Education, Corruption and Violent Crime in Mexico

1930-1990

Working Paper by

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1. Introduction

Nowadays, when Mexico appears in the headlines of the world’s newspapers, the reason is most probably another discovery of decapitated bodies, the extended number of kidnappings or gun battles between military forces and drug cartels. Over the last decade, the “drug war” was raging in Mexico and the country has gained the unsavory reputation of being extraordinarily violent. Especially the disappearance of 43 Mexican students from police custody in September 2014 has caught worldwide attention – and it has raised many questions about the connections between the Mexican government, the police force and the drug cartels.

To many, the sudden outbreak of violence after almost a century of steadily falling crime rates, political stability and sustained economic growth came as a shock. Mexico had experienced an impressive decline in violent crime rates: from 60 murders per 100,000 inhabitants in 1930, to less than 10 in 2000 while the US reduced the murder rate in the same period from 9 to 6 (Bureau of Justice Statistics 2015). On the other hand, there are also voices claiming that the drug war has been a long time coming. Watt (in Busch 2012) argues that the recent crisis in Mexico is a consequence of a long-standing entanglement of drug cartels and political and economic elites that has been growing since the beginning of the 20th century. When the ruling political party changed for the first time in 70 years in 2000, these arrangements between government and narcotics were no longer tolerated and violence escalated. Drug cartels turned to violence to defend their business and territory against rival organizations and the police, since they were no longer able to simply buy protection from the law. According to this argumentation, corruption and a weak rule of law were present already during the 20th century and they were the main driving forces behind violent crime. Other scholars however have claimed that the high inequality in Latin America is the cause of high violent crime rates. Is this the case in Mexico? What role do human capital and institutions play?

The purpose of this paper is to examine if there is empirical evidence for the entanglement between government and violence during the 20th century and at the same time revise the impact of other structural factors on crime rates.

In Mexico, the most common form of government involvement in illegal activity is through corruption (Piccato 2013): During the 20th century, “everyone knew that policemen, prosecutors and judges could be bought” (Piccato 2013, p. 112). When criminals are able to bribe police officials and consequently walk free, the overall probability of punishment is very low and
consequently makes criminal activities more attractive. Especially in a money-spinning illegal business such as drug trafficking, most delinquents have the financial capacity to buy protection from the law.

Since no direct corruption measures are available for 20th century Mexico, I will use a proxy that has been shown to be highly correlated with corruption: the size of the public sector. Especially in partially democratized countries, bigger public sectors are traditionally associated with a higher incidence of corruption, since the greater involvement of the government in the society introduces more possibilities of rent-seeking behavior. Mexico in the 20th century represents a partially democratized country, since the country is ruled by a one-party system for over 70 years, meaning that Mexico has not yet transitioned to a fully functioning democracy. Goel and Nelson (1996), Montinola and Jackman (2002) and Kotera and Okada (2012) show that (in partially democratic countries), government size increases corruption significantly.

Using the newly constructed data set covering the years from 1930 to 1990, I will estimate a fixed effects model with Driscoll-Kraay cross-sectional dependence robust standard errors to check if government activity does have a significant impact on violent crime, measured by homicide rates. To avoid omitted variable bias, I will control for a variety of structural, cultural and demographic factors that have been predicted to explain violent crime rates in different theories of crime. Traditionally, economists base their research on the economic theory of crime developed by Becker in 1968, according to which criminals react to incentives provided by their social, political and economic environment. The higher the expected revenue generated by a crime and the lower the opportunity costs, the higher the probability that a given individual engages in non-legal activity.

This implies that lower earning opportunities, less education and unemployment would increase crime incidence, whereas higher severity and probability of punishment reduces it. As mentioned before, the presence of corruption lowers the probability of punishment, and consequently leads to higher crime rates according to this theory. Education and economic growth have been shown to be highly effective in reducing crime rates in cross-national studies; I will check if I can find evidence for this effect in Mexico as well. Sociological theories cite cultural factors such as the machismo culture, ethnic fractionalization, urbanization or youth bulges as being responsible for high crime rates. I will control for all these factors in the regression analysis and check their significance in the Mexican case.
The motivation behind understanding the underlying dynamics of crime is evident, since personal security is an important component of well-being (van Zanden et al. 2014). The detrimental impact of crime and violence on society has been well documented and seems to be especially high in the Latin American region (see for example Prillaman 2003/ van Zanden et al. 2014 for an overview). The negative consequences of crime and violence start with the intangible personal costs like the constant fear and strain experienced when living in an unsecure environment, followed by the grief and pain experienced after the loss of a family member or friend. On a macroeconomic level, high crime rates cause measurable direct costs: the expenses on prevention and deterrence like police work, correction and prosecution as well as the medical treatment of the victims (Anderson 1999). However, the costs of crime are not limited to these direct costs, since crime also has a detrimental effect even on the (legal) economic sector. Uncertainty and inefficiency created by high crime rates deter investment activity, tourism and reduce the competitiveness of local businesses, reducing overall economic activity (Detotto and Otranto 2010). Londoño and Guerrero (1999, p. 26) estimate that in the time from 1980 until 1995, the social costs of only the violent crimes were as high as 12.3 % of GDP in Mexico.

The remainder of this paper is structured as follows: Section 2 gives a short historical background in order to set the stage for the analysis of homicide data. When analyzing crime incidence in Mexico, it is crucial to understand the presence of drug trafficking and its relationship to the Mexican government.

In Section 3 I will review the general theories of crime and its implications for the Mexican case. I will also have a look at the results of previous studies on crime in Mexico. In Section 4 I shortly discuss the methodology used to measure violent crime and I reconstruct the development of homicide rates during the 20th century in Mexico. Section 5 introduces the methodology employed for the empirical analysis and the results are presented. Lastly, section 6 offers some concluding remarks.
2. Historical Background

In order to analyze the interrelations between crime and state in 20th century Mexico, it is important to take into account the political and economic background. As mentioned before, Mexico had recently been subdued by the autocrat Porfirio Díaz who enforced law, order and discipline with a centralized and strict rule. He suppressed all kinds of violence and crime, using both the military and the federal police (Miller 1985). Under his rule, Mexico improved its infrastructure and Díaz encouraged the modernization of the economy as well as foreign investment in the country. His power ended with the outbreak of the Mexican Revolution in 1910 which was followed by a ten-year civil war.

In 1917, a new constitution was established, weakening the property rights that had before been protected under Díaz and expropriations were not uncommon (Miller 1985). After the governance of two different presidents between 1920 and 1929, the Partido Revolucionario Institucional (PRI) was elected and should remain in power until the year 2000 that is to say during the entire period covered by this study (1930-1990). Even though the PRI was elected in regular elections, the fact that one single party ruled the country during 70 years, illustrates that Mexico was not a fully democratized country until 2000 (Beer 2005, Greene 2007). The PRI was very powerful: it “held the majority in Congress until 1997, won every governorship until 1989 and controlled the vast majority of municipalities” (Greene 2007, p. 1). This one-party rule favored the emergence of close links between the government and criminal organizations, as discussed in the next subsection.

Economically, Mexico experienced a period of sustained economic growth and expansion after the revolution. During WWII, Mexico was a strong ally of the United States and provided metals as well as guest workers. This strengthened Mexico economically, establishing wealth and political stability throughout the country. The subsequent rapid economic progress is also known as the Mexican Miracle. The PRI followed a strategy mainly based on import substitution, oil exports and state-owned industrial companies. The population grew rapidly and urbanization advanced, the middle class almost doubled between 1940 and 1980 (Miller 1985). When oil prices fell in the 1980s, the country experienced a debt crisis that was counteracted by privatization of the economy and a renewed inflow of foreign investment. As a consequence, today Mexico’s most important export source are the assembling plants known as maquiladoras that have been introduced by foreign investors in the 1980s. Before, Mexico’s most important
sector has been agriculture, cultivating wheat, soybeans, rice, beans, cotton, coffee, fruit, sugar, and tomatoes and also livestock farming was prevalent. Mining, the extraction of minerals, including silver, copper, gold, lead, zinc, and natural gas was also important (Miller 1985).

