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Violence in Mexico and its Effects on Labor Productivity

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Abstract: This paper examines the evolution of Mexico's labor productivity (GDP per worker) across its 32 sub-national entities from 2003 to 2013, during a period of rising drug related crimes. Using quarterly data and economic controls, fixed-effects models suggest the effects of crime are small and differ depending on whether such crimes are prosecuted by state/local or federal authorities. However, results from System Generalized Methods of Moments (SGMM) regressions generate stronger responses for (endogenous) wages and labor productivity. First, crime has negative effects on Mexican labor productivity across states during the "war on drugs period". Second, increases in expenditures on public security lead to falling labor productivity which can be interpreted as indirect effects of crime. Third, federal authorities are found to be more effective (in not causing lower productivity) than state/local authorities.

Key Words: Labor Productivity, Mexico, Panel Data, Real Wages, Violence.

JEL Classification Numbers: F15, F21, F22, F43, O47.

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1. Introduction

Recent work by the United Nations' office on Drugs and Crime, compiled by the Wall Street Journal and reported by Luhnow (2014), shows that Latin America has about 31% of the total homicides in the world for 2012, with the region comprising 8% of the total world population. Mexico, in particular, ranked third in homicide count, after Brazil and Nigeria. Recent reviews of the dispatching of federal troops to the northern Mexican border state of Tamaulipas after rising violence between rival drug gangs are usually linked to the "war on drugs" position adopted by the Calderon's administration (from December 2006 to December 2012): "With both its long coastline and border with Texas that allows access to U.S. markets, Tamaulipas has been a prime drug-trafficking region for decades. It was ground zero to the wave of extreme drug-related violence that engulfed the country over the past seven years, leaving about 100,000 people dead or missing." Althaus (2014).

Studies on the recent rise in Mexico's violence have become increasingly more common with either city or state-level evidence. Rodriguez-Oreggia and Flores (2012), for example, adopt a spatial analysis framework at the municipality level to explain annual homicide rates with a focus on states applying for intervention by federal forces.[1] Controlling for inequality, income, and youth unemployment among other factors, Rodriguez-Oreggia and Flores (2012) find positive and statistically significant effects of federal intervention on crime. Pan et al. (2012) use spatial analysis from 2005 to 2009 and find that real per capita GDP growth for Mexican states depends positively on growth in neighboring states and negatively to crime in neighboring states. Liu et al. (2013) estimate annual panel fixed-effects models of crime at the Mexican state level

[1] Rodriguez-Oreggia and Flores (2012) pay particular attention to the fact that, after the federal government declared "war on drug cartels" Mexican states were offered federal forces to combat cartels. Some states accepted these federal interventions in 2007, some did in 2008, and several remained without intervention.

from 2001 to 2008 and find that higher wages, increased federal police forces, and higher incarceration rates imply higher reduction in crime across Mexican states.

An earlier paper by Albuquerque (2007) uses yearly panel data from 1985 to 2004 for 10 U.S.-Mexico sister cities and concludes that homicide rates are fundamentally different. On one side, data show that U.S. cities have positive coefficients on the aggregate homicide rate of all cities in the country except the city where the observation takes place. On the other side, negative coefficients in homicide rates are found for Mexican cities. His interpretation is that homicides on the Mexican side of the border are being driven by organized crime, making clustering and concentration of activities in one city. In this sense, when homicides rise in Mexican border cities, they tend to fall in other Mexican border cities. More broadly, Albuquerque (2007) finds that differences in homicide rates depend on differences in law enforcement institutions and population density.

Using panel data methods all of the above studies attempt to explain what determines crime in Mexico for either city or state level as unit of analysis. An alternative research design is to examine the effects of crime on economic variables. In this sense, Cárdenas and Rozo (2008) and Detotto and Otranto (2010) estimate the effects of crime on economic growth for Colombia and Italy, respectively. Recent examples for Mexico include Benyishay and Pearlman (2014), who use surveys of microenterprises in Mexico and find that the incidence of robbery is higher than fines and bribes (with higher average loss). Their empirical estimates suggest strong evidence that higher robbery rates reduce the probability of microenterprises expanding their operations. Another study by Basu and Pearlman (2013) look at migration effects of violence in Mexico. For the 32 Mexican states, Ashby and Ramos (2013) find a positive association between crime and Foreign Direct Investment in “mining and oil extraction”, but no association in the manufacturing sector. Fullerton and Walke (2014) examine the six largest metropolitan

economies along the U.S. border and show that local retail activity is affected negatively by drug related homicides. In this set of studies, the direction of causality goes from crime to economic indicators.

In this study, we examine the effects of the rise in drug violence in Mexico on a key indicator of economic growth: labor productivity. We define labor productivity as GDP per worker. Calculated at the state level, labor productivity is important for several reasons ranging from its economic content to measurement. First, it is a simple way to link the amount of goods and services produced relative to quantifiable variables from the labor market (either number of employees or hours worked). The higher its number, the more goods and services are produced per employee or per hour-worked. Second, labor productivity can be given a pro-cyclical interpretation with business cycles, since it is linked to the concept of "labor hoarding" which was recently reviewed by Biddle (2014) as the profit-maximizing response by firms to costs of hiring, firing, and training workers. Third, the alternative variable of total factor productivity (TFP) links goods and services to both capital and labor markets, which is relatively straightforward to calculate at the national level (under certain assumptions of capital depreciation), but faces data limitations at the sub-national level due to measurement of the capital stock.[2]

This study adopts a variant of the methodological framework in Mollick and Cabral (2015), who estimate Mexico's real wage convergence across its 32 national entities for the post-NAFTA years from 1997 to 2006. They use years of schooling as the basic fundamental characteristic of wages in previous Mincer-type approaches for Mexican wages, such as Hanson (2003) and Chiquiar (2008).

[2] Abel et al. (2013) discuss the theory of labor productivity versus TFP, as well as evidence for the U.S. under assumptions of constant returns to scale. For Mexican manufacturing, Mollick and Cabral (2009) find that productivity has a positive effect on employment for 25 manufacturing industries from 1984 to 2000.

They also use an alternative specification in which labor productivity is assumed to determine wages in an attempt to quantify the dynamics of wage changes. Mollick and Cabral (2015) allow for state-level forcing variables (FDI inflows as well as domestic and international migration flows) which endogenously impact the speed of adjustment in labor markets across regions. Among other results, they report that overall migration flows have greater effects on wages than FDI inflows.

In contrast to Mollick and Cabral (2015), we adopt an economic growth perspective, focusing mainly on the evolution of labor productivity. Labor productivity across Mexican states is assumed to depend on real wages and several shift factors, including alternative measures of drug related crimes. It is worth mentioning that the empirical methodology implemented below under System Generalized Methods of Moments (SGMM) addresses the endogeneity between labor productivity and wages. We note this implementation given the vast literature on major economies on the "labor productivity puzzle," which can be described as the extent to which labor productivity deviates from wages. For the U.S., for example, refer to Anderson and Kliesen (2006), Anderson (2007), and Feldstein (2008) and, for the U.K., see Pessoa and Van Reenen (2013), and Blundell et al. (2013). For a recent overview, see Boudreaux and Palagashvili (2014). For firm level evidence, Lazear (2000) documents that changes in the pay system, from hourly wages to piece-rate pay have a significant effect on output per worker.

