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The Violent Consequences of Trade-Induced Worker Displacement in Mexico[†]

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Mexican manufacturing job loss induced by competition with China increases cocaine trafficking and violence, particularly in municipalities with transnational criminal organizations. When it becomes more lucrative to traffic drugs because changes in local labor markets lower the opportunity cost of criminal employment, criminal organizations plausibly fight to gain control. The evidence supports a Becker-style model in which the elasticity between legitimate and criminal employment is particularly high where criminal organizations lower illicit job search costs, where the drug trade implies higher pecuniary returns to violent crime, and where unemployment disproportionately affects low-skilled men. (*JEL* F16, J24, J64, K42, L60, O15, R23)

The illicit drug trade is a multi-billion dollar industry that plausibly imposes high social costs. Notably, conflicts over drug trafficking during the past decade have transformed Mexico into an epicenter of global violence—in 2016, it ranked as the world's second most deadly conflict zone, with its number of violent deaths surpassed only by Syria (International Institute for Strategic Studies 2017). More generally, the world's highest rates of violence are concentrated in urban areas of developing countries involved in the cocaine trade (Igarapé Institute 2017). These striking facts raise the question of why participating in the drug trade is so attractive and fights to control drug routes are so violent. Anecdotal evidence suggests that limited economic opportunities and lackluster macroeconomic performance could play a central role. When asked how he got involved in the drug business, Joaquin "El Chapo" Guzman—named the world's most powerful trafficker by the US government—responded: "in my [geographic] area … there are no job opportunities" (Penn 2016).

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El Chapo's assessment is consistent with Gary Becker's 1968 seminal model of criminality, which highlights that a decline in legitimate job opportunities will increase crime by reducing the opportunity cost. However, a large subsequent literature, focused on strongly institutionalized countries, finds that Becker's insights have limited applicability to violent crime (see Draca and Machin 2015 for a review). It is unclear that these conclusions apply to weakly institutionalized contexts, where weak criminal justice institutions lower the detection probability and the safety net is limited. Moreover, extensive criminal organizations—common in weakly institutionalized settings—plausibly lower criminal job search costs, and large-scale conflicts between these organizations may increase the demand for violence.

This study examines how trade-induced job loss in Mexico impacts urban crime. It fills an important gap in the literature on violence in developing economies, which has focused on rural areas where violence has traditionally been concentrated. Notably, novel work by Dube, García-Ponce, and Thom (2016) documents that less favorable corn prices lead farmers to grow more marijuana in Mexico, subsequently increasing killings. With the decline of rural insurgency, violence has moved to urban areas: in Mexico four-fifths of homicides occur in urban municipalities and globally homicide rates are highest in urban locations (UNODC 2014). It is not clear the extent to which findings on rural conflict generalize to crime in more industrialized settings with well-developed labor markets.

Moreover, the impacts of trade on criminal activity have not been extensively studied. A notable exception is Dix-Carneiro et al. (2017), which like this study examines the relationship between trade and crime. It documents that violent crime in Brazil increased following trade liberalization, in regions initially more specialized in industries that experienced a greater decline in tariffs. Trade liberalization is an important but multi-faceted treatment—for example, they document that it also impacts public spending—whereas the variation we exploit helps to more directly test the Becker hypothesis. Moreover, a substantial share of variation in Brazil is driven by rural areas—as tariff declines varied substantially between agricultural versus manufactured goods—whereas this study focuses specifically on urban manufacturing job loss, an under-examined issue of major policy interest. We also provide novel evidence on mechanisms. Our analysis highlights the importance of augmenting a Becker framework of optimizing individuals with a role for criminal organizations.

Trade competition with China in the US market has been an important driver of local labor market conditions in Mexico. Mexico is also a major player in the drug trade, with 90 percent of cocaine consumed in the United States transiting through it (US Drug Enforcement Agency 2011). Drug trafficking organization (DTO) labor cannot be easily imported given the importance of localized knowledge, and hence a fall in the local opportunity cost of criminal employment will plausibly increase the profitability of operating trafficking routes through a location. This in turn may increase the incentives for drug traffickers to fight to gain control.

We use an instrumental variables strategy, inspired by the seminal contributions of Autor, Dorn, and Hanson (2013), to examine whether trade-induced changes in local labor markets influence violence. We construct a municipality-level measure of international competition that is higher if the municipality has a larger share of employment in industries where Chinese exports to the United States are expected

to grow during the sample period, based on their initial share. Using this approach for 2007–2010—which offers the most data to examine mechanisms—as well as 1998–2003 and 1998–2013, we show that Mexican municipalities with higher predicted increases in international competition experience significantly greater manufacturing job loss. This in turn leads to greater violence. A one standard deviation decline in manufacturing employment increases the drug-related homicide rate by 5.4 per 100,000 between 2007–2010, relative to a sample mean increase of 15. Effects appear to be larger where international competition is likely to disproportionately affect young, less-educated men. Back of the envelope calculations suggest that if Chinese imports to the United States had not changed during this period, the steep increase in drug-related homicides in our sample—totaling around 6,000 in 2007 and over 20,000 in 2010—would have been around 27 percent lower.