In the 1990s, Mexico experienced another economic crisis with the collapse of the peso. In 2000 Vicente Fox was elected president and Mexico experienced the first democratic transition to a president from a different party after a 70-year rule of the PRI.

2.1. Drug Trafficking and Corruption

The history of Mexico is inevitably intertwined with the presence of criminal organizations and corruption (Morris 2012). According to Lupsha (1991) it is “impossible to identify a beginning date for corruption in Mexico, for it is as eternal as the Aztec sun”.

Today, Mexico is said to be the world’s second largest opium poppy producer after Afghanistan, and the primary supplier of heroin to the United States (Office of National Drug Policy, 2015). Watt (2012) explains that this dimension of the drug trade is only possible due to the “mutually beneficial relationship between smugglers of contraband and the political and economic elites”. The long ruling term of the same political party from 1929 to 2000 was the perfect precondition for the development of a systematic control of the drug trade by the political elites, since drug cartels did not have to re-negotiate the terms of agreement after every election.

From the beginning of the 20th century, Mexico was a country of contraband of semi-legal products such as patent drugs, alcohol and marihuana flowing north from the Central American countries. For example during the prohibition between 1919 and 1933 in the US, Mexico was the main supplier of illicit alcohol (Watt 2012).

After the Mexican revolution, the central government was worried about turmoil and instability in the regions, giving the states quasi-autonomous powers to deal with this threat on their own.

Especially the northern states were cut-off from the central government, allowing their governors to abuse their position in order to make a fortune from prostitution, gambling and smuggling contraband to the US. The US Border Patrol was installed in 1924, but it resulted impossible to efficiently police the massive border that cuts through mainly remote terrain (Watt 2012). From the beginning, smugglers benefited from the corruption within the police force and the political system and used the vast amount of poor people with no legal alternatives as cheap labor force.
Corruption was already a socially perceived problem in the 940s, which led Mexican presidents to promote “anti-corruption campaigns”, making the public believe that corruption is an “individual problem of certain officials rather than a systematic problem” (Morris 1991, p. 78). The aim was to “separate the feelings toward public officials from overall evaluations of the system” (Morris 1991, p. 78), siding with the public in the “fight” against corrupt officials. Under this shield of public deception, organized crime collaborated with officials ever since the beginning of the century.

Opium poppy was introduced to Mexico in the 1930s, and in the following year, heroin was also produced in Mexico. The Mexican favorable mild climate, allows farmers to get two harvests per year which makes opium poppy cultivation a very profitable alternative in comparison to legal crops. Opium poppy grows best along the occidental coast of Mexico, namely in Chihuahua, Sinaloa, Durango, Nayarit, Jalisco, Michoacán, Guerrero, Oaxaca. The eastern coast is not suitable for poppy cultivation due to the tropical climate and higher rainfall frequency (Stratfor Global Intelligence 2012 and Perry-Castaneda Library Map Collection 2001). Figure 1 gives an overview of the location of the states in which poppy seed is cultivated, as well as the average homicide rate over the period from 1930 to 1990. At first sight it is striking that most of the states cultivating poppy seed also have a higher average homicide rate.

In 1947, the newly formed secret police force (DFS) was taking control of the drug business and traffickers depended on the permission of the DFS, the military, the police, mayors and state governors (Watt 2012). If they made a monthly payment to the authorities and obeyed to certain ground rules, they were able to operate in the area without interference from the authorities. If they failed to cooperate, they were arrested or assassinated, which made a good story in the media about how the police or the government had yet again inhibited the operations of a drug cartel. Due to these arrangements, Mexico experienced a period of “Criminal Order” (Rios Contreras 2012) characterized by the omnipresence of drug related corruption that however to some extent assured stability throughout the country and kept violence at a tolerable level (Morris 2012).
Up until the 1970s, Mexico was mainly a transit country for Colombian cocaine. Several Sinaloan families engaged in moving large amounts they received from Colombian and other Central American traffickers to the US. Culiacan, a city in the state of Sinaloa, became the capital of the Mexican drug trade with the Sinaloa Cartel and its head Felix Gallardo based in the city. Later, due to conflicts with the state, the activities were shifted to Guadalajara in Jalisco.

The Colombian Cartels however continued to be in control of the drug trade until 1981, when Reagan became president of the US and started a major crack-down in Florida, the Caribbean and Colombia. While the international community was focusing on the Colombian Cartels, the Mexican drug traffickers seized the opportunity (Quince and Phillips, 2014) and took control of the Inter-American cocaine and heroin market. After this transition, heroin was still produced in Colombia, however now Mexican Cartels were in control and organized transport and sales.

The high profitability of the drug trade increased the ability of the Mexican drug cartels to buy protection from the state as well as weapons, technique and training (Piccatto 2012).
After 1985, the Sinaloa drug cartel split up and an era of rivalries between cartels began. The volume of the Mexican drug trade increased even more, and today Mexico is the largest supplier of heroin to the US-market (UNODC 2014).

Even though the arrangements between state and drug cartels kept the violence at a relatively low level during the era of “criminal order”, it is important to note that violence was always present since drug trafficking does not work without violence (Piccato 2012). Violence is one of the few ways of illegal organizations to send credible and effective messages, since they are not able to sign binding contracts. For example it is common practice among drug cartels to leave a message to rival organizations next to a corpse (Piccato 2012). Mutilations of different body parts are also used to send certain messages and also the dumping or placement of the corpses can transmit information. Illegal organizations also have to employ violence to protect their property, since they cannot rely on the law for the enforcement of their property rights. Therefore it is evident, that drug related violence must have been present all throughout the history of drug trafficking, and is not just a recent phenomenon (Piccato 2012).

Based on this information, my hypothesis is that the violence was especially high in the states, where corruption was present and hence illegal organizations were operating. This implies a strong positive link between the government activity and the opportunities for rent-seeking and violent crime. States in which the opportunities for corruption were scarce were avoided by the illegal organizations, and hence experienced less violent crime. The aim of this paper is to find empirical evidence of the interrelations between government activity and violence crime.
3. Crime

3.1. Forms and Properties
Crime has been present across all cultures and periods of human history and almost every person is victim of a bigger or smaller offense at least once in life. Crime appears in a variety of forms that can be divided into two major categories: offenses against the person, also known as violent crime, (homicide, assault, robbery, kidnapping or sexual assault) and offenses against property (theft, robbery, burglary, fraud, forgery, etc.). When thinking about the above mentioned social costs of crimes, it has been claimed that particularly violent crime is an obstacle to economic development, and consequently has the more detrimental overall impact on society (Prillaman 2003). Violent crime does not only slow down economic development but it also undermines the strength and credibility of democracy and its institutions. When violent crime rates are extraordinarily high, voters turn to extremist and populists candidates that promise a “hard hand” against crime. Many times, these anti-crime strategies also involve the military (just as in Mexico’s recent drug war) and citizens engage in vigilante justice and mob lynching, which weakens the monopoly on the use of force by the state. In many Latin American countries, private security forces outnumber the police force (Prillaman 2003). Jointly, these factors lead to the fading of public faith in democratic institutions, courts and the police force and ultimately weaken democracy.

3.2. Theories of Crime and its implications for the Mexican case
The causes of crime are multidimensional and intertwined. This makes it difficult to identify the impact of one single factor on crime rates. If we want to check the impact of government activity and corruption on crime, we also have to control for a variety of other factors that might cause crime incidence and are related to the government activity. In order to identify potential confounding factors, I review the theories of crime that have been developed and I discuss their implications for the Mexican case.

Over the course of the past century, a variety of theories from the fields of biology, psychology, sociology and economics have been developed, attempting to explain crime incidence.
In the 1920s it was mainly sociologists and psychologists that started to study crime as a social phenomenon, and eventually criminology emerged as an independent discipline (Cook et al. 2013). Until the late 1960s, theories explaining crime focused on the character of the criminal, which was assumed to be fundamentally different from a “normal”, law abiding person. Delinquents, especially killers, were assumed to be “vicious, depraved or psychologically disturbed individual[s]” (Cook and Laub 2001, p. 14). An increase in criminal activity was therefore explained by the disproportionately high prevalence of these anomalous individuals (Cook and Laub 2001), also called the “super-predators” (Bennett, DiIulio and Walters 1996).

