity between Figure E.1 and analogous figures from the United States (Owens, 2011) suggests that the age–market-violence relationship is not context-specific.

Figure E.2a graphs the distribution of age at death among violence victims in 1960 and 2012 (both adjusted for demographic structure). This plot makes clear that the 2012 distribution more closely resembles the market-based violence distribution of Figure E.1a than the other-violence distribution; the opposite is true of 1960. In other words, over time, the distribution of age at death among all violence victims comes to resemble the distribution of age at death among market-based violence victims.

Figure E.2b presents estimates of θ from Equation 5, for each year between 1955 and 2012. Prior to 1989, the proportion of violent deaths deriving from market-based violence is estimated quite close to zero.[41] After 1989, the proportion

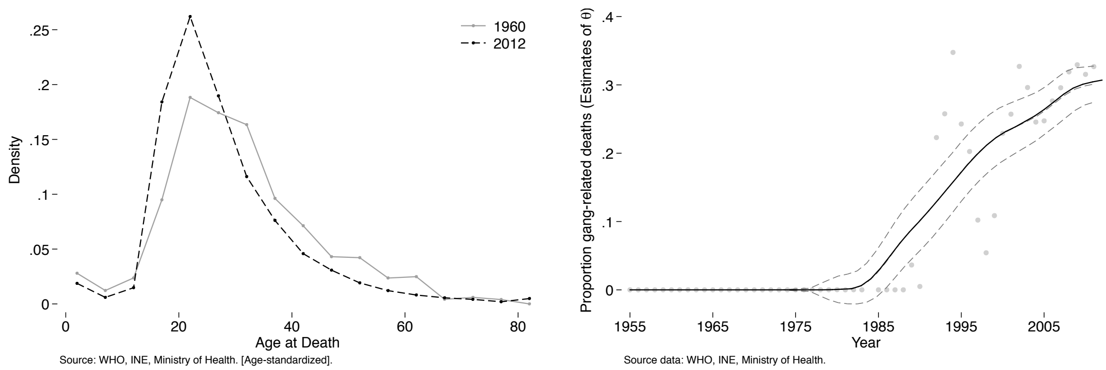
[41] Or rather, the unconstrained estimate of θ is negative, and the estimates in Figure E.2b present constrained estimates (see Equation 5).

Figure E.2: Age Distribution of Violent Death Victims Compresses Over Time

Figure (a) plots the distribution of age-at-death among violence victims in 1960 and in 2012 (adjusted for changes in the demographic structure of the population); c.f. Figure E.1a. Figure (b) plots estimates of Equation 5, the proportion of violent deaths related to market-based conflict.

(a) More 15-to-25-Year-Old Victims

(b) Proportion of Market-Based Violence



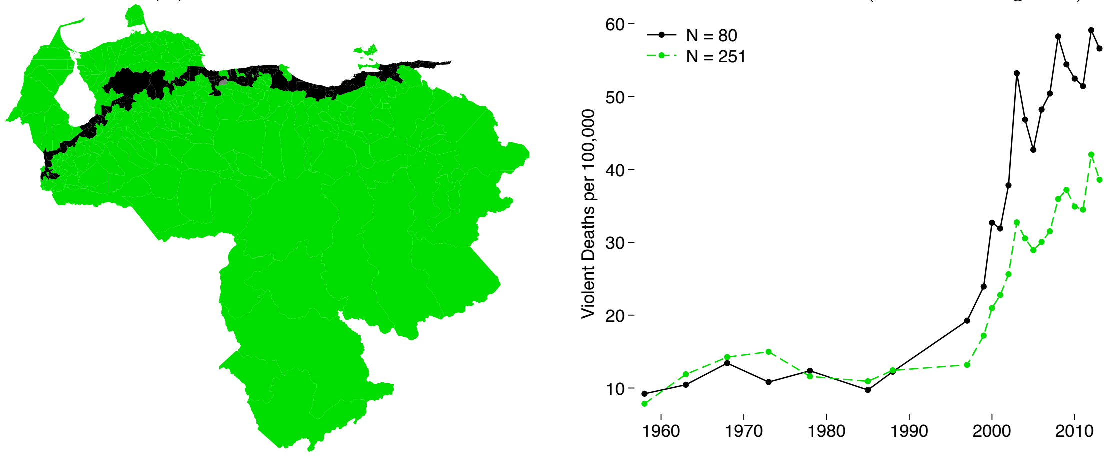
jumps to approximately 20% and then climbs further to approximately 35% in 2012. These results are consistent with the notion that the post-1989 increase in illegal-market revenues in Venezuela generated market-based violence.