The evidence on mechanisms highlights the importance of criminal organizations in linking unemployment to violence. Violence effects are concentrated in places with a major DTO presence, whereas there are no effects in places without drug trade operations initially. Cocaine involves the extensive mobilization of lookouts, the largest group of DTO employees, and hence we would expect a decline in the opportunity cost of criminal employment to increase the profitability of trafficking it through a municipality, plausibly leading drug traffickers to fight over the newly lucrative routes. Municipalities experiencing a decline in employment opportunities indeed witness an increase in cocaine seizures, a reasonable proxy for cocaine traffic given that we do not find evidence of changes in enforcement.

While other mechanisms could link labor markets to criminality, we rule out some key alternatives. We also document that trade-induced employment changes are uncorrelated with changes in trafficking and violence throughout the 15 preceding years, alleviating concerns that places hard hit by international competition were on a different path regardless.

I. The Context

Drug violence in Mexico has claimed over 100,000 lives in the past decade, with the total number of violent deaths between 2007 and 2014 exceeding the combined total in Iraq and Afghanistan by 60 percent (Breslow 2015; Beittel 2017). More generally, a substantial share of global violence occurs in urban areas of developing countries that are involved in the cocaine trade. Comprehensive data compiled by the Igarapé Institute (2017) document that 43 of the world's 50 most violent cities are in Latin America, with cities along cocaine routes in Mexico and Central America topping the list. Brazil, the world's second largest cocaine market and a transit hub to European drug markets, dominates the list's middle, with the bottom rounded out by Colombia, a major cocaine producer, and the United States.

Mexican DTOs dominate US wholesale illicit drug markets. Data from DTO accounting records suggest several reasons why urban labor market conditions would influence illicit sector wages, which in turn plausibly condition drug trafficking routes and violence.[1] DTO local franchises (*plazas*) are well above the

[1] These summary facts about the business operations of DTOs, drawn from confiscated accounting books, are discussed in a report by the Organization of American States (2013).

ninety-ninth percentile of the Mexican firm size distribution, and labor costs form a bulk of DTO expenditures. Lookouts, who monitor the movements of authorities and competing DTO operatives, form the largest category of employees and require extensive local knowledge to blend in and perform their duties. Hence this type of labor cannot be easily imported. Moreover, the evidence for a response of overall migration in Mexico to international competition with China is fairly weak.[2]

A fall in the opportunity cost of criminal employment due to shrinking local manufacturing opportunities could increase the profitability of operating trafficking routes through a location, plausibly increasing the incentives for DTOs—or factions within them—to fight to gain control. DTOs rarely peacefully cohabit the same routes (Williams 2012; Guerrero 2011, pp. 10, 106–108). In our data, the vast majority of drug trade-related homicides involve drug traffickers killing each other.

The role of China in global trade expanded significantly over the period examined. Its share of global manufacturing value added increased from 7 percent in 2000 to 13 percent in 2007 and 19 percent in 2010. Initially, low-skill intensive products such as apparel were central to China's export basket, which over time has shifted toward higher tech goods such as computers.

II. Methods

A. *Data*

To construct manufacturing employment, we utilize the Monthly Survey of Manufacturing Industry (EMIM). EMIM is conducted by Mexico's National Institute of Statistics and Geography (INEGI) and begins in 2007.[3] We use EMIM to examine changes in manufacturing employment between 2007 and 2010–2011. This allows us to elucidate mechanisms using the unique data on the drug trade compiled by the Calderon presidential administration (2006–2012) while avoiding 2008 and 2009, which were atypical due to the Great Recession. We also use the Economic Census, conducted every five years, to measure initial nonagricultural employment and to conduct analyses for periods for which EMIM is unavailable. The Economic Census was conducted in 1999, 2004, 2009, and 2014, with 1998, 2003, 2008, and 2013 reference periods. We do not use the 2008/2009 round because it was conducted at the height of the Great Recession.[4] Data on international competition are from COMTRADE. The baseline analysis uses four digit industries.

Confidential government data provide individual-level information on drug trade-related homicides between 2007 and 2010. Homicides were classified as drug trade-related by federal security officials. We also examine publicly-available homicide data from INEGI, which measures total homicides at the municipality $\times$ year level for 1992–2013.

[2] Majlesi and Narciso (2017) document that Chinese competition increases internal migration in Mexico but decreases migration to the United States, plausibly because individuals are less likely to be able to fund the moving costs. Most of their specifications do not find a statistically significant effect on overall migration.

[3] EMIM surveys large plants with certainty while adding small plants in certain sectors in a probabilistic way, and follows the same plants over time once included, which makes EMIM practically a census of large plants.

[4] Employment fluctuated significantly during this period. To the extent that the constant reference period was not fully understood by respondents, variation in the timing of the survey could generate significant measurement error.