3.2.1. Economic Theory of Crime

In 1968, Gary Becker revolutionized the view of criminality when presenting an economic approach to crime, shifting the focus from the time-stable characteristics of the criminal individual towards situational factors such as the social, economic and political environment. He applied the economic rational choice model to the context of criminal activity, pointing out that crime is an option open to everyone that can be a rational choice. An individual is most likely to choose the criminal option if the expected return of the crime is higher than his legal earning opportunities, even when taking into account the likelihood of apprehension and conviction and the severity of the punishment (Becker 1968).

Even though certain aspects of the human character (preferences) still play a role when explaining criminal behavior, the focus is now on the circumstances (Eide, Rubin and Shepherd 2006; Cook et al. 2013), that determine the expected return from crime. The economic factors that determine the utility from a crime can be summarized in three groups: the revenue generated by the crime, the probability and severity of punishment (deterrence) and the costs (direct and indirect, e.g. opportunity costs) expended to commit the crime.

The opportunity costs are mainly defined by the employment status, income level (e.g. wages, education) and/or existing wealth (e.g. consumption). The implication is that one possibility to lower crime rates is increasing the legal earning opportunities of potential delinquents. This could be done via the general income level or wages (GDP, real wages), a reduction of unemployment or by higher education, which improves the working opportunities of the individual in the legal sector and the wages. Several studies have shown that these implications are in principal valid (Trumbull 1989, Machin and Meghir 2000).
The employment status has been shown to be of less importance (Ehrlich 1973 and Freeman 1994), even though there seems to be a significant and positive relation between unemployment and crime.

On the other hand, what seems to be a very important factor is education. On the individual level, there is a clearly negative effect running from education to crime (Witte and Tauchen 1994). In Mexico, the constitution of 1917 stipulated compulsory, free basic education. Consequently, the number of schools as well as the number of enrolled students increased rapidly. In 1930, there were only around 11,000 primary schools in Mexico, but this number doubled by 1940 (Alvarez Mendiola 1994). Even though the educational system was mainly controlled by the central government, the disparities across regions were still very high. Access to schooling was easier for the urban population, whereas the rural and indigenous population was mainly neglected.

After WWII, the government focused more on the education of the indigenous and rural population and the reduction of illiteracy (Alvarez Mendiola 1994), and education continued to improve. The percentage of the school-age population not receiving education has been reduced significantly from 36 % in 1970 to only 13% by 1990, and all states have been able to reduce the share of illiterate persons significantly. For example in Chiapas, in 1950 only 35% of the total population was able to read and write, in 1990 it was already 70%.

In the framework of Becker’s crime theory, these improvements in education are expected to promote a reduction in crime rates, since the opportunity costs of potential delinquents all over the country have been increased. Piccato (2013) stated that crime rates and literacy rates were negatively correlated in Mexico in the 20th century.

When contemplating the development of the general income level in Mexico, we would also expect a decrease in crime: According to Esquivel (1999), real per capita income in Mexico has grown at an average rate of 2% from 1940 until 1995, tripling the income in this period.

The second implication from Becker’s theory of crime is the possibility of deterrence, since the potential criminals are assumed to respond rationally to a change in the return from crime due to an aggravation of the potential punishment and/or a higher probability to be caught (Cook et al. 2013). Ehrlich (1975) for example has shown that the death penalty has a major impact on crime rates, for other studies see Mathieson and Passell (1976) and more recently Levitt (1995; 1997). One problem with deterrence proxies is that they suffer from endogeneity, since the severity of
the punishment might react to the development of the country’s crime rate. Countries with higher crime rates also tend to have tougher legislation. The weak rule of law can partly be captured by indicators of efficiency of the police force and the jurisdiction system, e.g. the probability of being punished when committing a crime.

The severity of the punishment is mainly determined by the legal system and the jurisdiction, whereas the probability of the punishment is determined by the efficiency of the legal system and the police force.

In Mexico, the legal system has its roots in the Colonial law of the 16th century but was reformed by the 1917 constitution which is the main source of Mexican law. The Judicial Power is vested in the Supreme Court, but every state has its own state supreme court that applies the state laws. On the state level, there are also courts of first instance which are the ones dealing with cases of the “common law” (fuero comun) that are the kind of offenses that only affect the victim of the act directly, such as robbery, theft, rape, bodily injury and most importantly homicide (Procuraduría General de la República 2011).

One important proxy for the severity of the punishment is the death penalty, since it is “assumed to be an indicator of the overall severity of [the] legislation regarding the punishment of offenders “ (FLL 2000, p. 249). In the case of Mexico, the death penalty has been abolished by each state independently in the period between 1924 (Michoacan) and 1975 (Sonora) (Gonzalez Mariscal 2011); this variation can be used to examine the impact the abolition of the death penalty had on homicide rates.

More importantly however is the probability that a delinquent does actually receive the punishment after committing a crime, since even the most severe punishment will not have any deterrent effect if it is not applied. In Mexico, the probability of punishment seems to be unbelievably low: According to Cascante (2013), around 98.2 percent of all killings went unpunished in 2012. The reason behind this low clear-up rate is probably corruption, as discussed in the next section on the presence of drug cartels in Mexico.

The widespread impunity weakens the public trust in legal institutions and consequently their deterrent ability. Greene (2013) shows that the main impact of police on crime is through deterrence and not through the actual detention of criminals. If the probability of punishment is really low however, then the police force loses this deterrent function.
Due to the low probability of punishment, I do not expect to find a significant deterrent effect of the death penalty and it will be interesting to see if the arrest rate or the conviction rate has a significant impact on crime incidence.

The third group of factors in Becker’s model is comprised by the aspects related to the potential revenue generated by a crime. Most importantly, the income level also plays a role here. The higher the overall income level, the higher the value of the pickings from an assault against a random individual. Hence, increasing income or wages do not only increase the opportunity costs for potential delinquents but also increases the potential revenue from a crime. Therefore the impact is ambiguous.

Recently, another inference from Becker’s crime model has caught the attention of researchers: Inequality - In unequal societies, the high income differential makes criminal activity especially attractive for individuals at the bottom end of the income distribution since it combines high expected revenue from crime with low opportunity costs. Numerous studies have shown a robust positive link between inequality and crime incidence (see for example Machin and Meghir 2000, Ehrlich 1973; Demombynes and Özler 2002; Chiu and Madden 1998, Bourguignon 1999, Hsieh and Pugh 1993).

Furthermore, since especially in Latin American countries both crime rates and inequality are high, it seems plausible to blame high inequality as main driving force behind crime rates.

In Mexico, cross-regional inequality is substantially more pronounced than intra-regional inequality (Moreno Brid and Ros 2009). For example, in 1940, the per capita income in the Federal District was almost 10 times as high as in the poorest state, Oaxaca (Esquivel 1999, p.13). In 1995, this coefficient had been reduced to 5.4, but these interregional disparities are still very pronounced in international comparison (for example in Colombia 3.3, USA 1.2) (Esquivel 1999). Esquivel also describes that there is some rigidity among states, such that in the period from 1940 to 1995, the poorest states remained poor and the states at the top part of the income distribution also managed to stay there. All throughout this time period, the capital states (Federal District and Mexico State) as well as the Northern states have been at the top of the income distribution, whereas the states in the south (Chiapas, Guerrero, Michoacan and Oaxaca) have maintained their position at the bottom. Esquivel (1999) identifies the unequal access to education as one of the most important reasons behind these cross-regional disparities. When it comes to intra-regional income inequality, there is no reliable data available for Mexico, however
several sources suggest that inequality was falling at least until the 1980s. Hanson and Harrison (1999) for example calculate the ratio of white-collar to blue-collar wages in Mexican manufacturing plants and show that the wage gap was steadily falling until 1985. Felix (1977) however affirms that income inequality in Mexico was rising from 1940 until 1975. Moreno Brid and Ros (2009) emphasize that intra-regional inequality are linked to urbanization, as rural areas lag behind the industrialized cities.

Since the cross-regional inequality is much more pronounced, I expect that inequality was not a major factor to impact crime in Mexico.