F Regional and state-level trends

Figure F.1: Violent death rates in various groups of municipalities

Note: These figures will not print in black and white. See Section 3 for discussion. Solid black lines plot the mean violent death rate in municipalities colored black in each corresponding map; dashed green lines plots the mean violent death rate in green municipalities. Municipalities colored gray are excluded from the plots. "Central region" includes the states of Miranda, Vargas, the Federal District, Aragua, and Carabobo.

(a) *Panamericana* from the Colombian border to Sucre (same as Fig. 1a)



(b) In the 1990s, lethal violence confined to Central Region

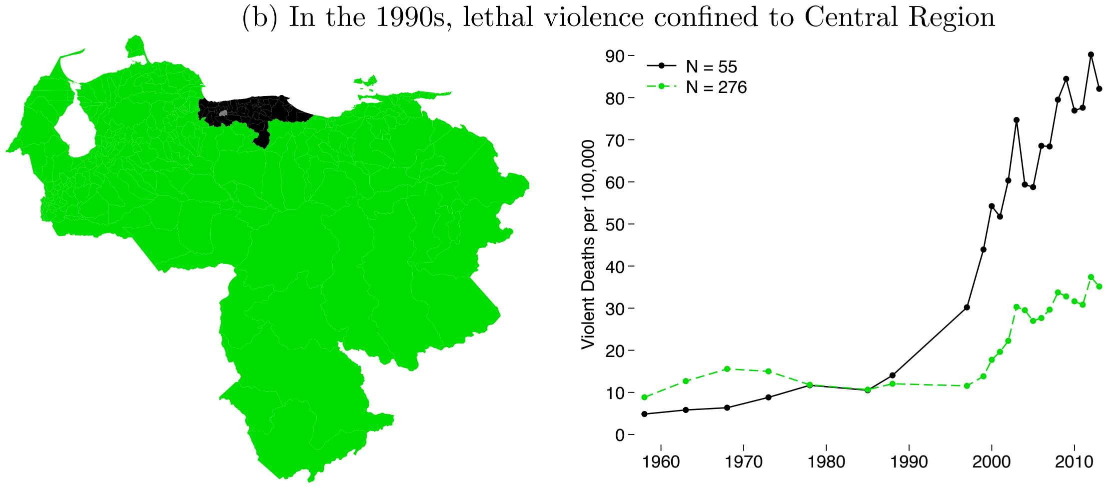
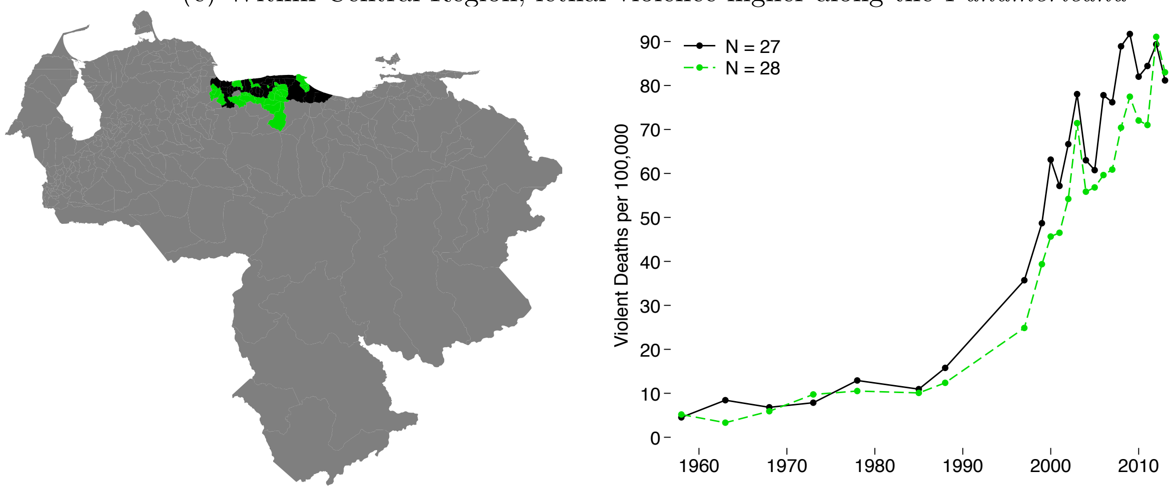
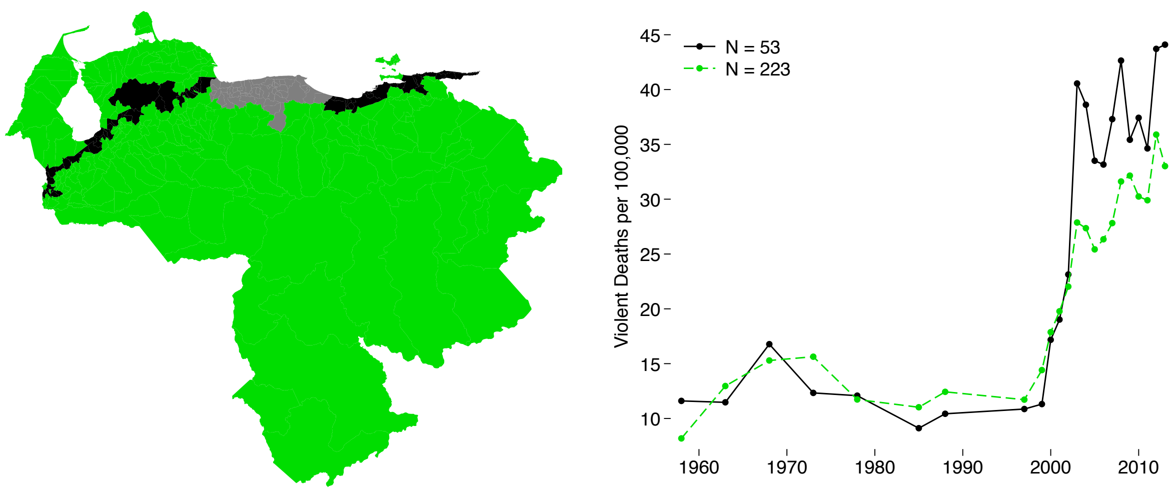