Our aim in this paper is not, however, to detect what is the cause of the puzzle (new technologies, fall in the capital/labor ratio due to higher cost of capital, etc.) Rather, we acknowledge that the puzzle exists and we attempt to manage the bidirectional nature between labor productivity and wages when estimating the impact of crime on labor productivity. To quote one of the papers above on this methodological point, "We cannot tell whether

productivity is driving wages, or vice versa, but understanding why wages have fallen within jobs is at the heart of the UK's productivity puzzle." Pessoa and Van Reenen (2013, Abstract).

Some studies have looked at GDP per capita across all Mexican states. Arellano and Fullerton (2005) quantify linkages between GDP per capita and education levels, while Molina et al. (2010) verify the linkages between FDI and GDP per capita. More recently, Gonzalez-Andrade (2014) estimates GDP per capita for all Mexican states, including the Federal District, from 2003 to 2010 at the annual frequency using fixed-effects models. Two empirical models combine state-level economic variables (FDI, civilian labor force with access to health services, years of education, unemployment, and fiscal transfers) with crime variables (either aggregate or disaggregated by type, such as theft, kidnapping and rape levels). The results reported by Gonzalez-Andrade (2014) appear to be very sensitive to the fixed-effects specification: more meaningful coefficients are found when time fixed effects are included. This is in opposition to the results becoming much weaker when state-level fixed effects are included. The significant degree of serial correlation casts doubt, however, on these panel data models for GDP per capita of Mexican states.

In addition to Fixed Effects Models (FEM), this paper also adopts a different methodology (SGMM) exploiting the bidirectional nature between labor productivity and wages and controlling for productivity persistence and higher frequency of data (quarterly) in a completely different dataset. Our sample includes all 32 Mexican sub-national entities from 2003 to 2013. Using FEM, our results indicate that total crime, as well as some crime variables prosecuted by state and local authorities have a negative and statistically significant effect on labor productivity once the President Calderon in 2007 started a frontal war against drug cartels. However, the interaction between the 'war on drugs' dummy variable and the different measures of crime results is almost always positive and statistically significant. We conjecture that these

rather unexpected results arise from the endogenous relation that exists in some of the right hand side variables and the inability of FEM to properly capture productivity and crime dynamics.

Meanwhile, for (endogenous) wages and labor productivity using SGMM, our main results suggest the following. First, the interaction between crime variables and the "war on drugs" dummy variable indicates that total crime has a negative and statistically significant effect on labor productivity once President Calderon started a frontal war against drug cartels. Second, contrary to crimes prosecuted by federal authorities which have no impact on labor productivity; most of crimes prosecuted by local/state authorities are negative and statistically significant having a clear negative effect on labor productivity. A possible explanation for such difference could be related to the different response of local/state authorities and federal authorities once violence arouse during Calderon's administration. The negative effects of crimes prosecuted by local/state authorities could reflect the weaknesses of local/state authorities (i.e. municipal or state police) since they were not strong enough to prosecute crime. Presumably, federal authorities are less corrupt and might have been more effective combating crime than local or state authorities.

The rest of this paper is structured as follows. Section 2 describes the dataset and shows two political maps of Mexico illustrating the sub-national entities (31 states plus the Federal District) according to the total drug crimes for the periods analyzed in this paper. Section 3 introduces the methodology. Section 4 discusses the results of the empirical models of Mexican labor productivity with subsamples estimations. Finally, Section 5 provides concluding remarks.

2. The Data

Our dataset comes from a variety of sources. Financial variables are collected for the aggregate of the Mexican economy (exchange rates and interest rates, etc.) and for socio-

economic measures from all Mexico's 32 sub-national entities: real GDP per worker (the dependent variable), a wide range of crime figures from two separate datasets, new FDI investments, electricity, and state expenditures on public security, etc.

We follow Mollick and Cabral (2015) and use, at the state level, wages for employees enrolled in Mexico's social security system (IMSS). These wage series provides a reasonable choice among other wage series for Mexico. Mollick and Cabral (2015) also employ in their analysis minimum wages and maquiladora wages. We do not use minimum wage data in this study because it is determined by the government and my not be market driven. Hence, it is not closely related to labor productivity. We opt not to use maquiladora wages, because the available data have an unbalanced coverage across Mexican states.[3]

Data collection has been performed at the state level for the 31 states in Mexico plus the Federal District. We employ a quarterly dataset that spans from 2003:Q1 to 2013:Q1. Table 1 shows the summary statistics of the variables considered in this study. Such variables are divided into drug crime variables (state/local and federal jurisdictions), socio-economic, and financial variables. In order to build a quarterly frequency database, we make some adjustments as explained in detail below.

The variables directly related to drug violence in Mexico are taken from the National Public Security Executive Office (Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública), which is a government office managed by the Interior Ministry. We obtain the drug crime data from the two databases available from this office, which are divided into state/local (fuero comun) and federal jurisdictions (fuero federal). In both databases, data are presented at

[3] Castellanos et al. (2004) argue that data from the IMSS records offer several advantages over existing surveys (ENEU) for Mexico. For example, with IMSS records it is known with certainty whether a worker remains employed with the same firm over time. Also, the definition of the base salary is a comprehensive measure of wages and benefits and is consistently measured over time. Finally, given that these wages are those on which employers pay payroll taxes, they are less subject to be measured with error.

state levels on a monthly basis. Such data are transformed into quarters by simply adding the monthly values for each corresponding quarter along the analyzed period.[4]

State/local and federal jurisdictions databases show a variety of crime variables, but not all of them are directly or indirectly related to drug trafficking. On the one hand, the variables from the federal jurisdiction database most likely related with the drug crimes are: drug crimes, property crimes, firearm crimes, and organized drug cartels crimes. During the period analyzed in this paper, which spans from 2003:Q1 to 2013:Q1, these variables together represent about 64.5% of the total crimes in the federal jurisdiction database. On the other hand, the variables from the state/local jurisdiction database most likely related with the drug violence are: Property crime, homicide crimes, burglary and robbery crimes, kidnapping, and threat crimes. These variables together represent 62% of the total crimes mentioned in the state/local jurisdictions database for the analyzed period in this article.[5]

The incidence of drug-related crime in Mexico has increased dramatically during the last seven years. The drug cartel disputes and the 'war on drugs' started by President Calderon's administration in 2007, propelled a severe wave of violence in Mexico. The drug-related violence spread widely, but some regions have been particularly hit by this issue. Due to the clear message President Calderon sent against the drug cartels when inaugurating in December 2006, we break the analysis in two periods. The first period spans from 2003-2006 and the second from 2007-2013.

[4] The Ministry of the Presidency during the Calderon's administration published a report with official figures on the number of drug-trafficking related homicides. We do not use this database because some researchers are skeptical of the accuracy of these figures (see, for instance, Correa-Cabrera, 2013). In addition, this database has not been updated since December 2010.