To examine drug trafficking, we use month × municipality level information on illicit drug seizures for 1992–2011.[5] We group drugs into two types: domestically produced drugs, which consist largely of marijuana as well as some heroin and methamphetamine, and cocaine. Confidential government data on municipality-level DTO presence and identity in 2008 provide another key data source for elucidating mechanisms. The online data Appendix provides more details on these and additional data sources.

B. *Empirical Strategy*

The ideal experiment for causal identification would be to randomly assign trade-induced job loss and observe the subsequent impacts on violence and trafficking. While such an approach is not feasible or ethical, we can closely approximate it by isolating a component of trade exposure that: (i) has a strong effect on local labor markets; (ii) is independent of potential drug trade outcomes; and (iii) only impacts the drug trade through changes in local employment. Specifically, we exploit variation in Chinese exports to the US market, which are a primary source of competition for Mexican manufacturing firms, and provide evidence that they are plausibly exogenous to changes in drug violence in Mexico. Following the trade literature, we use the following measure of trade competition:[6]

$$\Delta ICW_{iy} = \sum_{j} \frac{L_{ij,0}}{L_{Mj,0}} \frac{\Delta UC_{jy}}{L_{i0}},$$

$$\Delta UC_{jy} = \frac{Exp_{j,0}}{Exp_{0}} \Delta Exp_{y},$$

where ΔICW_{iy} is the change in international competition per worker faced by Mexican municipality i between the initial year 0 and year y.[7] Here, $L_{ij,0}$ is employment of industry j in municipality i in the initial year, $L_{Mj,0}$ is total initial Mexican employment for industry j, and L_{i0} is total initial nonagricultural employment in municipality i. The term ΔUC_{jy} is the predicted change in Chinese exports to the United States in industry j between year 0 and year y. It equals the value of Chinese exports to the United States of industry j goods as a share of total Chinese exports to the United States in the initial year, $Exp_{j,0}/Exp_{0}$, times the change in the total value of exports from China to the United States between the initial year and year y, ΔExp_{y}. The term ΔICW_{iy} can be interpreted as the change in exposure to international competition per worker in municipality i (in USD terms) and is higher if a municipality has a larger share of employment in industries where Chinese exports to the United States are predicted to grow, based on their initial share.

[5] To our knowledge, the Peña Nieto presidential administration, which took office in 2012, has not made data on seizures during its administration available.

[6] For example, Bloom, Draca, and Van Reenen (2016) and Utar and Ruiz (2013) use a similar approach.

[7] We use municipalities rather than commuting zones because the latter (as constructed by INEGI) can encompass extremely large areas that would take many hours to traverse via public transit—the only mode of transport available to most manufacturing workers—and hence do not effectively proxy local labor markets in larger mega-cities. Moreover, the political outcomes we examine are at the municipality level.

We use the ICW measure in the following first stage specification:

$$\Delta L_{iy}^{m} = \beta_0 + \beta_1 \Delta ICW_{iy} + \mathbf{\Gamma X}_i + \epsilon_{iy}, \tag{1}$$

where ΔL_{iy}^{m} is the change in manufacturing jobs between the initial year and year y in municipality i, normalized by the size of the initial nonagricultural labor force. Note that $\mathbf{X}_i$ are a set of municipality-level control variables and state fixed effects. They absorb residual variance, but make little difference for the point estimates (see online Appendix A for a detailed robustness analysis), suggesting that indeed changes in predicted competition are orthogonal to other factors influencing the outcomes of interest. The regression is weighted by the size of the nonagricultural labor force. We limit the sample to urban municipalities, in addition to controlling for the initial manufacturing employment share, so variation in ΔICW_{iy} is driven by the initial industrial composition. IV regressions are analogous, using ΔICW_{iy} to instrument ΔL_{iy}^{m}.

We focus on Chinese competition in the US market because it is particularly relevant for Mexican firms—generating a strong first stage—but to the extent that it proxies trade competition more generally, the interpretation would be similar. Identification would be threatened if predicted Chinese competition affected changes in the local drug trade through channels other than the labor market. It is possible—though not obvious given that illicit drug demand is highly inelastic—that Chinese competition could affect US demand for drugs trafficked through Mexico. However, it is hard to tell a story where changes in demand would disproportionately affect Mexican municipalities that happened to experience employment declines due to Chinese competition, and where effects would disproportionately fall on high dollar cocaine traffic, which anecdotally is not the drug of choice for displaced US manufacturing workers. Another concern is that places hard-hit by international competition were already experiencing differential trends in drug violence and traffic because they also had a comparative advantage in the drug trade, but we will show, using data extending 15 years prior to our sample period, that this is not the case.

III. Results

A. *Local Labor Markets and the Drug Trade*

We begin by examining whether changes in employment, instrumented by international competition, influence changes in violence during four distinct periods: 1998–2013, 1998–2003, 2007–2010, and 2007–2011.[8] 1998–2013 provides insight into the relationship between employment and violent crime in the longer run. 1998–2003 is a period where violence was falling, whereas violence rose sharply during the 2007–2010/11 period, which offers the richest data to examine mechanisms. Table 1 provides summary statistics for key variables in each of these periods. There is a much larger change in predicted international competition over the longer

[8] The sample throughout is urban municipalities in the 2007 and 2010–2011 EMIM.