Since the 1960s, the results of numerous studies have supported Becker’s theory and it has been shown that the “super-predator” view of crime is not maintainable (for example Cook and Laub 1998; Eide, Rubin, Shepherd 2006; Dezhbakhsh et al. 2003). Even though widely accepted, the “rational choice theory” is in my opinion not sufficient to explain crime incidence in many cases, especially in the field of hate and violent crime and in the case of Mexico. I suppose that, even though these traditional economic determinants of crime rates are important, Mexico’s weak rule of law and especially corruption played a much stronger role.
3.2.2. Sociological Theories

Other fields can also contribute valid approaches to a better understanding of variation in crime. For example in sociology, one of the most influential examples is the strain theory developed by Robert Merton in 1938. If social obstacles make it impossible for certain individuals to achieve a culturally defined goal (such as wealth for example), the strain experienced by these individuals pushes them into using illegal methods in order to succeed, since the importance of the goal might outshine the means (Merton 1968). Even though plausible, this theory is especially difficult to test, since strain is a quite subjective concept that is hard to measure; but one example can be found in Agnew and White (1992) who used questionnaire data of US adolescents to test the impact of strain on delinquency and found significant results. General inequality has also been used to capture at least part of the strain levels experienced by the poor part of society. For example Kelly (2000) finds that inequality has an important impact on violent crime, whereas inequality is not related to property crimes. This would indicate that inequality impacts crime rather through the strain-channel than through the Becker-higher payoff channel.

Another theory focusing on the social environment as important factor is the social disorganization theory. Social disorganization is defined as “the inability of a community structure to realize the common values of its residents and maintain effective social controls” (Sampson and Groves 1989, p. 777). In their classic work, Shaw and McKay (1942) found that the three structural factors low economic status, ethnic heterogeneity and residential instability weaken the social bonds within a community, which encourages more individuals to choose in illegal alternatives. In the case of Mexico, the population is made up of two main ethnical groups, namely the descendants of Spanish immigrants and indigenous, and it might be illustrative to control for the presence of each ethnic group as well as a measure of ethnic fractionalization. Freeman (1986) found a strong relation between church attendance and arrest probability, indicating that the social organization (trust, norms, networks) might also be captured by religion.

The demographic composition of a society also seems to play a role when it comes to determining crime incidence. Since most crimes are committed by men aged 20 to 30, a smaller size of that cohort implies that there are simply fewer individuals in the age group with the
highest risk of committing a crime. Higher fertility and consequently population growth might lead to an increase in crime rates when the bigger cohorts reach the critical age (Krahn et al. 1986). FLL (2000) however could not find any impact of the proportion of young males on homicide or robbery.

There are also two theories that emphasize the development of crime over time.

Emile Durkheim realized already in the 19th century that during the transition from an agricultural to an industrial economy, the increasing division of labor, urbanization and residential instability weakens the social bonds and norms that in a rural society help to restrict criminal behavior. The consequence of this was an increase of crime in Europe during industrialization (Rogers 1989; Clinard and Abbott 1973). Shelley (1981) further developed this idea and created the modernization theory, that predicts an initial upswing in crime during industrialization, but as economies mature, crime is expected to decline again.

Also in Latin America, it has been found that crime is mainly an urban phenomenon (except for Columbia, Prillaman 2003). Urbanization also might reduce the direct costs of criminal behavior, since “a large degree of urbanization can facilitate the development of social interactions between criminals and would-be criminals” (FLL 2000, p. 252). Several studies found a significant link between urbanization and/or population density and property crime, however not on homicide (FLL 2000, Gaviria and Pages 2002, Glaeser and Sacerdote 1996).

Norbert Elias (1939) stated that as a country develops, it experiences a “civilizing process” which includes a dramatic change of the forms of human interaction, for example in the fields of violence, sexual behavior and customs. The more specialized the division of labor, the more dependent the individuals are on each other, what makes it necessary to establish common rules, exert self-control and coordinate actions. Physical force is monopolized by the government, which results in a long term decrease of crime and violence (Eisner 2001, Pinker 2011). Here, the size of the public sector might play a role, since a bigger government might be able to more efficiently control and punish criminal behavior. Also an increase in education might change how individuals deal with strain and frustration, leading to lower violence among them.

Cultural aspects in general have also been suspected to cause especially high or low crime rates. In Japan, the “shame culture” seems to be the reason why the country modernized relatively crime free (Leonardsen, 2004). Contrarily, in Latin America, the “cultural values conducive to
violence [that] have evolved out of the history of colonization and subjugation” have been blamed for causing the high homicide rates throughout the continent (Neapolitan 1994, p. 4).

3.2.3. Drug Cartels and Corruption
As mentioned before, the presence of organized crime groups, drug cartels and corruption might play an important role when trying to explain the crime incidence in Mexico. It is mostly consensus that organized crime is not able to operate without corruption (Morris 2012), hence, the presence of illegal drug business necessarily implies the presence of violent crime.

Numerous studies have shown that illegal business is linked with higher violent crime rates (Grogger and Willis 1998). Violence is a tool on both the supply and the demand side of the drug markets. On the supply side, drug cartels use violence to enforce agreement and property rights. On the demand side, juveniles with low opportunity costs apply violence mainly to obtain the income they need to purchase the drug, since drugs have a very low elasticity of demand (habit forming good). Hence it seems that property crimes appear mostly on the demand side, and violent crimes mostly on the supply side.

Mexico is situated on the demand side with the single most important illegal industry being the drug production and trade. The presence of profitable criminal industries or the geographical precondition for such provides an important incentive to commit crimes.

According to FLL (2000, p. 250) the presence of illegal drug business is a “potentially important determinant of crime, not only because the drug trade is highly profitable but also because it uses a very violence-intensive technology”. Here again it is possible to make the connection to the direct costs of operating in the drug production and trade, since the presence of important drug cartels might be highly connected to the presence of corruption. Drug cartels select themselves into those regions in which government officials are especially easy to bribe and consequently bribery costs are low, and avoid regions in which law enforcement is relatively strict. Consequently, violent crimes are expected to be highest in regions with high corruption and high presence of drug cartels.

One scholar that has been putting forward this hypothesis is Peter Watt, author of the Book “Drug War Mexico”, who argues that the Drug War in Mexico is based on a long standing collaboration...
between government and police officials and drug cartels. He argues that traffickers benefit from
the state and vice versa, which results in a close connection between the two through corruption.

The presence of corruption on the other hand interacts with the deterrence of the probability and
severity of punishment.

Bowles and Garoupa (1997) modeled this relationship by extending Becker’s rational choice
model and allowing for corruption. Introducing the possibility of collusion between the police
officer and the criminal, they show that corruption weakens the deterrent effect of the potential
sentence. Consequently, corruption is expected to increase crime incidence by weakening the
deterrent effect of the judicial institutions and the police force.

Shirk and Cazares (2007) have taken a look at the rule of law in Mexico, and found that the main
reasons behind it are poor training of officials, limited transparency and inefficient procedures.
Abuse of authority, corruption and even involvement of police officers in criminal activity are
common.
4. Data and Descriptive Analysis

4.1. Measuring Violent Crime
As mentioned before, this research’s focus is on violent crime being the more severe of the two principal forms. The subsequent analysis is therefore limited to the concept of violent crime and its determinants.

For my analysis, I decided to employ homicide rates as a proxy for violent crime rates and assembled a data set containing yearly observations for each of the 32 Mexican regions on homicide rates for the years from 1930 until 1988. Most of the data has been obtained from mortality data in statistical yearbooks found in the Archive of the National Institute of Statistics and Geography (INEGI) in Mexico City (see abstract for more details on data sources). In the crime literature, homicide rates have been the most prevalent indicator of violent crime or even overall crime rates (Neapolitan 1997, Nivette 2011) and are defined as the number of “unlawful death[s] deliberately inflicted on one person by another person” (OECD, 2011) per 100,000 people.

When it comes to measuring crime, it is important to notice that data on crime is of course “notoriously poor”, since crime is inherently clandestine and difficult to measure (Prillaman 2003, p. 4). The biggest drawback is the problem of underreporting (FLL 2000). The victim might not report the crime, which happens mostly in the case of minor offenses or in cases of domestic violence and rape. A change in a crime rate could always reflect a change in the information-gathering technique, the reporting behavior of the society, corruption or the way crime records are aggregated. Another source of bias is that government agencies or police officials especially in less democratic countries tend to artificially lower crime rates to mask their inability to cope with crime.