[5] Using the 4 or 5 categories depicted in Tables 1 and 2, the aggregates of crime move as follows across periods. For the variables from the federal jurisdiction database, the share of crimes closely related with drug crimes moves from 64.3% to 64.6%. For the variables from the state/local jurisdiction database, the share of crimes closely related with drug crimes moves from 60.4% to 63.0%. Individual figures show, of course, much more visible movements across periods, as will be discussed below.

Table 2 shows values for both periods. The observations are available at a state level on a quarterly basis. All forms of crimes increased from the Fox administration (period before 2007) to Calderon's and Peña Nieto's administrations (period after 2007). Burglary is the variable with the highest rates of incidence among all the analyzed variables. This variable increased 33% on average at the state level between the analyzed periods. Similarly, drug cartel crimes (from the database in the upper panel) and kidnapping (from the database in the lower panel) increased between both periods at an average of 174% and 150%, respectively.

Socio-economic and financial variables

Gross Domestic Product (GDP), nominal wages, employment, and electricity usage are calculated using data from the National Institute of Statistics and Geography (INEGI). The real GDP (2008=100) at state level is only available on a yearly basis, however. To calculate the quarterly values for the analyzed period different calculations are made. Initially, we take GDP value available for 2003 at INEGI and use it as the value for the 4^{th} quarter in 2003. Then, the remaining GDP values are calculated using the quarterly growth rate of the ITAEE values. The ITAEE is an index (2008=100) published on a quarterly basis also by INEGI. Such index measures the economic activity of each state and the Federal District in Mexico. We believe the quarterly growth rate of the ITAEE index is a good proxy for the growth rate of real GDP, so we assume the state GDP is growing at the same rate as the quarterly ITAEE rate. We then calculate the GDP per-worker by dividing the quarterly state GDP by the number of employed workers in the state in the period.

Nominal wages are available at state levels on a monthly basis and are published by the Mexican Social Security Institute (IMSS) on the INEGI website. These wages correspond to employees enrolled at IMSS and are reported in daily pesos. Quarterly data are obtained by calculating the average wage in the corresponding period. These nominal wages are deflated

using the Consumer Price Index (CPI, 2008=100) to get the real wages. The variable electricity is an index (2008=100) available on a monthly basis measuring the total consumption of electricity by each state in the country. The quarterly data are obtained by getting the average electricity consumption in the corresponding period. The last variable from INEGI is employment. This variable comes from the National Survey about Occupations and Employment (ENOE) available in the INEGI website. The information is available on quarterly basis at state level.[6]

The interest rate series (TIIE, the Mexican counterpart of the U.S. federal fund rate) comes from the Central Bank of Mexico (Banco de Mexico) and is available on a daily basis. The real exchange rate (also from Banco de Mexico) is a measure of competitiveness of the Mexican peso against a basket of many currencies: an increase indicates a real depreciation of the peso. Quarterly values are obtained by simply calculating the average values in the period. The variable "new investments" is obtained from the Ministry of Economy and is available at a state level on a quarterly basis. This variable is a portion of the Total Foreign Direct Investment (FDI). Values are in millions of dollars and are transformed into real pesos by using the nominal exchange rate for the period and then deflating those values using the CPI, 2008=100. We use new investments instead of the total FDI because we believe that new investments are more sensitive to the violence environment in the country than the total FDI.

Government spending on Public Security comes from the Ministry of Finance. Such data are available monthly at state level in millions of pesos. Those values are converted into real pesos using CPI 2008 = 100, and then converted into quarterly data by aggregating monthly data.

Geographic Distribution of Drug Crime in Mexico

[6] Observations for 2011-2013 are available on INEGI's website, but they are calculated based on forecast estimations of the total population for each state in the country. They use forecast estimations because the last population census in the country was performed in 2010.

The drug crime in Mexico is highly concentrated in a few states. During the period analyzed in this paper (2003 to 2013), 44% of the drug crimes were concentrated in 5 out of the total 32 states in the country. Similarly, 63% of the drug crimes were concentrated in 10 out of the total states in the country. Figure 1a and 1b show the total drug crime (crimes prosecuted by state/local and federal authorities) across its 32 sub-national entities for the periods 2003 – 2006 and 2007-2013, respectively. In both figures, the darker the color, the higher the number of crime rates in that particular state[7]. The total number of crimes between both periods is dramatically different. For example, the total number of crimes per year in Figure 1b, which covers the period 2007-2013 also called the "war on drugs" period is in average 24.5% higher than the average crime rate per year covered in Figure 1a.

When comparing both figures, crime rates are consistently concentrated in a few states in the country, even with the increase in the number of crimes during the "war on drugs" period. For example, Distrito Federal, Estado de Mexico, Baja California, Chihuahua, Guanajuato, Jalisco, and Michoacan have had persistently the highest crime rates. In addition, states like Nuevo Leon, Sinaloa and Coahuila became more dangerous during the "war on drugs" period.

There are different factors that could explain the high concentration of crime in particular states. One factor could be population size: if more people are living in a state, then a higher number of crimes are expected in that place in comparison with a less crowded state. One way to mitigate this factor is to control crime rate by population size and present crime rates by every 100,000 people at the state level. By presenting our crime rates data by every 100,000 people, as done by previous studies (e.g., Ashby and Ramos (2013)), the picture gives the idea that states

[7] This map is just illustrative. States with same colors do not have the same number of crimes. Given the number of entities in the country, it is not possible to assign one color to each place. Instead, the number of crimes is divided into four brackets to identify the states with low (lighter color) and high (darker color) values of drug crimes.

that have been considered more peaceful like Baja California Sur and Yucatan (Vilalta, 2014) seem to be among the most violent, while states with the highest numbers of crime in the northern border seem to be among the less violent. For this reason, in our empirical analysis we use the total number of crimes rather than rates for every 100,000 people.

Another factor that could explain the high number of crimes in a specific state through time is the existence of different drug cartels rivals disputing the same territory. For example, the six Northern Mexican states that share a border with the United States (Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas) have been considered dangerous places due to the high crime rates that exist in those places in comparison with other states in the country. The states that share the border with the United States altogether capture 25% of the total drug violence crime during the analyzed period in this paper.