Table 1—Summary Statistics

	Δ2007–2010 (1)	Δ2007–2011 (2)	Δ1998–2003 (3)	Δ1998–2013 (4)
ICW	0.03	0.06	0.04	0.25
	(0.07)	(0.13)	(0.06)	(0.34)
Manufacturing employment rate	−0.02	−0.01	−0.02	0.04
	(0.05)	(0.06)	(0.13)	(0.23)
Homicides per 100,000	20.86	20.94	−3.05	10.52
	(47.94)	(34.47)	(5.83)	(18.95)
Drug-related homicides per 100,000	15.14	—	—	—
	(39.42)	—	—	—
log cocaine seizures	3.35	3.85	1.25	—
	(6.02)	(5.81)	(5.03)	—
log non-cocaine seizures	3.90	4.57	0.11	—
	(5.82)	(5.74)	(5.38)	—

Notes: Cell values report variable means—weighted by the nonagricultural labor force size—with standard deviations shown in parentheses. ICW is reported in units of US$100,000 per worker. Seizures are reported in log USD. Drug-related homicides are only available for 2007–2010, and seizures data are not available for the 1998–2013 period.

period because the increase in Chinese exports to the United States was proportionately larger during this period.

Table 2, panel B documents a strong first stage relationship across all periods, though the magnitudes vary. A US$10,000 increase in predicted international competition per worker results in a 0.08 (1998–2013) to 0.97 (1998–2003) standard deviation decline in employment. The first stage should not be taken too literally, as our aim is not to study the impact of Chinese competition on labor markets but rather to examine the effect of trade-induced employment changes on crime, using *predicted* international competition as an instrument.[9] To answer the former question, one would instrument actual Chinese competition with predicted competition, and labor market measures would be the outcome. For our question, labor market measures are the endogenous variable and actual Chinese competition does not enter (though estimates are robust to instrumenting with it instead).

Nevertheless, it is worth highlighting several reasons why the magnitude of the first stage varies. Mexican municipalities specializing in industries in which China had an initial comparative advantage were hard hit when China joined the WTO in 2001—as reflected in the large first stage for 1998–2003—but partially recovered over the longer 15-year time span (i.e., by specializing in new products or improving efficiency). Part of the difference is also mechanical: employment changes are standardized for ease of interpretation in the second stage, and the standard deviation varies across periods.[10] Moreover, the predicted competition measure changes

[9] There is a group of papers that analyze the consequences of competition with China for Mexico specifically. This includes Utar and Ruiz (2013) and Iacovone, Rauch, and Winters (2013), who analyze the impact of competition with China on the performance of Mexican manufacturing plants; Sugita, Teshima, and Seira (2017), who investigated the impact on the changes in transaction partners in the US market; and Chiquiar, Covarrubias, and Salcedo (2017), who examined the impact for Mexican regional labor market outcomes.

[10] For example, a one standard deviation change in manufacturing employment is nearly twice as large for 1998–2013 as for 1998–2003.

Table 2—Job Loss and Violence

	1998–2013 (1)	1998–2003 (2)	2007–2010 (3)	2007–2010 (4)	2007–2011 (5)	Low-skill young men 2007–2010 (6)	Residual group 2007–2010 (7)
Panel A. Violence							
	Dependent variable is change in homicide rate						
%ΔJobs	−11.89	−0.95	−6.88	−5.44	−8.72	−12.07	−4.87
	(3.28)	(0.26)	(4.38)	(3.23)	(5.02)	(6.70)	(2.86)
Observations	518	518	520	520	515	520	520
First stage *F*-stat	12.12	14.12	73.40	73.40	28.85	31.89	80.39
Mean of dep var	10.52	−3.05	20.86	15.14	20.94	15.14	15.14
Homicide type	All	All	All	Drug-Related	All	Drug-Related	Drug-Related
Panel B. First stage							
	Dependent variable is percent change jobs						
ΔICW	−0.82	−9.78	−5.17	−5.17	−1.76	−31.89	−5.98
	(0.24)	(2.60)	(0.60)	(0.60)	(0.33)	(5.65)	(0.67)
Observations	518	518	520	520	515	520	520
R^2	0.240	0.297	0.375	0.375	0.214	0.293	0.380
Partial R^2	0.054	0.220	0.151	0.151	0.052	0.063	0.165

Notes: Observations are municipalities weighted by the pre-period nonagricultural labor force size. The sample includes all non-rural Mexican municipalities covered by the Mexican Monthly Survey of Manufacturing Industry (EMIM) in 2007 and 2011 in column 5 and municipalities covered in 2007 and 2010 for all other columns. %ΔJobs is the difference between annual manufacturing employment levels in the relevant years divided by the pre-period nonagricultural labor force size. ΔICW measures the predicted change in international competition per worker during the relevant years (see the text for details). In column 6, ΔICW and %ΔJobs consider only employment of low-skill young men, while in column 7 these variables consider employment of the residual group of laborers. Regressions include the controls described in the online Appendix text, and robust standard errors are in parentheses.

proportionately with the change in overall Chinese exports to the United States, which grow more over the longer period. Finally, demand shocks in the United States can lead certain Mexican and Chinese exports to move together, weakening the negative relationship. Notably, the difference between the 2007–2010 and 2007–2011 first stage results largely from the 2011 recovery of Mexican computer exports, despite the fact that predicted (and also actual) Chinese computer exports continued to grow.