Figure F.1 (con't): Violent death rates in various groups of municipalities

(c) Within Central Region, lethal violence higher along the *Panamericana*



(d) Post-2003, divergence also driven by *Panamericana* outside Central Region



(e) Original groups, excluding neighbors of *Panamericana* municipalities

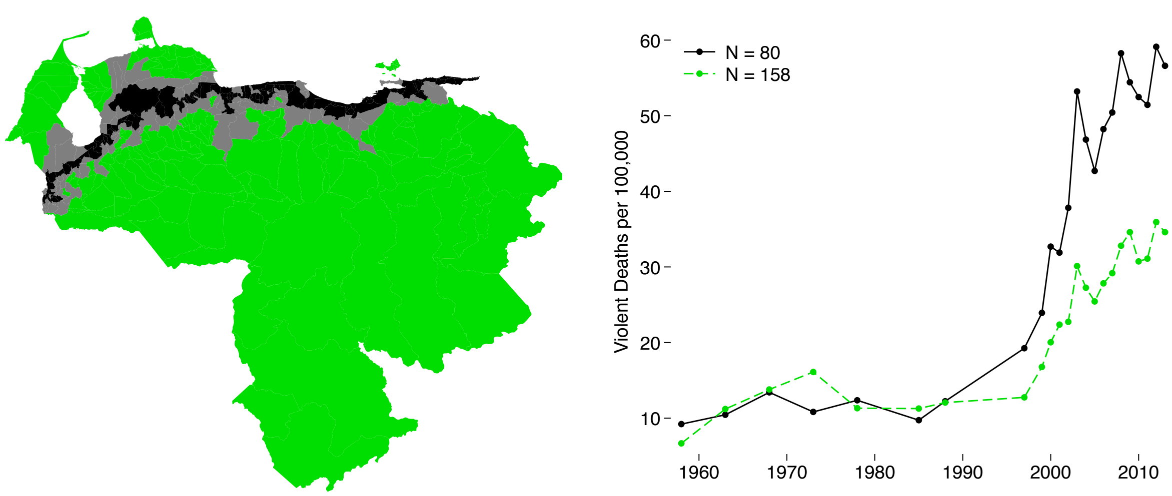
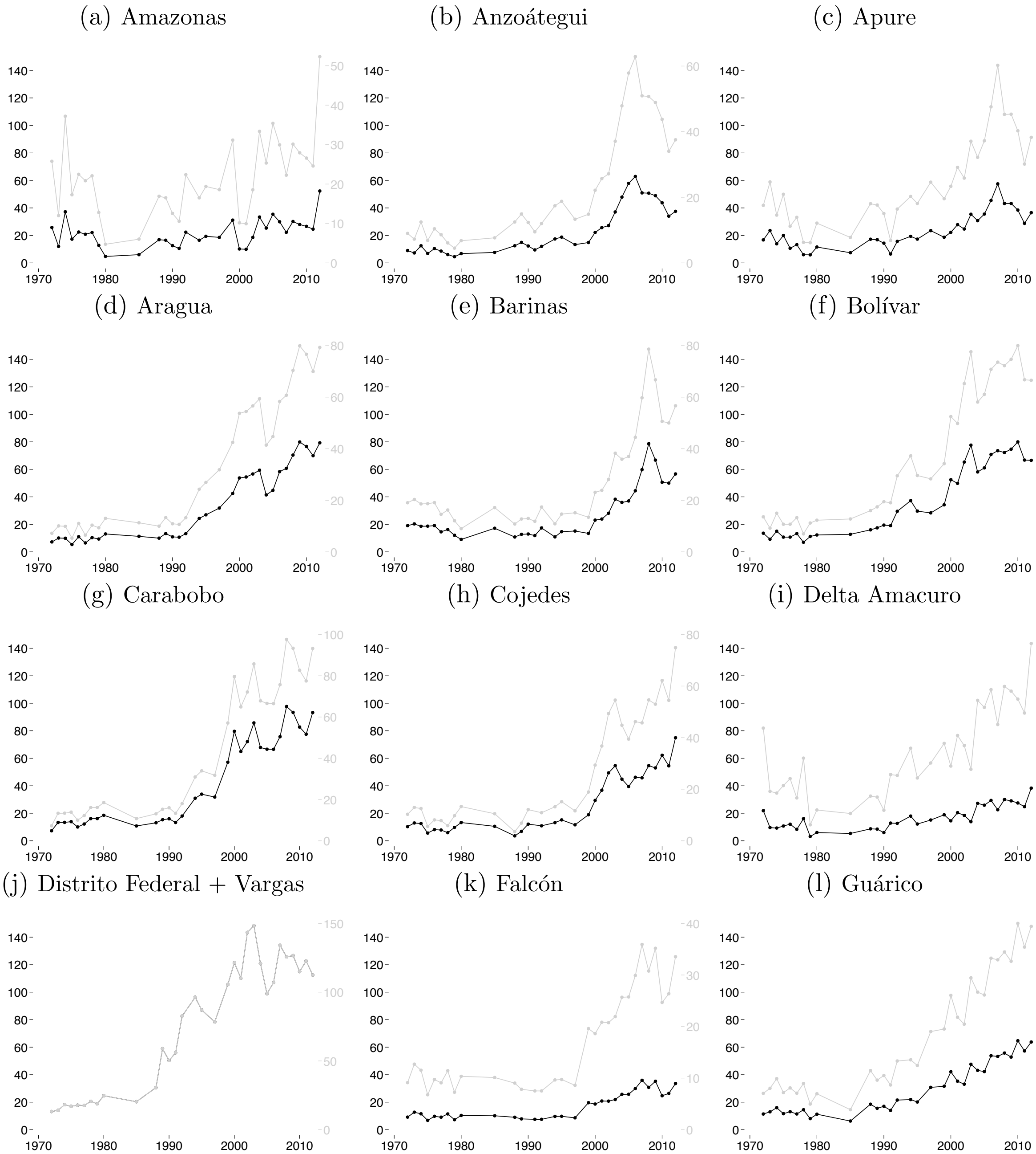


Figure F.2: Homicide rate in each state

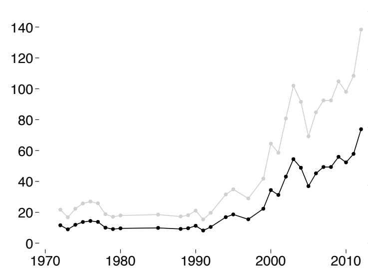
These figures plot the violent death rate (violent deaths per 100,000) in each Venezuelan state. The black line plots each state trend on the a standardized scale, so as to compare trends across states (left axis); the gray lines plot the same trends on individual scales. Source: See Appendix A.