3. The Empirical Models

The models employed to estimate labor productivity (Y/L) across all Mexican states and the Federal District (varying from i = 1 to 32 and t = 2003.1 to 2013.1) have the following form (omitting the constant term):

$$(Y/L)_{it} = \rho(Y/L)_{it-1} + \alpha_1 W_{it} + \alpha_2 CRIME_{it} + \alpha_3 DW + \alpha_4 (DW*CRIME)_{it} + \Sigma \beta_j X_{it} + \varepsilon_{it} \qquad (1),$$

where: Y/L stands for GDP per worker, W refers to wages, CRIME is any of the violence measures discussed in the previous section, DW is a dummy variable for the "war on drugs" initiated during President Calderón's administration (equal to 1 from 2007.1 to 2013.1; 0 otherwise), DW*CRIME is the interactive variable between this dummy variable and any of the

violence measures examined, and X_{it} is the group of j=1 to *k* control variables, including new FDI investment, infra-structure levels (electricity lines), and expenditures on public security. We expect ρ to be close to one if productivity is persistent, $\alpha_1 > 0$, and the sign of α_2 is ambiguous. It can be positive ($\alpha_2 > 0$) if higher crime records reflect a more intensive prosecution of criminal activities, leading to a reduction of inefficiencies and production costs. This represents an institutional view of the connection between social and economic markets, requiring an established law and judicial framework to effectively handle crime activities across states. Alternatively, it can be negative ($\alpha_2 < 0$) if higher crime leads to more uncertainty and, for example, to less business startups and thus to less output per worker. This interpretation is based on the rate of goods creation (and innovation) by business firms. For example, Griliches (1988) reviews why productivity has grown so slow in the U.S. in the last decade. His prime suspect then was the rise in energy prices and its macro consequences, although several forces must be at play. More recently, Prescott and Ohanian (2014) review the recent (first quarter of 2014) decline of U.S. GDP (-2.9% annual rate) and the corresponding decline in productivity (-3.5% annual rate), the inflation adjusted business output per hour worked. Looking at U.S. Census Bureau's Business Dynamic Statistics, Prescott and Ohanian (2014) attribute the decline in U.S. productivity to the large decline in the creation of new business, with virtually every U.S. state (not only those states hardly hit by the recession) suffering drops in startups.

Previous versions of this paper reported panels using two subsamples: 2003:01 to 2006:04 and 2007:01 to 2013:01. As suggested by an anonymous referee, an alternative procedure is to make a single estimation for the whole sample, but including a dummy variable for the 'war on drugs' period and creating at the same time a variable with possible interactions between the dummy variable and the crime variables, as captured by the coefficients α_3 and α_4.

The major drawback of this approach is that the sample size increases and thus the procedures required to achieve meaningful identification have to be revised. In particular, when the whole sample (2003.1 – 2013.1) is analyzed the number of observations becomes too large and the proliferation of instrument problem discussed by Roodman (2009) remains an issue. In order to reduce the instrument set, we limit the endogenous variables to lagged real wages and labor productivity and restrict the time span. In this sense, under the whole sample and with the introduction of the 'war on drugs' dummy and interactive variables, we estimate dynamic panels including 31 instruments, which is less than the number of cross-section units (32 Mexican states). This procedure reduces the p-value to a value smaller than 1 in Hansen's statistics when the number of instruments is not limited.

Studies that examine determinants of crime present a complex mix of factors which may be quantified when estimating the determinants of CRIME. Levitt (2004) studies the decline of crime in the U.S. and finds that four factors account for most of the observed decline of crime in the 1990s: increases in the number of police, the rising prison population, the waning crack epidemic, and the legalization of abortion. Machin and Meghir (2004) estimate property crime as function of wages at the bottom of the distribution (25^{th} percentile), share of young in population, and conviction rates for England and Wales between 1975 and 1996. They report strong impact of wages on crime: falls in wage of unskilled workers lead to increases in crime. Engelhardt et al. (2008) build a search theoretic model to study the effects of various labor market and crime policies. When their model is calibrated to the U.S. data, the overall effect reduces crime but the

effect is quantitatively small. On the other hand, police technology and jail sentences affect crime rates significantly but have only negligible effects on the labor market.[8]

Given this, we believe it is important to control for some type of crime policies when estimating (1). We choose to look at expenditures on public security at the state/local level. To the extent that police activities lower crime, it should exert a positive effect on productivity. Two factors may prevent this from happening, however. First, there is the usual delay in investing more in police and the reduction on crime to take place.[9] Second, it is natural to assume that crime and expenditures on public security are correlated, in which case sensitivity analysis is needed. If we allow for both crimes and public security expenditures in (1), it is possible that crime has both a direct and an indirect effect (through expenditures by states on public security) on labor productivity.

As for the controls, new FDI investment, and infrastructure levels are all expected to have positive effects on labor productivity. Vector X also contains the real exchange rate (RER), which does not vary across states and captures exchange rate competitiveness. Its expected sign is positive providing that a depreciation of the real exchange rate makes Mexico's large exporting sector and the Mexican economy more competitive.[10] Our vector, X, is general enough to capture determinants of labor productivity across Mexican states. Other regressors, such as the share of manufacturing GDP on total state GDP and the nominal interest rate, have been excluded due to their lack of statistical significance as additional controls and/or high correlation with some of the regressors in (1).

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[8] In addition, Engelhardt et al. (2008) show that small wage subsidies reduce unemployment and crime rates of employed and unemployed workers. And hiring subsidies reduce unemployment but can raise the crime rate of employed workers.

[9] Expenditures on public security have negative effects on crime under SGMM estimations of Brazilian states by Sachsida et al. (2010).

[10] Miller and Upadhyay (2000) estimate the effects of a vector of X on Total Factor Productivity of countries of the world under panel fixed effects. Terms of trade (export and import prices), in particular, have a positive effect on productivity but only at the 20% level.

We employ the System Generalized Method of the Moments (SGMM) estimator proposed by Blundell and Bond (1998) in which lagged differences are employed in addition to the lags of the endogenous variables. This methodology produces more robust estimations when the autoregressive process becomes persistent (i.e., when ρ is close to 1). SGMM estimators are said to be consistent if there is no second order autocorrelation in the residuals by the AB (2) test and if the instruments employed are valid by the Sargan or Hansen's J-test.

The identifying assumption for the reverse causation in this paper is that labor productivity is allowed to impact wages. There are several studies discussing the factors that may distort the link between labor productivity and wages. For example, Lazear (2000) contains microeconomic evidence that wages may affect labor productivity using data for a company of about 3,000 workers over a 19-month period. He finds that the adoption of changes in the pay system from hourly wages to piece-rate pay has a significant effect on output per worker.[11] In general, what matters is that "over long periods of time, increases in 'real' wages – that is, wages adjusted for changes in consumer prices – reflect increases in labor productivity." Anderson (2007). For recent evidence for the U.K., including the major financial crisis of 2008-2009, see Pessoa and Van Reenen (2013) and Blundell et al. (2013).

In our SGMM estimations, one lag of the dependent variable is enough to remove any serial correlation in the data. In order to avoid over-identification problems, the instrument set is constrained and lags of the endogenous regressors (labor productivity and wages) are used as instruments. We apply the collapse procedure proposed by Roodman (2009) in order to reduce the number of instruments. The benchmark equation, without constraining the instrument set, initially included 81 instruments in two of the panels, which makes the p-value of the Hansen-J

[11] For example, for the U.S. at the macro level it can be mentioned the productivity boom in the late 1990s covered by Anderson and Kliesen (2006), or the skill bias in the labor market mentioned by Anderson (2007), and the measurement issues regarding the price deflator raised by Feldstein (2008).

test be 1 in both cases. We then limit the number of lags in time for the collapse procedure such that the number of instruments become smaller than the cross-section (N = 32 states). This implies that all panels reported in the tables below have less instruments (31), thus not being subject to the problem above.