By using homicide rates as indicator, I reduce the probability of underreporting, under recording and measurement error: First of all, the definition of murder is very clear cut and stable over time and across cultures and legal systems, which is especially important in studies including a variety of countries or a large time horizon (van Zanden et al. 2014). Secondly, homicides are drastic events that are most likely reported and recorded. Soares (2004) finds that underreporting is
severe for property crimes and crimes with social stigma such as rape. In the case of homicide however, measurement error is not substantial (Levitt 1995). These factors make homicide rates a superior crime indicator that is least affected by measurement error (OECD 2011, Neapolitan 1997, FLL 2000, Fox and Zawitz 2000).

Secondly, the data used was assembled by health authorities that obtained the information from hospitals and morticians. In the sources it was evident that the authors were concerned about the sanitary causes of death as well as certain infectious diseases and hence had no incentive to artificially reduce crime rates, as would have for example police officials. Van Zanden et al. (2014) confirm that health statistics are much less likely to underestimate the actual number of homicides than for example criminal records and police statistics. Using data from health authorities further reduces the probability of underreporting.

Another advantage of my analysis is that the focus is on the variation between the states and over time and not the absolute level. Assuming that the reporting bias is more or less the same in one state, part of it is captured by the state fixed effect. Even though the specific numbers might not be precise, the analysis of trends and changes is possible.

4.2. The long-term trend in homicide rates

In this section, I will take a look at the development of crime rates in the 32 Mexican regions in the 20th century. This is completely new evidence, since to the best of my knowledge there has been almost no regional data on crime available for the period before 1990 (except for Piccato (2013) who presents data on homicide incidence for the Federal District).

Figure 1 presents the development of the homicide rate from 1930 until 2010 in Mexico. First of all it is evident that the overall trend during this period was negative. Starting from a very high level of more than 60 homicides per 100,000 inhabitants in the 1930s, the rates experienced a sustained downward trend that lasted almost 40 years. This period coincides with the economic growth and stability especially after WWII, and the obvious conclusion would be that the improvement of overall living conditions reduced the incentives to commit violent crimes. In the subsequent analysis I will check if the overall income level was really the driving factor behind declining crime rates.

In the 1970s, the downward trend in homicides breaks and leaps up to a higher level. This jump coincides with the appearance of drug cartels in the 1970s, but also with the slowing down of the
economic growth. Here again the question arises whether the economic conditions were responsible for the break of the downward trend or rather the appearance of drug cartels?

After this jump in the 1970s, the homicide rates continue to fall, however at a much slower pace, until 2007. The beginning of the drug war is clearly recognizable as another break in the long term trend, with rapidly increasing homicides in the years from 2008 until 2010.

![Homicide Rates Mexico 1930-2010](image)

Figure 2 Homicide Rate Mexico 1930 - 2010

In the next step, the development of the homicide rates in the individual states is contemplated (Figure 2).
Most of the 32 states mirror the trend visible for entire Mexico. They display an initial upswing in homicide rates, followed by a long and sustained decrease throughout the entire century that is reverted or at least slows down in the 1970s (Sinaloa, Oaxaca and Yucatan) or 1980s (Distrito Federal, Mexico State, Nayarit). One could state that especially until 1970, the homicide rates in many states move quite parallel to each other. This indicates that there exit factors that affected the in homicide rates in many states equally, which will have to be taken into account when estimating an empirical econometric model.

However there are also states that seem to follow a different development. Baja California Norte still shows the characteristic initial increase; however homicide rates fall back on the initial level already in the 1930s and then remain stable after 1940. In the South of Baja California, homicide rates do not follow a clear cut trend but rather fluctuate around a quite low mean. In Campeche, homicide rates seem to increase already in the 1960s. A possible explanation of these differences in the development of violent crime could be the early presence or absence of drug cartels in these states.
Now I will take a look at the development of homicide rates using the same scale for all of the states (Figure 3).

Here we can see that there are a few states displaying especially high homicide rates throughout the period. The most pronounced deviation is presented by Colima, which starts with an initially very high level in the 1930s. This particularly high incidence of homicides could be explained by the aftermath of the revolution, since many of the conflicts took place on the territory of Colima (for example the “asalto de manzanillo” in 1928 and the “campaña cristera de Colima” in 1927).

Other states that display an especially high homicide rate are Guerrero, Hidalgo, Jalisco, Morelos, Puebla and Veracruz. Especially Guerrero is still today a major location of the drug war.
It is also illustrative to compare the development of violent crime in different states. In Figure 5 I compare two exemplary states, Sinaloa and the Federal District. Sinaloa starts at a much higher level in the 1930s, however in the next 40 years, homicide rates fall in both states and reach the same level in the 1960s. It is interesting, that Sinaloa is the first one in experiencing the reversal of this downward trend, experiencing a jump-wise increase in the 1970s. In the Federal District, the same reversal occurs only about 10 years later. Sinaloa is known as the crib of the drug cartels (Marshall 1991) from where the Sinaloa Cartel grew to the first major drug cartel in the 1970s. Hence it is possible that the increase in violence in Sinaloa in the 1970s is related to the expansion of illegal drug trafficking. The Federal District might have been affected by drug violence only 10 years later.

In Sinaloa, the homicide rate starts decreasing already in the 1980s, whereas in the Federal District crime continues increasing until the end of the observed period. One explanation might be that in 1977, the US and Mexico started a antidrug campaign that involved aerial spraying of drug crops particularly in the state of Sinaloa (Marshall 1991), which forced the drug trafficking organizations out of the state (Vinson 2009).
In a last step, I want to compare the violence in states that are known for poppy seed cultivation and all the remaining states. The heart of the drug production in Mexico is situated in the so called “Golden Triangle” formed by the states of Sinaloa, Durango and Chihuahua (Vinson 2009). Figure 3 shows that even though the homicide rate in the “Golden Triangle” started on a higher level in the 1940s, it decreased rapidly and stayed lower than the homicide rate in the rest of Mexico up until 1970. Afterwards, while the homicide rate remains stable in the rest of Mexico, it increases in two waves in the poppy-seed cultivating states during the 1970s and the 1980s. This development coincides with the rise of the Sinaloa cartel in the 1970s. At the end of the 70s, due to the antidrug campaign, activity of drug cartels was slightly suppressed; they recovered however in the 1980s. The development of the homicide rates seems to mirror the activity level of the drug cartels.

Figure 6

In a last step, I want to compare the violence in states that are known for poppy seed cultivation and all the remaining states. The heart of the drug production in Mexico is situated in the so called “Golden Triangle” formed by the states of Sinaloa, Durango and Chihuahua (Vinson 2009). Figure 3 shows that even though the homicide rate in the “Golden Triangle” started on a higher level in the 1940s, it decreased rapidly and stayed lower than the homicide rate in the rest of Mexico up until 1970. Afterwards, while the homicide rate remains stable in the rest of Mexico, it increases in two waves in the poppy-seed cultivating states during the 1970s and the 1980s. This development coincides with the rise of the Sinaloa cartel in the 1970s. At the end of the 70s, due to the antidrug campaign, activity of drug cartels was slightly suppressed; they recovered however in the 1980s. The development of the homicide rates seems to mirror the activity level of the drug cartels.
Overall, the descriptive results imply two things: First of all, it will be necessary to estimate the model including state-fixed effects in order to capture the differences in the level of homicide rates that are persistent over time and caused by time-invariant characteristics of each state. Secondly, there is considerable correlation between the developments of homicide rates in different states, which implies the existence of cross-sectional correlation. Since the data includes all 32 states of the same country, it is plausible to expect that there exist common shocks that affect all states equally, as for example national policy measures, economic crises or interrelations due to trade between states. This has to be taken into account in the subsequent empirical analysis.
5. Methodology and Results

The aim of the empirical analysis is to check if there is a significant impact from government activity on violent crime rates. At the same time, I will explore what other factors have been responsible for the variation in homicide rates in Mexico. The base of the analysis is a panel data set containing information about homicide rates and numerous control variables for the 32 federal entities of Mexico. The observations are annual and range from the 1930s until the 1980s, however due to data availability issues and to reduce the probability of finding spurious correlation (see unit root tests in the appendix) I decided to use decade averages, which results in 6 time periods (1930 – 1980) for each of the 32 regions, leaving me a total of 192 observations. Another advantage of using decade averages is that I eliminate the possibility of selection bias, since the data set is now a strongly balanced panel, containing an observation for every decade for every state.