Using international competition as an instrument for changes in employment, Table 2, panel A documents that declines in manufacturing job opportunities substantially increase violence, across all time periods examined and regardless of the direction of overall violence trends. A one standard deviation decline in manufacturing jobs increases the annual homicide rate between 1998 and 2013 by 12 per 100,000 (column 1), whereas the effect between 1998 and 2003 is around 1 (column 2). While these coefficients at first glance appear quite different, they both represent large impacts relative to the respective overall changes in the homicide rate. Between 1998 and 2003, the average homicide rate fell by around 3, whereas the homicide rate rose by 12 between 1998 and 2013. A standard deviation change in employment is also about twice as large during the longer period. After adjusting for this, the coefficients are of fairly similar magnitudes relative to the mean changes in violence.

This relationship also holds during the 2007–2010/11 period, using the EMIM manufacturing data and information on drug-related homicides, collected through 2010. A one standard deviation decline in manufacturing jobs between 2007 and 2010 increases the drug-related annual homicide rate by 5 per 100,000, relative to a sample mean increase of 15 (column 4, s.e. = 3.23). The effects on the overall change in homicides between 2007 and 2010/11 are similar.[11] To put this into comparative perspective, the homicide rate in New York in recent years has been around 7, whereas the homicide rate in Chicago is about twice that. It is worth noting that the correlation between the 2007–2010 and 1998–2003 ICW is only 0.3—as China's comparative advantage has shifted over time—so the set of municipalities generating the relationship in each period is quite distinct.

Our data on the demographic characteristics of drug homicide victims show that over 95 percent were male, and around half were under age 30. We would expect employment declines to have larger effects when they disproportionately influence the young, less skilled male workers that are most likely to fill the drug trade's low-level ranks. Neither EMIM nor the Economic Census provide information on worker characteristics, but we can proxy them using data from the 2000 Population Census. We calculate the share of employees in the young, male, less educated demographic at the municipality × three digit industry level and merge these shares with EMIM to estimate the number of jobs in that demographic in each municipality × four digit industry × year.[12] These demographic-specific counts are then used to construct the instrument and endogenous variable, which will approximate demographic-specific changes in employment to the extent that trade shocks hit different workers within three-digit industries equally.[13] In column 6, the endogenous variable is the imputed employment change for less educated, younger men, whereas the endogenous variable in column 7 is the change in employment for the residual category. While a proxy that produces somewhat noisy estimates, coefficient magnitudes are much larger—around 12 versus 5 drug-related homicides per 100,000 inhabitants—for a one standard deviation employment decline predicted to affect less-educated, younger men.

Moreover, an examination of heterogeneity by the initial presence of drug trafficking organizations (DTOs) underscores the role of large-scale criminal organizations in linking labor market conditions to violent crime, highlighting the importance of marrying a Becker style model of optimizing individuals with a role for organizations. This analysis is conducted for the 2007–2010 sample, as we lack pre-period data on DTO presence for the earlier periods. Table 3, panel A examines all homicides, and panel B examines drug-related homicides. For comparison, column 1 reports the baseline estimates of the impact of employment changes on violence. Column 2 documents that there is no effect on overall or drug-related violence in the approximately one quarter of the sample with no initial drug trade presence.

[11] Since there is inherent noise in classifying homicides as drug trade-related, part of the difference between these two rates plausibly consists of drug violence as well.

[12] We define "young" as individuals under 30 and "less educated" as individuals who have completed eight or fewer years of schooling—i.e., lower secondary or less. Results (available upon request) change little if we use different cutoffs or do not impose an age criterion.

[13] We impute municipality × industry measures of worker demographics, rather than classifying some industries as intensive in these types of workers and focusing only on those industries, because there is significant heterogeneity in the demographic characteristics of workers in a given industry across municipalities.