4. Results

Table 3 contains the correlation coefficients for the period 2003-2013. Productivity (state GDP per worker) correlates positively with wages (0.567). The correlation between labor productivity and drug crime varies. While the correlation between labor productivity and state/local drug related crime is -0.271, the correlation coefficient is positive and very small (0.014) between labor productivity and drug crimes reported by federal authorities. The correlation coefficients between labor productivity and real exchange rate are either close to zero (0.007), small and positive between labor productivity and electricity (0.091) and between labor productivity and new FDI (0.073), or small and negative between labor productivity and expenditures on public security (-0.087). The latter, in particular, suggests that states expenditures on public security move inversely with labor productivity.

As for the correlation among the regressors of (1), the two types of crime (state/local and federal) are correlated (0.652). A positive level of correlation is expected because both crimes are originated by increases in drug violence: as state/local crimes prosecuted by local jurisdiction authorities increase, so do crimes prosecuted by federal authorities. Of all the correlation coefficients among (RHS) regressors, the most significant are the positive correlations between state expenditures on public security and crime variables: higher incidence of crimes is associated with states spending more on public security. The values vary from 0.501 for state/local crime to 0.543 with federal crime. In general, if we split Table 3 into two sub-periods

(2003-2006, and 2007-2013), there is an increase over time in the correlation coefficients between state expenditures on public security and crime variables. This is consistent with the idea that states spend more on public security when crime levels rise. In the following subsections we move from association to causation using the framework in (1) above and several estimation methods.

4.1 Fixed Effects Estimations

Table 4 presents the results of fixed effects model estimations for the period 2003.1 to 2013.1. All variables are in natural logarithms. The table reports estimations by FEM for labor productivity equation (1) excluding the lag of the dependent variable. Results show that the coefficients of wages are negative, but not statistically significant; this is opposite to the expected because traditionally there is a positive correlation between wages and productivity.

According to the table, overall crime has a negative and statistically significant effect on labor productivity. Once the crime variables are divided into crime prosecuted by local/state and federal authorities results vary as follows. Most of local/state variables have a negative and statistically significant effect on labor productivity, but violence measures corresponding to those prosecuted by federal authorities are not statistically significant implying a lack of evidence that they have any effect on labor productivity.

To capture the effect of the “war on drugs” in our model we introduce in the FEM model a dummy variable called “war on drugs” which is zero for the period before 2007 and is one since 2007 once President Felipe Calderon started a frontal war against drug cartels. The idea of this variable is to see if the “war on drugs” has an effect on labor productivity. Then, we create a new variable which is the interaction between the crime variable and the “war on drugs” dummy variable. The intention of such interaction is to capture if the “war on drugs” period has an effect

on labor productivity. Results indicate that total crime as well as some crime variables prosecuted by state and local authorities have a negative and statistically significant effect on labor productivity once the President Calderon in 2007 started a frontal war against drug cartels. Surprisingly, the 'war on drugs' dummy variable has negative effects on labor productivity when we assess the impact of crimes prosecuted by state and local authorities; but positive effects for some types of crimes when we assess the effects of the crime prosecuted by federal authorities. Meanwhile; the interaction between the 'war on drugs' dummy variable and the crime variables result sometimes in positive and statistically significant coefficients. We conjecture that these such results arise from the endogenous relation that exists between the right hand side variables and the inability of the FEM model to capture properly the effects of crime dynamics on labor productivity. Regarding the log of electricity, our proxy for infrastructure, and new FDI, both of them have coefficients that are consistently positive and statistically significant meaning that more infrastructure or new FDI increases labor productivity. Lastly, the variable expenditure on security is negative and statistically significant just in few of the regressions in Table 4.

Despite the fact that we are using time effects, we initially thought that results in Table 4 were somehow influenced by the effects of the financial crisis which started to affect the Mexican economy in the last quarter of 2008. Our first strategy on how to deal with this problem is to introduce in equation (1) a crisis dummy variable that takes the values of zero before the fourth quarter in 2008 and unity afterwards, but found no qualitative difference to the ones reported here.

We conjecture that, in addition to the financial crisis effects, other problems such as real wages endogeneity and productivity persistence discussed earlier could be affecting our estimates, especially during the "war on drugs" period. In what follows we deal with those problems employing dynamic panel data methods.

4.2 System GMM Estimations

We turn next to SGMM which handles the reverse causation between productivity and wages, while allowing for persistence in productivity with its lagged dependent variable. Table 5 contains SGMM estimations of equation (1) for the whole sample which spans from 2003.1 to 2013.1. According to the table the persistence is fairly high in most of the regressions suggesting that productivity depends to a large extent on its past, with coefficient values ranging from 0.536 (robbery prosecuted by state/local authorities) to 0.896 (property prosecuted by federal authorities). The signs on wages are positive in most cases, although they are not statistically significant.

As can be seen in the Table 5 the crime variables are not statistically significant. Nevertheless, the interaction between crime variables and the dummy variable "war on drugs" indicates that total crime has a negative and statistically significant effect on labor productivity once President Calderón started a frontal war against drug cartels. On the one hand, most of crimes prosecuted by local/state authorities are negative and statistically significant having a clear negative effect on labor productivity.

On the other hand, the coefficients of crime measures prosecuted by federal authorities are negative in most variables, but not statistically significant. A possible explanation for such difference could be related with the role of local/state authorities and federal authorities on the economic environment in the Mexican states once violence has risen. For example, the negative effects of crimes prosecuted by local/state authorities could reflect the weaknesses of local/state authorities (i.e. municipal or state police) because when crimes arose panic among the society arouse as well and this could had a negative impact on the economic activity in the state (for example, given such environment some business closed, people went less often to restaurants,

etc.) and local authorities were not strong enough to immediately dissipate such panic among population created by the increase in the crime rate. The local/state crime variables that have a negative and statistically significant impact on labor productivity are property, extortion, homicide and kidnapping. Alternatively, when violence increased and federal authorities (i.e., Mexican army) intervened such panic among population was immediately dissipated having a minimum effect on the economic activity and labor productivity. Presumably, federal authorities are less corrupt and might have been more effective combating crime and protecting the Mexican economy from the effects of violence on productivity than state/local authorities.

Variables such as exchange rate, electricity and new foreign direct investment are not statistically significant. In the case of electricity, which is a proxy for the level of infrastructure in the state, and foreign direct investment it is expected these factors have a positive effect on labor productivity. The signs are positive for both variables, but not statistically significant. Lastly, the variable expenditure on security is negative and statistically significant varying from -0.016 and -0.022 for crimes prosecuted by state/local authorities and from -0.019 to -0.06, for crimes prosecuted by federal authorities. This can be interpreted as an indirect effect of crime: due to higher incidence of crime, states tend to spend more on public security. In turn, the shift of public spending from more productive public investment projects to public security negatively impacts labor productivity.

All the estimates presented in Table 5 are free from serial correlation problems according to Arellano-Bond tests for second-order autocorrelation (AB (2)) and to the Hansen's J tests of validity of instruments reported in the table.