5.1. Measuring State Activity and Corruption

The main explanatory variable is real government spending per capita in 1995 Mexican pesos. The size of the public sector has been used as a proxy for corruption in partially democratized countries. Traditionally, larger governments are associated with more corruption. The argumentation is that “regulation and other forms of intervention typically associated with and facilitated by larger public sectors distort competition and introduce opportunities for rent-seeking” (Montinola and Jackman, 2002). Goel and Nelson (1996) show that government spending has a strong positive influence on corruption.

Kotera and Okada (2012) show that this relationship is especially true in partially democratized countries, which tend to have a higher level of corruption generally (Montinola and Jackman 2002). In dictatorships and mature democracies however, corruption tends to be low and bigger public sectors are not linked to higher corruption.

Mexico in the 20th century represents the case of a partially democratized country, emerging from a dictatorship but not having reached the status of a full democracy yet (one-party system).

The channel through which corruption can affect crime is the probability of punishment. The higher the overall corruption level, the more likely a criminal can bribe a police officer into refraining from executing his duties, and consequently the lower is the probability of punishment. In short, the hypothesis here is that higher government spending is related to corruption, which
again increases violent crime due to the presence of illegal organizations. On the other hand, if government spending was used efficiently to improve institutional quality, it might also reduce crime rates.

When looking at the development of government spending over time, we can see that this variable remains more or less on the same level form 1930 until 1960, but increases rapidly in the 1970s and 80s (Figure 6) in most of the states. There is one outlier that displays a higher level of per capita government spending over the entire period, namely the Federal District. Since this is the capital, it is straightforward that it represents higher government spending per inhabitant.

![Figure 7: per capita government spending in the Mexican states – 1930 – 1980s](image)

The increase in government activity coincides with the reversal of the downward trend in homicides; hence it might have triggered the increase of corruption incidence and consequently the emergence of large scale drug trafficking organizations. However there still has to be one or more additional factors that caused the long-term decrease in homicide rates before the 1970s. To identify these factors and to assess the relationship between government spending and crime is the aim of the subsequent analysis.
5.2. Identification Strategy

In order to estimate the impact of government spending on crime incidence I propose a model based on the theoretical framework developed by Becker:

\[ CRIME_{i,t} = \delta \ast \log(government \ spending)_{i,t} + \beta'X_{i,t} + u_{i,t} \]

with \( i = \) state, \( t = \) year and \( X \) the vector of additional control variables. The government spending per capita variable has been logarithmized to approach a normal distribution.

As illustrated in the previous sections, the potential determinants of crime rates are manifold and can be found in many different areas of society. Thus, it is very likely that some of these factors are correlated with both the crime rate and government spending, resulting in omitted variable bias. To avoid this bias I will include as many of these confounding factors as possible in the regression model.

First of all, there are factors that affect crime rates on the state level but do not change over time such as geographical conditions (location relative to the border/US, suitability of poppy seed cultivation), certain demographic, ethnic and cultural features that are roughly constant over time, crime reporting behavior as well as attitudes towards crime and historically grown institutions and customs, for example in the judicial system. It is well known that OLS results in biased estimators in the presence of these unobserved fixed effects. Including fixed effects in the regression model, it is possible to allow for (the likely) correlation between geography or historical factors and the regressors such as GDP, government spending or the quality of the jurisdiction.

The only caveat of including state fixed effects is that it is not possible to analyze the impact of time constant geographical conditions (for example the presence of poppy seed cultivation) or the location at the border on crime rates.

In the regression, I will also include time fixed effects in order to capture common time trends or events that affected all states in exactly the same way, like national political reform. Additionally, including time trends further reduces the possibility of spurious regression.

With time and state fixed effects, the model is as follows:

\[ CRIME_{i,t} = \delta \ast \log(government \ spending)_{i,t} + \beta'X_{i,t} + f_t + \eta_i + u_{i,t} \]
An additional challenge when estimating this model is that traditional panel data methods are all based on the assumption of cross-sectional independence, which in this case is an assumption that is not easy to maintain. Since the data stems from the 32 states of Mexico, the time series are likely correlated across cross-sections due to common unobserved and observed factors, as for example similar geographical and climate conditions, federal policy measures that affected some of the regions as well as the interrelations of drug cartels and commerce between states. Time fixed effects do account for some of the cross-sectional dependence; however they assume a very simple form of dependence, imposing the same coefficient for all the cross-sections.

The Pesaran (2004) test for cross-sectional independence on the residuals of individual ADF-regressions as well as on the residuals of the baseline model both result in the rejection of the Null hypothesis of cross-sectional independence (see appendix).

This indicates that there is still considerable cross-sectional dependence present in the panel even when controlling for time fixed effects, (as indicated by the graphical analysis).

In order to accommodate both time and cross-sectional fixed effects and cross-sectional dependence, I chose to use fixed effects regression with Driscoll and Kraay (1998) standard errors. These are robust to all forms of (spatial) cross-sectional dependence and temporal dependence.
5.3. Results
The empirical analysis follows the pattern presented by FLL (2000). First of all, a baseline model examines the relationship between government spending and crime, including as control variables those factors that have been shown to be important determinants of homicide rates in cross-country studies:

(1) General Indicators of well-being:
   b. Consumption: per capita sugar consumption in kilograms, assumed to be correlated with overall consumption

(2) Human Capital/Education: literacy rates (percentage of the population that is able to read and write) quantifying the stock of human capital

(3) Inequality – In order to measure inequality, I use the ratio of the wage of unskilled labor to GDP per worker hour. Both are measured in 1995 Mexican pesos. In order to be able to interpret the ratio as an indicator of inequality, I transformed it by subtracting it from 1, so that an increase in the indicator now represents an increase in inequality.

\[
\text{Inequality} = 1 - \frac{\text{real minimum wage (unskilled)}}{\text{GDP per worker hour}}
\]

Subsequently, the baseline model is extended along three dimensions (deterrence, demographics and culture/ethnicity), assessing the robustness of the principal findings and at the same time exploring the role of other potential crime determinants.

5.3.1. Baseline Model
The results are presented in Table 1. In column (1) I estimated a standard fixed effects regression, not taking into account the cross-sectional dependence. The coefficients on sugar consumption, government spending, GDP and the inequality proxy are all positive but not significant. Only the coefficient on literacy is negative and highly significant, indicating that a higher human capital stock in the population effectively reduces crime incidence.

However, the Pesaran (2004) test for cross-sectional dependence on the residuals results in a rejection of the independence hypothesis (p=0.0000), indicating that even when including time-fixed effects, there is still considerable cross-sectional dependence present.
Consequently, I estimate a fixed effects regression with Driscoll-Kraay standard errors that are robust to all kinds of cross-sectional dependence, and the result is presented in column (2). In this regression, both government spending and GDP per capita become significant, while sugar consumption remains insignificant.