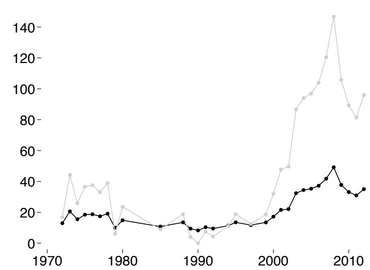
Homicide rate in each state (continued)

These figures plot the violent death rate (violent deaths per 100,000) in each Venezuelan state. The black line plots each state trend on the a standardized scale, so as to compare trends across states (left axis); the gray lines plot the same trends on individual scales. Source: See Appendix A.

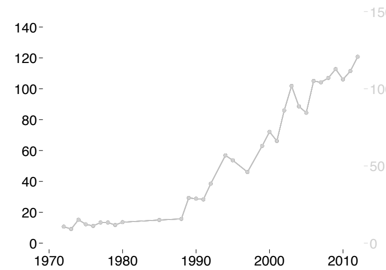
(a) Lara



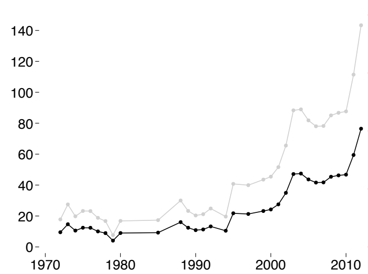
(b) Mérida



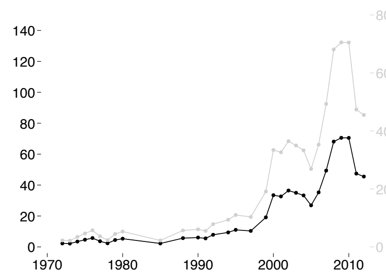
(c) Miranda



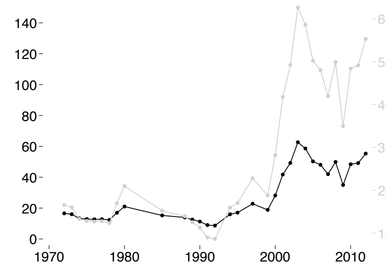
(d) Monagas



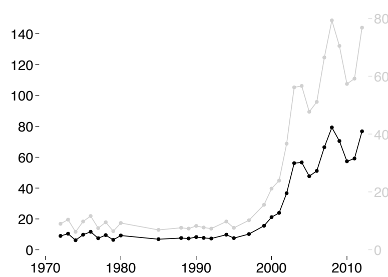
(e) Nueva Esparta



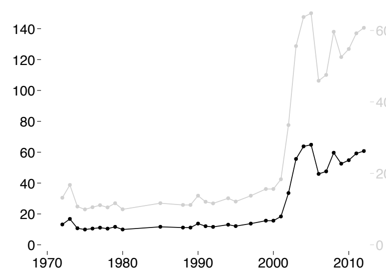
(f) Portuguesa



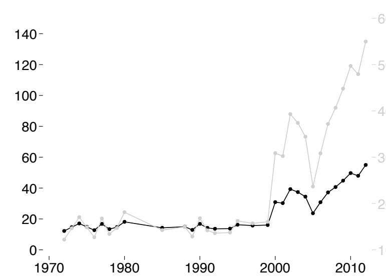
(g) Sucre



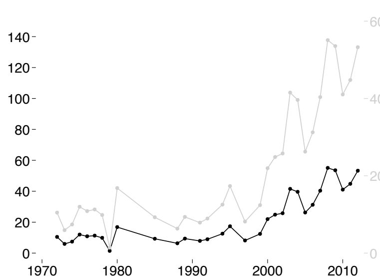
(h) Táchira



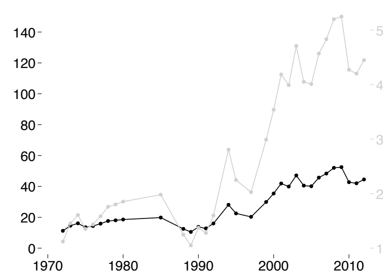
(i) Trujillo



(j) Yaracuy



(k) Zulia



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