4.3 Robustness Checks

To check the robustness of results, a table available upon request shows FEM and SGMM estimations on labor productivity once we remove the crime variables from our model. On the one hand, the estimates show that public security expenditures coefficients remain negative and statistically significant as before, while all other control variables keep their statistical significance. These results support the negative indirect effects of crime on the Mexican labor productivity shown in Table 5.

On the other hand, if we remove public security expenditures from (1), there are issues with the stability of the empirical model. Such estimations are not reported but are available upon request. In particular, those results show that wages have negative and statistically significant effects on labor productivity. Indeed, in our model the inclusion of public security expenditure is needed to capture the detrimental effects of shifting resources from productive public expenditure into public security. Also, in many specifications the lagged dependent variable has a coefficient larger than one, which casts doubt on the estimations. We conclude that the extent to which states spend on security expenditures captures an important reaction function to the incidence of crime in the society, which does not appear to be negligible in Mexico.

Other SGMM specifications assuming alternative identification procedures have been employed, including using only lags of wages as instruments and using alternative sets of exogenous variables to labor productivity in turn: not only the dummy and crime measures, but also adding macro variables and public security expenditures.

5. Concluding Remarks

We examine in this paper the effects of the rise in drug violence on labor productivity for all Mexican states from 2003 to 2013. Under SGMM, productivity is found to be very persistent, being mainly explained by its own past lag. We find that - after the “war on drugs” stance

adopted by President Calderon's administration from 2007 onwards - the rise in crime (measured by the sum of categories related to drug related crime) has negative and statistically significant coefficients on labor productivity, especially across categories of crime prosecuted by state/local authorities. Our most likely explanation is through the effects on new business and capital formation associated with higher levels of business uncertainty, along the lines of Prescott and Ohanian (2014) for the recent decline in U.S. productivity. For Mexico, in particular, Ashby and Ramos (2013) find that the effect of crime on FDI depends on the sector of activity and Benyishay and Pearlman (2014) provide evidence that higher robbery rates reduce the probability of microenterprises expanding their operations. We further observe that the effects of crime on productivity differ depending on whether crimes are prosecuted by state/local or federal authorities with the latter apparently being more effective combating crime than the former. Presumably, federal authorities are less corrupted by drug cartels and might have been more effective in the war against crime than state/local authorities.

A common feature in the SGMM estimations herein is that increases in expenditures on public security lead to a fall in labor productivity. This may sound counter-intuitive, but it may also indicate that crime has negative effects that go beyond the direct effect of crime. Despite the financial crisis of 2008, the amount of resources allocated to public security in Mexico has increased. Nevertheless, there might be long lags until those efforts are effective in controlling crime and convene productivity gains.

We visualize opportunities for future work that address regional perspectives. For example, since the Mexican border region is where most of the activity with drug cartels has been documented [see, among others, Vulliamy (2010)] an extension is to focus on the trends of the border region in more detail. In addition, an interesting topic for future research would be to

explore if there exists non-linear relationships between crime and labor productivity and how such relationship has varied over time and across geographic regions in the country.

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Figure 1a: Total Drug Violence Crime (2003-2006)

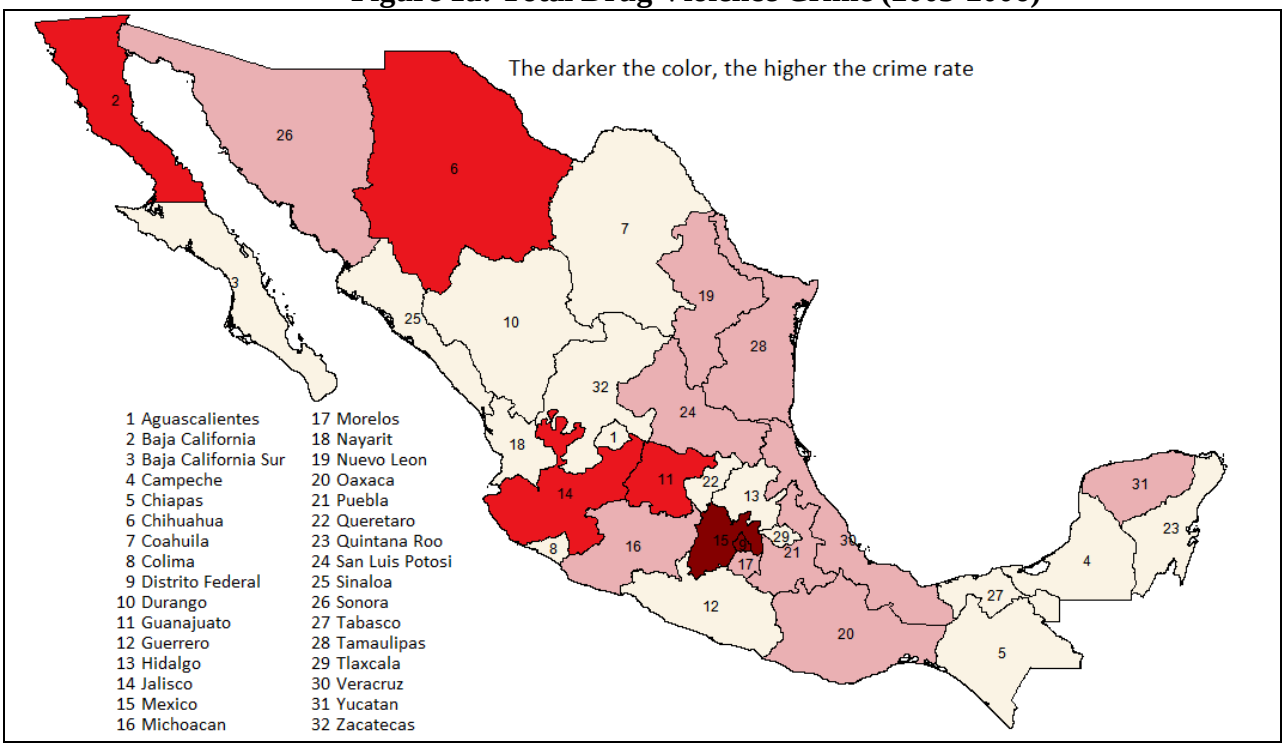

Figure 1b: Total Drug Violence Crime (2007-2013)