Table 1: Baseline Model Regressions

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Homicide Rate</th>
<th>(2) Homicide Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FE</td>
<td>FE with DK</td>
</tr>
<tr>
<td>Sugar Consumption per capita</td>
<td>0.0437</td>
<td>0.0437</td>
</tr>
<tr>
<td></td>
<td>(0.142)</td>
<td>(0.121)</td>
</tr>
<tr>
<td>Log(Government spending)</td>
<td><strong>2.331</strong>*</td>
<td><strong>2.331</strong>*</td>
</tr>
<tr>
<td></td>
<td>(2.802)</td>
<td>(0.636)</td>
</tr>
<tr>
<td>Log (GDP)</td>
<td><strong>4.054</strong>*</td>
<td><strong>4.054</strong>*</td>
</tr>
<tr>
<td></td>
<td>(2.923)</td>
<td>(1.217)</td>
</tr>
<tr>
<td>Literacy</td>
<td><strong>-80.03</strong>*</td>
<td><strong>-80.03</strong>*</td>
</tr>
<tr>
<td></td>
<td>(26.59)</td>
<td>(16.60)</td>
</tr>
<tr>
<td>Inequality Indicator</td>
<td>0.0442</td>
<td>0.0442</td>
</tr>
<tr>
<td></td>
<td>(1.793)</td>
<td>(1.135)</td>
</tr>
<tr>
<td>Constant</td>
<td>28.62*</td>
<td>28.62*</td>
</tr>
<tr>
<td></td>
<td>(30.91)</td>
<td>(14.47)</td>
</tr>
<tr>
<td>Decade-fixed effects included</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.690</td>
<td>0.690</td>
</tr>
<tr>
<td>Number of groups</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The hypothesis stated above, e.g. that increased government spending is linked to higher crime incidence, is confirmed by the results. Higher government spending seems to aggravate the violence problem, which is counterintuitive at first. But if we take into account that in a partially democratized environment with weak rule of law, the government budget is not spent efficiently in order to improve institutions for example, it seems more plausible. A higher government spending in the Mexican context implies a bigger relative size of the public sector, which again is known to encourage corruption by introducing more opportunities for rent seeking. Organized crime groups might have selected themselves into those states known for a lose government structure and as a consequence violent crime rates are higher in those states.

What comes as a surprise is the positive sign of the coefficient on GDP per capita. In Becker’s model, an increase in the general income level on the one hand increases the opportunity costs, but on the other hand it also increases the potential revenue from a criminal activity. In the Mexican case, the latter effect seems to dominate, and a higher GDP level is associated with more crime. This is also in line with the fact that the sugar consumption does not have a significant impact on crime rates. Higher crime seems not to be related to poverty or a lack of resources, but rather to the overall income level that determines the potential revenue from crime.
From this we can deduce that the rapid economic growth in Mexico after WWII was not causing the decline in homicide rates. What might have contributed to declining crime rates is education. The coefficient on the literacy rate is highly significant, positive and big in magnitude. An increase of the literacy rate from 75% to 85% would lead to 8 fewer murders per 100,000 inhabitants. This once again emphasizes the importance of education for the improvement of individual well-being.

Lastly, the coefficient on inequality is positive, however not significant. This is a sharp contrast to the findings of many recent studies that concluded that one reason for the high crime incidence in Latin America was the extraordinarily high income inequality. One reason for this could be that the inequality proxy used here is insufficient in order to capture the concept of income inequality.

In the following I will extend the basic model along various dimensions, checking the robustness of the main findings and at the same time exploring the role of other crime determinants.

### 5.3.2. The Role of Deterrence

Becker’s theory of crime predicts a negative impact from the probability of being convicted on crime rates. Furthermore, the severity of the punishment also has a deterrent effect, resulting in lower crime incidence.

The death penalty has been used as proxy for the severity of punishment, since it is “assumed to be an indicator of the overall severity of [the] legislation regarding the punishment of offenders (FLL 2000, p. 249). In the case of Mexico, the death penalty has been abolished by each state independently in the period between 1924 (Michoacán) and 1975 (Sonora) (Gonzalez Mariscal 2011). This variation allows me to analyze the impact of the death penalty on the homicide rate. I generated a dummy variable that takes on the value 1 when the death penalty was still in place and 0 after its abolition.

One problem with the inclusion of the death penalty as control variable is that it suffers from endogeneity; since it is expected to react to the country’s crime rate. Countries or states with higher crime rates have tougher legislation, and the death penalty might be abolished only when the crime rates are already quite low. Finding a positive coefficient on the death penalty variable implies that its crime reducing impact does not offset the positive bias caused by reverse causality.
Apart from the severity of the punishment, I will also control for the probability of being convicted with several indicators. The probability of punishment is directly linked to the institutions and the rule of law. Hence corruption and inefficiency of the judicial and police institutions play an important role.

I have at hand data on the number of persons that have been accused and sentenced of homicide in each state. Figure 8 compares the development of the homicide rate to the number of persons accused of homicide (per 100,000 inhabitants) and the number of convictions for homicide (per 100,000 inhabitants). In 1940, the first year for which all three rates are available, we notice a big gap between the number of homicides, the number of persons accused and the number of persons convicted. There are more than 50 homicides per 100,000 inhabitants, however there were only around 33 accused and 12 convicted. This translates in a probability of punishment of only around 20%. The vast majority of murderers never had to face punishment. Over the course of the century, the three rates converged significantly, reaching almost the same level in the 1970s. In 1974 however, the homicide rates increase abruptly whereas the number of accused and convicted continues following the downward trend.

Figure 8
The fact that the increase of homicides in the 1970s is not accompanied by an increase in the number of accused and convicted insinuates that these additional murders successfully evaded punishment. My hypothesis is that the additional violence appearing in the 1970s is caused by illegal organizations that had agreements with the government authorities, and hence were exempt from judicial prosecution.

To empirically assess the role of deterrence, I will use the following indicators that gauge the probability of punishment:

- **Police** – percentage of murderers that have been caught by the police and accused of homicide: \( \frac{\text{# of persons accused of homicide}}{\text{total # of homicides}} \), this indicator measures the efficiency of the police force, e.g. if the police is able to find and arrest the delinquent

- **Jurisdiction** – percentage of accused that are actually convicted: \( \frac{\text{# of persons convicted}}{\text{# of persons accused of homicide}} \), this indicator measures the efficiency of the judicial system, e.g. if it is able to prove the delinquent guilty.

Both of these variables might be subject to measurement error, since it is indeed possible that the police catch the wrong person and consequently the judicial system is not able to prove the person guilty. I assume however that the number of incidents like this is relatively small.

In column (1) of Table 2 I include the two indicators of the probability of punishment. The coefficients of both indicators show a negative sign as expected, however only the jurisdiction indicator is significant. An explanation for this finding can be found in Piccato (2012): The corruption was mainly a phenomenon of the police, since the police officials were the ones in direct contact with the criminal organizations on a daily basis. The officials of the jurisdiction system only faced criminals when they were already arrested. As a consequence, corruption was especially widespread among the police force. An improvement in policing efficiency consequently did not impress potential delinquents, since they knew that they could easily buy their way out. A better jurisdiction system however had indeed a deterrent effect, since bribing here was not as easy.
In column (2), I also include the death penalty dummy. The coefficient is positive and significant, which is probably the result of the endogeneity bias. The deterrent effect of the death penalty (while it is still in place) does not offset the endogeneity problem that states probably abolished the death penalty when crime rates were already low. Omitting the two indicators of the probability of punishment does not change this finding (column (3)).

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Homicide Rate</th>
<th>(2) Homicide Rate</th>
<th>(3) Homicide Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FE with DK</td>
<td>FE with DK</td>
<td>FE with DK</td>
</tr>
<tr>
<td>Sugar Consumption per capita</td>
<td>0.0438 (0.118)</td>
<td>0.0408 (0.120)</td>
<td>0.0409 (0.124)</td>
</tr>
<tr>
<td>Log(Government spending)</td>
<td>2.483*** (1.153)</td>
<td>2.881*** (1.220)</td>
<td>2.689*** (1.277)</td>
</tr>
<tr>
<td>Log (GDP)</td>
<td>4.420*** (1.153)</td>
<td>4.442*** (1.220)</td>
<td>4.042*** (1.277)</td>
</tr>
<tr>
<td>Literacy</td>
<td>-79.51*** (16.97)</td>
<td>-75.19*** (17.42)</td>
<td>-75.48*** (16.62)</td>
</tr>
<tr>
<td>Inequality Indicator</td>
<td>-0.0294 (1.107)</td>
<td>0.168 (1.124)</td>
<td>0.233 (1.153)</td>
</tr>
<tr>
<td>Police</td>
<td>-0.255 (0.756)</td>
<td>-0.441 (0.744)</td>
<td></td>
</tr>
<tr>
<td>Jurisdiction</td>
<td>-5.203*** (1.269)</td>
<td>-5.609*** (0.955)</td>
<td></td>
</tr>
<tr>
<td>Death Penalty</td>
<td>4.377*** (1.511)</td>
<td>3.961*** (1.422)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>28.57* (14.55)</td>
<td>22.27 (15.64)</td>
<td>22.14 (15.36)</td>
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<td>Decade-fixed effects included</td>
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<tr>
<td>Observations</td>
<td>192</td>
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<tr>
<td>Number of groups</td>
<td>32</td>
<td>32</td>
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</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
5.3.3. Demographic Factors

As illustrated above, various theories predict an impact of demographic factors such as birth rate, population growth and urbanization rate on crime rates. Therefore I also included some of these variables in my empirical analysis and the results are presented in Table 3. Overall, the results indicate that demographic factors are not significantly related to crime rates in 20th century Mexico.