Table 3—Violence and Drug Seizures

Sample:	All (1)	No DTO (2)	Any DTO (3)	Major DTO (4)
Panel A. ΔTotal homicide rate				
%ΔJobs 2007–2010	−6.88	0.06	−8.59	−41.27
	(4.38)	(0.70)	(5.16)	(19.34)
Observations	520	144	376	293
F-stat	73.40	16.56	55.49	7.22
Mean of dependent variable	20.86	10.04	25.05	25.71
Panel B. ΔDrug-related homicide rate				
%ΔJobs 2007–2010	−5.44	0.39	−7.17	−30.11
	(3.23)	(1.06)	(3.87)	(13.99)
Observations	520	144	376	293
F-stat	73.40	16.56	55.49	7.22
Mean of dependent variable	15.14	5.67	18.81	19.24
Panel C. Δlog cocaine seizures				
%ΔJobs 2007–2010	−1.19	0.21	−1.42	−4.11
	(0.29)	(0.33)	(0.38)	(1.88)
Observations	520	144	376	293
F-stat	73.40	16.56	55.49	7.22
Mean of dependent variable	3.35	1.28	4.15	4.29
Panel D. Δlog non-cocaine seizures				
%ΔJobs 2007–2010	0.85	−0.15	0.99	−0.42
	(0.28)	(0.32)	(0.29)	(1.26)
Observations	520	144	376	293
F-stat	73.40	16.56	55.49	7.22
Mean of dependent variable	3.90	0.88	5.07	5.16

Notes: Observations are municipalities weighted by the pre-period nonagricultural labor force size. The sample includes all non-rural Mexican municipalities covered by EMIM in 2007 and 2010. Estimates are from instrumental variables specifications in which the endogenous variable is %ΔJobs—the difference between annual manufacturing employment levels in the relevant years divided by the pre-period nonagricultural labor force size—and the instrument is the predicted change in international competition per worker (see the text for details). The outcome variables are the changes from 2007 to 2010 in the following variables. Panel A: total homicide rate; panel B: drug-related homicide rate; panel C: log value of cocaine seizures; panel D: log value of non-cocaine seizures. Regressions include the controls described in the online Appendix text, and robust standard errors are in parentheses.

Focusing on municipalities with a drug trade presence—either of a major DTO (as defined by the Mexican government) or a more localized drug gang—the effects are slightly larger than in the full sample (column 3). Strikingly, when we consider only municipalities with a major DTO—in other words, municipalities with a large-scale criminal organization whose primary aim is to transport drugs to the lucrative US market—a one standard deviation decline in manufacturing employment increases the drug-related homicide rate by 30, an effect about six times larger in magnitude than that in the full sample (column 4). Given the smaller sample, the first stage is somewhat weaker and the coefficient estimate somewhat noisier than that for the full sample, but is still highly statistically significant. A subset of municipalities in this group witnessed the most extreme increases in violence, and manufacturing employment declines were also large in these municipalities. A back of the envelope calculation using the reduced form of the regression specifications in Table 3

and setting the change in Chinese exports to the United States in this period to zero (hence $\Delta ICW = 0$) suggests that if they had not changed, the increase in drug violence would have been around 27 percent lower.

B. *Mechanisms*

We hypothesize that declines in the opportunity cost of criminal employment make drug trafficking more lucrative, and this in turn leads criminal organizations—or factions within them—to fight to control affected territories. Local knowledge is a key input for low-level traffickers, and hence we would expect local labor supply to matter for DTO profitability, particularly for high-value drugs like cocaine that involve the extensive mobilization of lookouts. We test this by examining whether drug traffic, as proxied by illicit drug seizures, increases when manufacturing employment opportunities decline. We focus on the 2007–2010 period. This allows us to examine heterogeneity by DTO presence, and to our knowledge the Mexican government has not released information on drug seizures occurring after the Calderon (2006–2012) presidential administration.

Drug seizures will provide a reasonable proxy for overall drug traffic—which by nature is unobserved—to the extent that changes in employment opportunities do not have large direct impacts on enforcement. In Mexico, local law enforcement is primarily funded by state and federal transfers. Data on municipal budgets compiled by INEGI show that only 10 percent of municipal budgets are funded by local taxes, the vast majority of which come from taxes on assets and very little of which are drawn from taxes on consumption, production, or income.[14] Moreover, we will document that changes in employment do not influence the probability that the party controlling the mayorship—which influences local law enforcement—changes between 2007 and 2010.

Seizures of cocaine and other drugs (marijuana, heroin, and methamphetamine) are examined in Table 3, panels C and D, respectively. Column 1 estimates that declines in local employment opportunities between 2007 and 2010 lead to a substantial increase in seizures of cocaine, a highly lucrative drug that is overwhelmingly exported to the United States.[15] There are no effects, however, in places without a drug trade presence initially (panel C, column 2). In contrast, the effects are positive and statistically significant in municipalities with an initial drug trade presence (column 3) and are particularly large in areas with a major DTO presence (column 4), closely mirroring the heterogeneity in violence.

There is some evidence for substitution away from the trafficking of domestically produced drugs, which consist largely of lower value marijuana that is sold in part domestically and in part to the US market. Manufacturing job loss decreases seizures of domestically-produced drugs in places with an initial drug trade presence (panel D, column 3), but the effect is smaller and statistically insignificant in municipalities with a major DTO (column 4). This could be explained by an extension of the Becker model, in which criminal organizations—particularly the smaller drug gangs—must

[14] See https://www.inegi.org.mx/temas/finanzas/.