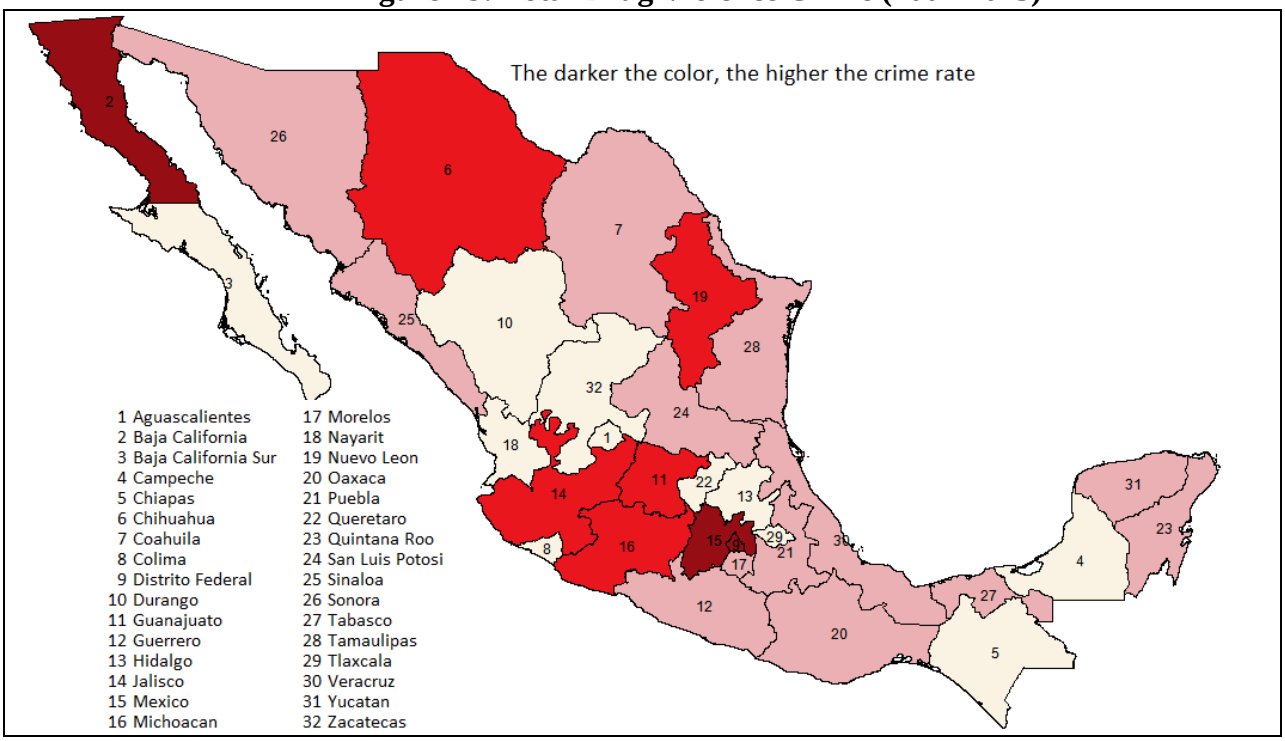

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Variables Federal Jurisdiction					
Drug crime rate	1312	381.6	675.5	0.0	5621
Property crime rate	1312	101.8	190.3	0.0	1558
Firearm crime rate	1312	123.9	106.7	3.0	650
Drug cartel crime rate	1312	10.3	26.1	0.0	342
Variables State/local Jurisdictions					
Property crime rate	1312	2018.4	1728.4	0.0	8068
Theft crime rate	1312	4909.4	5680.2	74.0	29640
Kidnapping crime rate	1312	6.5	11.2	0.0	108
Homicide crime rate	1312	239.9	227.8	12.0	1592
Threat crime rate	1312	455.4	462.1	0.0	3335
Socio-economic Variables					
Real wage (pesos 2008=100)	1312	200.7	31.5	136.4	318.1
GDP (mill. pesos 2008=100)	1312	353,097	364,401	51,705	2,257,695
GDP per worker (mill. pesos 2008=100)	1312	0.3	0.4	0.1	2.9
New Inv. FDI (mill. pesos 2008=100)	1312	1048	4779	-31799	75197
G. Sp Public Security (mill. pesos 2008=100)	1312	44.9	30.3	-34.3	173.0
Electricity	1312	94.7	29.8	15.7	247.6
Financial variables					
Real Exchange Rate	1312	78.5	5.8	69.2	91.2
TIIE (Federal Funds Rate)	1312	6.7	1.7	4.7	10.0

Sources: Own estimations using different websites.

Table 2. Summary Statistics of the Drug Violence Variables

Variable	Period	Obs	Mean	Std. Dev.	Min	Max
Federal Jurisdiction Crimes *(Delitos Fuero Federal)*						
Drug Crime	2003-2006	512	301.4	503.9	9	4367
	2007-2013	800	432.9	761.2	0	5621
Property Crime	2003-2006	512	70.3	173.5	0	1222
	2007-2013	800	122	197.7	4	1558
Firearm Crime	2003-2006	512	110.0	100.3	3	650
	2007-2013	800	132.7	109.8	4	622
Drug Cartel crimes	2003-2006	512	5.0	28.1	0	270
	2007-2013	800	13.7	24.1	0	342
State/local Jurisdiction Crimes *(Delitos Fuero Comun)*						
Burglary Crime	2003-2006	512	4084.4	4978.3	74	24326
	2007-2013	800	5437.4	6031.1	87	29640
Homicide Crime	2003-2006	512	211.3	253.3	12	1592
	2007-2013	800	258.2	207.9	15	1201
Property Crime	2003-2006	512	2012.4	1669.2	0	7606
	2007-2013	800	2022.2	1766.2	16	8068
Kidnapping Crime	2003-2006	512	3.4	10.7	0	108
	2007-2013	800	8.5	11.1	0	82
Threat Crime	2003-2006	512	455.3	397.2	0	1532
	2007-2013	800	455.5	499.5	0	3335

Sources: Own estimations using data from the National Public Security Executive Office, Interior Ministry.

Table 3. Correlation Matrix. Full Sample: 2003-2013

	GDP per worker	Real wages	State/local Crime	Federal Crime	Exchange Rate	Electricity	New FDI	Public Security
GDP per worker	1							
Real wages	0.567	1						
State/local crime	-0.271	0.271	1					
Federal crime	0.014	0.360	0.652	1				
Exchange rate	0.007	0.101	0.073	0.064	1			
Electricity	0.091	0.213	0.115	0.082	0.412	1		
New FDI	0.073	0.371	0.427	0.361	0.014	0.045	1	
Public security expend.	-0.087	0.290	0.501	0.543	0.149	0.203	0.148	1