[15] The dependent variable is the log USD value of seizures if they are positive and zero otherwise. This measure is nonnegative, as the value of drug seizures is always sufficiently large.

allocate fixed business resources and flexible workers—i.e., lookouts—between cocaine and less labor intensive, lower value drugs.

A central concern is that places that experienced more job loss would have been on a different violence trajectory in any case because they had a comparative advantage in the drug trade. Table 4 conducts a series of placebo exercises where the dependent variable is changes in homicides or cocaine/non-cocaine seizures in the following periods: 1992–1995, 1995–1998, 1998–2001, 2001–2004, and 2004–2007. The treatment remains the change in manufacturing employment between 2007 and 2010, instrumented by international competition. We examine the sample as a whole, as well as municipalities with an initial drug trade presence. This exercise is feasible because Chinese comparative advantage shifts across time, from low-skilled goods—particularly apparel—to higher-skilled goods such as computers, produced in different locations. The coefficients on job loss tend to be small and statistically insignificant, with the few that are statistically different from zero plausibly arising by chance given the large number of regressions examined.

While this allays concerns about identification, one might worry that the mechanism is not employment opportunities but some other factor affected by employment. One alternative hypothesis is that increases in trafficking and violence result from increased local drug demand due to unemployment, but the pattern of heterogeneity in Table 3 suggests that this is unlikely. If effects were driven by local demand, we would expect to see them as much in places where major DTOs dominate as in places where they do not, and we would expect to see substitution toward more locally affordable drugs like marijuana.

Another alternative story is that trade-induced job loss changed political preferences, in turn influencing election outcomes and enforcement. Table 5 documents using state-level public opinion data that employment declines indeed make respondents less likely to agree that politicians improve well-being, less likely to think there are more opportunities than in the past, and less likely to rate Mexico as democratic (columns 2–4).[16] The relationship between employment declines and homicides, while noisy, continues to hold at the state level (column 1). Mayors from Mexico's PAN political party were more likely to crack down on the drug trade following the election of President Felipe Calderon in 2006, in turn generating large increases in violence (Dell 2015), and one concern is that employment declines could increase the probability that the PAN takes office and implements a crackdown. Columns 5–8 do not find an effect of employment changes on the probability that the party of the mayor changes between 2007–2010, for the overall sample or the subsamples based on initial DTO presence. Moreover, online Appendix Table B-1 documents that if anything, employment declines reduce the probability that the PAN gains control in municipalities where it did not hold office initially. As discussed above, in Mexico law enforcement is primarily funded by state and local transfers, and this funding is unlikely to vary with idiosyncratic local economic conditions.

[16] Questions are answered on a scale from one to three, with higher numbers indicating stronger agreement.

TABLE 4—PLACEBOS

Dependent variable is:	ΔHomicide rate		Δlog value cocaine seizures		Δlog value non-cocaine seizures	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. 1992–1995						
%ΔJobs 2007–2010	−4.52	−4.37	0.69	0.82	0.15	0.34
	(0.95)	(1.17)	(0.39)	(0.42)	(0.44)	(0.51)
Observations	512	370	512	370	512	370
F-stat	72.48	52.92	72.48	52.92	72.48	52.92
Mean of dependent variable	2.93	1.47	0.57	0.57	1.26	1.37
Sample	All	Any DTO	All	Any DTO	All	Any DTO
Panel B. 1995–1998						
%ΔJobs 2007–2010	0.14	−0.13	0.64	0.77	−0.07	−0.25
	(0.45)	(0.54)	(0.46)	(0.58)	(0.46)	(0.58)
Observations	519	375	519	375	519	375
F-stat	76.87	60.58	76.87	60.58	76.87	60.58
Mean of dependent variable	−1.68	−1.44	0.19	0.28	2.73	3.38
Sample	All	Any DTO	All	Any DTO	All	Any DTO
Panel C. 1998–2001						
%ΔJobs 2007–2010	0.23	0.42	0.64	0.57	0.26	0.25
	(0.25)	(0.29)	(0.36)	(0.39)	(0.50)	(0.55)
Observations	519	375	519	375	519	375
F-stat	78.76	66.10	78.76	66.10	78.76	66.10
Mean of dependent variable	−2.58	−2.33	1.56	2.09	−0.19	−0.28
Sample	All	Any DTO	All	Any DTO	All	Any DTO
Panel D. 2001–2004						
%ΔJobs 2007–2010	−0.15	−0.17	0.05	0.11	0.17	0.06
	(0.27)	(0.31)	(0.55)	(0.53)	(0.37)	(0.48)
Observations	520	376	520	376	520	376
F-stat	77.59	65.29	77.59	65.29	77.59	65.29
Mean of dependent variable	−0.83	−0.95	−0.61	−0.59	−0.29	−0.34
Sample	All	Any DTO	All	Any DTO	All	Any DTO
Panel E. 2004–2007						
%ΔJobs 2007–2010	−0.43	−0.62	0.17	0.21	−0.48	−0.52
	(0.49)	(0.47)	(0.21)	(0.26)	(0.52)	(0.52)
Observations	520	376	520	376	520	376
F-stat	75.82	60.34	75.82	60.34	75.82	60.34
Mean of dependent variable	−0.59	−0.25	−0.47	−0.73	−1.04	−1.25
Sample	All	Any DTO	All	Any DTO	All	Any DTO