Table 4. Fixed-Effects Panel Data (FEM) Models for Labor Productivity

Control Varables	Overall Crime	Crime Prosecuted by State and Local Authorities							Crime Prosecuted by Federal Authorities				
		Total Crime	Property	Extortion & Fraud	Robbery	Homicide	Kidnapping	Sexual Assault	Total	Drugs Related	Property	Fire Arms	Organized Crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
log real wages	-0.179	-0.175	-0.173	-0.196	-0.154	-0.282	-0.296	-0.277	-0.263	-0.287	-0.251	-0.268	-0.324
	(0.207)	(0.205)	(0.200)	(0.209)	(0.204)	(0.240)	(0.246)	(0.243)	(0.235)	(0.244)	(0.241)	(0.234)	(0.249)
log crime	-0.022**	-0.024***	-0.018*	-0.021**	-0.023***	-0.005	-0.002	-0.015*	0.005	-0.003	0.003	0.001	0.004
	(0.009)	(0.009)	(0.010)	(0.009)	(0.007)	(0.006)	(0.004)	(0.008)	(0.009)	(0.007)	(0.005)	(0.009)	(0.007)
war on drugs dummy (dw)	-0.290***	-0.285***	-0.198***	-0.131	-0.224	-0.057	0.029	-0.006	-0.051	0.045**	0.000	0.000	0.084*
	(0.097)	(0.096)	(0.072)	(0.000)	(0.000)	(0.000)	(0.025)	(0.000)	(0.044)	(0.022)	(0.032)	(0.041)	(0.045)
log crime * dw	0.034***	0.034***	0.031***	0.024***	0.031***	0.019**	0.010*	0.012*	0.01**	0.010*	0.013**	0.014*	0.006
	(0.010)	(0.010)	(0.009)	(0.008)	(0.009)	(0.009)	(0.006)	(0.007)	(0.007)	(0.005)	(0.005)	(0.008)	(0.006)
log electricity	0.077***	0.077***	0.076***	0.077***	0.076***	0.081***	0.082***	0.1***	0.1***	0.08***	0.08***	0.1***	0.06***
	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)	(0.012)
log new FDI	0.003**	0.002**	0.002	0.002*	0.002**	0.003**	0.003**	0.01**	0.01**	0.002**	0.003**	0.01**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log public security exp	-0.005	-0.005	-0.008	-0.012	-0.005	-0.021	-0.026*	-0.02*	-0.019	-0.03**	-0.022	-0.019	-0.015
	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.028)
constant	-0.468	-0.466	-0.498	-0.308	-0.610	0.167	0.271	0.274	-0.023	0.292	-0.033	0.031	0.308
	(1.104)	(1.103)	(1.086)	(1.136)	(1.091)	(1.279)	(1.318)	(1.325)	(1.230)	(1.319)	(1.288)	(1.218)	(1.381)
No. observations	1131	1131	1131	1131	1131	1131	1131	1131	1131	1130	1100	1131	694
R^2 overall	0.050	0.038	0.042	0.033	0.031	0.142	0.135	0.084	0.122	0.110	0.101	0.149	0.259
R^2 between	0.221	0.180	0.205	0.121	0.166	0.294	0.264	0.164	0.296	0.222	0.258	0.331	0.375
R^2 within	0.291	0.293	0.298	0.285	0.292	0.253	0.245	0.242	0.250	0.237	0.246	0.246	0.304

Notes: Newey-West robust standard errors to heteroskedasticity and serial correlation are reported in parenthesis. The symbols *, **, and *** refer to levels of significance of 10%, 5%, and 1%, respectively.

Table 5. Dynamic Panel Data (SGMM) models for Labor Productivity. Period (2003.1-2013.1)

Control Variables		Crime Prosecuted by State/local Authorities							Crime Prosecuted by Federal Authorities				
	Overall Crime	Total Crime	Property	Extortion & Fraud	Robbery	Homicide	Kidnapping	Sexual Assault	Total	Drugs Related	Property	Fire Arms	Organized Crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
log of GDP per worker$_{-1}$	0.637**	0.625**	0.644**	0.682**	0.536*	0.632**	0.634	0.452	0.8***	0.84***	0.89***	0.740***	0.481
	(0.288)	(0.287)	(0.293)	(0.290)	(0.291)	(0.281)	(0.393)	(0.318)	(0.227)	(0.237)	(0.205)	(0.278)	(0.354)
log real wages	0.101	0.119	0.211	0.062	0.292	0.056	0.011	0.226	-0.019	-0.030	-0.231	0.200	0.557
	(0.344)	(0.331)	(0.275)	(0.333)	(0.360)	(0.263)	(0.423)	(0.354)	(0.251)	(0.297)	(0.267)	(0.236)	(0.357)
log crime	0.076	0.067	0.022	0.031	0.027	0.072	0.070	0.087	-0.034	-0.019	-0.010	-0.034	0.034
	(0.077)	(0.072)	(0.032)	(0.043)	(0.082)	(0.066)	(0.055)	(0.126)	(0.039)	(0.022)	(0.014)	(0.045)	(0.045)
war on drugs dummy (dw)	1.994*	1.915*	0.894***	0.692*	1.507	1.294*	0.327**	1.197	-0.134	-0.056	-0.112	0.146	0.111
	(1.091)	(1.031)	(0.345)	(0.402)	(1.106)	(0.730)	(0.154)	(1.052)	(0.300)	(0.137)	(0.193)	(0.390)	(0.218)
log crime * dw	-0.220*	-0.212*	-0.12***	-0.111*	-0.187	-0.253*	-0.253**	-0.279	0.022	0.008	0.026	-0.032	-0.064
	(0.120)	(0.114)	(0.048)	(0.062)	(0.139)	(0.141)	(0.110)	(0.240)	(0.053)	(0.028)	(0.045)	(0.089)	(0.081)
log exchange rate	-0.099	-0.104	-0.056	-0.008	-0.092	-0.026	0.096	-0.094	-0.003	0.009	0.004	-0.025	-0.135
	(0.083)	(0.085)	(0.060)	(0.070)	(0.082)	(0.075)	(0.112)	(0.099)	(0.047)	(0.058)	(0.060)	(0.045)	(0.100)
log electricity	0.052	0.055	0.049	0.054*	0.064	0.043	0.035	0.062	0.030	0.032	0.037	0.026	-0.007
	(0.038)	(0.038)	(0.032)	(0.031)	(0.046)	(0.037)	(0.050)	(0.049)	(0.025)	(0.027)	(0.022)	(0.030)	(0.065)
log new FDI	0.007	0.008	0.007	0.007	0.010	0.005	0.006	0.006	0.005	0.005	0.005	0.004	0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.010)	(0.004)	(0.005)	(0.004)	(0.006)	(0.012)
log public security exp	-0.02***	-0.022***	-0.02***	-0.02***	-0.02***	-0.02***	-0.016*	-0.02***	-0.02**	-0.02**	-0.02***	-0.021***	-0.060***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.009)	(0.006)	(0.007)	(0.007)	(0.007)	(0.006)	(0.018)
No. Observations	1102	1102	1102	1102	1102	1102	1102	1102	1102	1101	1074	1102	693
No. Instruments	31	31	31	31	31	31	31	31	31	31	31	31	31
AB(2)	-0.108	-0.037	-0.003	0.560	-0.311	-0.608	-1.227	-0.662	0.930	0.808	0.997	0.773	-0.138
AB(2) p-value	[0.914]	[0.971]	[0.998]	[0.576]	[0.756]	[0.543]	[0.220]	[0.508]	[0.352]	[0.419]	[0.319]	[0.439]	[0.890]
Hansen test	23.759	23.560	22.502	25.878	24.640	25.257	22.861	21.753	27.556	26.368	24.942	28.051	25.531
Hansen p-value	[0.305]	[0.315]	[0.371]	[0.211]	[0.263]	[0.236]	[0.351]	[0.414]	[0.153]	[0.193]	[0.250]	[0.139]	[0.225]

Notes: The constant term is not reported in this table because the lack of space. Heteroskedasticity robust standard errors are shown in parenthesis. The Hansen test reports that under the null the overidentified restrictions are valid. AB (2) corresponds to the Arellano-Bond test for serial correlation, under the null of no autocorrelation. The p-values for the Hansen test and the Arellano-Bond test of second order autocorrelation (AB(2)) are shown in brackets. The symbols *, **, and *** refer to levels of significance of 10%, 5%, and 1%, respectively.