Notes: Observations are municipalities weighted by the pre-period nonagricultural labor force size. The sample includes all non-rural Mexican municipalities covered by EMIM in 2007 and 2010. Estimates are from instrumental variables specifications in which the endogenous variable is %ΔJobs—the difference between annual manufacturing employment levels in the relevant years divided by the pre-period nonagricultural labor force size—and the instrument is the predicted change in international competition per worker (see the text for details). ΔHomicide rate reflects the change in the homicide rate during the time period stated in the panel heading, and Δlog value of cocaine seizures and Δlog value of non-cocaine seizures are defined analogously. Regressions include the controls described in the online Appendix text, and robust standard errors are in parentheses.

Table 5—Politics and Opinions

	ΔHomicide rate (2007–2010)	Change in agreement (2005–2012): Politicians improve well-being	Change in agreement (2005–2012): More opportunities than in past	Change in agreement (2005–2012): Mexico is Democratic	Any change in party of mayor (2007–2010)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
%ΔJobs 2007–2010	−22.79	0.10	0.08	0.17	0.04	0.04	0.05	−0.12
	(11.85)	(0.04)	(0.05)	(0.07)	(0.03)	(0.04)	(0.03)	(0.13)
Observations	32	32	32	32	517	144	373	293
First stage *F*-stat	35.44	35.44	35.44	35.44	73.16	16.56	55.11	7.22
Mean of dependent variable	14.92	0.02	−0.34	−0.11	0.47	0.30	0.54	0.54
Unit	State	State	State	State	Muni.	Muni.	Muni.	Muni.
Sample	All	All	All	All	All	No DTO	Any DTO	Major DTO

Notes: Observations are states weighted by the pre-period nonagricultural labor force size in columns 1–4 and municipalities weighted by the pre-period nonagricultural labor force size in columns 5–8. In columns 5–8, the sample includes all non-rural Mexican municipalities covered by EMIM in 2007 and 2010. Estimates are from instrumental variables specifications in which the endogenous variable is %ΔJobs—the difference between annual manufacturing employment levels in the relevant years divided by the pre-period nonagricultural labor force size—and the instrument is the predicted change in international competition per worker (see the text for details). The outcome variable in columns 5–8 is an indicator for whether there was any change in the ruling mayoral party between 2007 and 2010. Regressions in columns 1–4 have no controls and regressions in columns 5–8 include the controls described in the online Appendix text. Robust standard errors are in parentheses.

C. *Robustness*

We conduct extensive robustness analyses, described in more detail in the text at the beginning of the online Appendix. Results are broadly robust to the inclusion of a wide variety of controls (online Appendix A), to employing alternative measures of international competition (online Appendices C–F), to using six rather than four-digit industries (online Appendix G), to constructing the denominator of the ICW and employment change measures using manufacturing employment from EMIM rather than nonagricultural employment (online Appendix H), and to using a randomization inference style approach rather than conventional inference (online Appendix I).

IV. Conclusion

Trade-induced job loss in Mexico leads to large increases in violence, particularly in municipalities with transnational criminal organizations. We hypothesize that when changes in local labor market conditions make it more lucrative to transport drugs through a location by lowering the opportunity cost of criminal employment, drug trafficking organizations fight to gain control.

Cities in the developing world—and in Latin America in particular—are epicenters of global violence, with drug gangs that have ties to the cocaine trade often playing a central role (Igarapé Institute 2017). Far from being irrelevant to the non-criminal populace, these conflicts consume significant public resources, overwhelm the judicial system, and terrorize citizens. In Mexico, public expenditures on fighting the drug trade rival social development spending, the national clearance rate for homicide at the peak of the drug wars was only 20 percent—and was as low

as 4 percent in the most violent states—and public opinion surveys have found that security is more likely than the economy to be chosen as the biggest problem facing the country (Estados Unidos de Mexico, Gobierno Federal 2010; Keefer and Loayza 2010; México Evalúa 2012). Whether improving economic opportunities can reduce rates of drug violence is a topic of considerable political debate (Ballesteros 2018). While rural insurgencies have traditionally received the lion's share of attention in the social science literature, urban violence will likely only grow in importance as urbanization continues.

This study underscores the value of an augmented Becker-style approach combining individual economic incentives with a role for organizations. Far from being an anomaly, criminal organizations operate on a large-scale in drug transit and producing countries, where violent crime typically occurs at high rates. When outside options are limited, the economic opportunities provided by the lucrative illicit drug trade are all the more valuable, particularly for the young, low-skilled men that dominate its lower ranks. Improving the outside option of displaced manufacturing workers—through strengthening the social safety net or other adjustment programs—plausibly has an important role to play in the arsenal of policymakers seeking to reduce high rates of organized violent crime in the developing world.

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