The lagged birth rate (the birth rate of the past decade) and the urbanization rate do not have a significant impact on the crime rate, the same holds for the population growth rate. Thus violence is not caused by the social unrest triggered by increasing urbanization as predicted by the modernization theory.

Table 3: Demographic Factors

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Homicide Rate</td>
<td>Homicide Rate</td>
<td>Homicide Rate</td>
<td>Homicide Rate</td>
</tr>
<tr>
<td></td>
<td>FE with DK</td>
<td>FE with DK</td>
<td>FE with DK</td>
<td>FE with DK</td>
</tr>
<tr>
<td>Sugar Consumption per capita</td>
<td>0.0179</td>
<td>0.0367</td>
<td>0.0267</td>
<td>0.0204</td>
</tr>
<tr>
<td></td>
<td>(0.0930)</td>
<td>(0.112)</td>
<td>(0.0994)</td>
<td>(0.127)</td>
</tr>
<tr>
<td>Log(Government spending)</td>
<td><strong>3.860</strong>*</td>
<td><strong>2.344</strong>*</td>
<td><strong>2.337</strong>*</td>
<td><strong>2.140</strong>*</td>
</tr>
<tr>
<td></td>
<td>(0.756)</td>
<td>(0.659)</td>
<td>(0.667)</td>
<td>(0.627)</td>
</tr>
<tr>
<td>Log (GDP)</td>
<td>1.941*</td>
<td>3.923***</td>
<td>4.255***</td>
<td>4.121***</td>
</tr>
<tr>
<td></td>
<td>(0.954)</td>
<td>(1.397)</td>
<td>(1.239)</td>
<td>(1.216)</td>
</tr>
<tr>
<td>Literacy</td>
<td>-<strong>73.38</strong>*</td>
<td>-<strong>81.35</strong>*</td>
<td>-<strong>77.09</strong>*</td>
<td>-<strong>73.84</strong>*</td>
</tr>
<tr>
<td></td>
<td>(15.43)</td>
<td>(18.42)</td>
<td>(15.68)</td>
<td>(16.64)</td>
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<tr>
<td>Inequality Indicator</td>
<td>0.904</td>
<td>0.100</td>
<td>-0.0428</td>
<td>0.0583</td>
</tr>
<tr>
<td></td>
<td>(1.013)</td>
<td>(1.221)</td>
<td>(1.144)</td>
<td>(1.114)</td>
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<tr>
<td>Lagged Birth Rate</td>
<td>-0.333</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(0.211)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population Growth Rate</td>
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<td>-0.114</td>
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<td></td>
<td></td>
<td>(24.47)</td>
<td></td>
<td>(0.126)</td>
</tr>
<tr>
<td>Urbanization Rate</td>
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<td>-0.114</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(0.126)</td>
<td></td>
</tr>
<tr>
<td>Population Density</td>
<td></td>
<td></td>
<td></td>
<td><strong>0.00215</strong>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.000674)</td>
</tr>
<tr>
<td>Constant</td>
<td>47.49***</td>
<td>31.39</td>
<td>31.38</td>
<td>24.32</td>
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<tr>
<td></td>
<td>(17.12)</td>
<td>(18.83)</td>
<td>(18.71)</td>
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<tr>
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<td>191</td>
<td>192</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>Number of groups</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

Standard errors in parentheses, decade-fixed effects included in all regressions

*** p<0.01, ** p<0.05, * p<0.1
The coefficient of the population density is however positive and significant, indicating that violence was higher in more densely settled states.

5.3.4. Cultural Factors and Ethnic Fractionalization

In this last section I will test the hypothesis introduced by the social disorganization theory, that ethnic heterogeneity or fractionalization might be causing high crime rates. In model (1) of Table 4, I include the share of indigenous population as well as the share of Catholics as explanatory variables. Surprisingly the share of indigenous population is highly significant and also very high in magnitude. It indicates that the higher the percentage of indigenous population, the lower the violent crime rates. It might be due to the fact that indigenous communities stay mainly unconnected to the “modern” Mexican society and did not get involved in the drug trafficking business.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) Homicide Rate</th>
<th>(2) Homicide Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FE with DK</td>
<td>FE with DK</td>
</tr>
<tr>
<td>Sugar Consumption per capita</td>
<td>0.0432</td>
<td>0.0327</td>
</tr>
<tr>
<td></td>
<td>(0.116)</td>
<td>(0.123)</td>
</tr>
<tr>
<td>Log(Government spending)</td>
<td><strong>2.430</strong></td>
<td><strong>2.892</strong></td>
</tr>
<tr>
<td></td>
<td>(0.966)</td>
<td>(0.884)</td>
</tr>
<tr>
<td>Log (GDP)</td>
<td><strong>3.143</strong></td>
<td><strong>2.868</strong></td>
</tr>
<tr>
<td></td>
<td>(1.070)</td>
<td>(0.973)</td>
</tr>
<tr>
<td>Literacy</td>
<td><strong>-83.00</strong>*</td>
<td><strong>-90.92</strong>*</td>
</tr>
<tr>
<td></td>
<td>(16.69)</td>
<td>(11.96)</td>
</tr>
<tr>
<td>Inequality Indicator</td>
<td>0.415</td>
<td>0.515</td>
</tr>
<tr>
<td></td>
<td>(1.105)</td>
<td>(1.016)</td>
</tr>
<tr>
<td>% Indigenous Population</td>
<td><strong>-73.29</strong>*</td>
<td><strong>-74.08</strong>*</td>
</tr>
<tr>
<td></td>
<td>(17.25)</td>
<td>(16.15)</td>
</tr>
<tr>
<td>% Catholics</td>
<td><strong>-19.39</strong></td>
<td><strong>-18.70</strong></td>
</tr>
<tr>
<td></td>
<td>(8.476)</td>
<td>(8.023)</td>
</tr>
<tr>
<td>Ethnic Fractionalization</td>
<td>3.746*</td>
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</tr>
<tr>
<td></td>
<td>(2.069)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>58.42***</td>
<td>61.78***</td>
</tr>
<tr>
<td></td>
<td>(14.58)</td>
<td>(11.95)</td>
</tr>
<tr>
<td>Observations</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>Number of groups</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
The indicator of the share of catholic population is significant at the 5% level, indicating that the presence of Catholics has a slight negative impact on crime rates. This could be due to the cultural impact the catholic religion had on society.

In model (2) I also include an ethnic fractionalization indicator. The “measure of ethnic diversity” is a transformation of the Herfindahl concentration index calculated with the following formula:

$$1 - \sum_{k=1}^{2} p_k^2$$

with $p_k$ being the share of group k in the total population (in this case indigenous and other). The interpretation of the index is quite intuitive, since it expresses the probability that two randomly drawn individuals belong to different ethnical groups (Bossert et al. 2005).

The variable is significant at the 10% level and has a positive sign, hence ethnic fractionalization does indeed have a significant impact on violent crime incidence, however it is not as important as other factors included in this analysis.

5.3.5. Main Findings

The main findings of the baseline model are robust to the inclusion of a variety of sets of control variables. The coefficients of government spending and literacy never change sign or significance in any of the regressions. Per capita GDP is significantly and positively related to crime rates in all the regressions.

Hence, the growing income level in Mexico throughout the 20th century was not the cause of the century-long reduction in violent crime. The consumption indicator (per capita sugar consumption) was not significant in any of the regressions, confirming the findings that poverty is rather not the causal factor behind high crime rates.

The only factor negatively and significantly associated with homicide rates is thus education, suggesting that education was the most important crime reducing factor in the 20th century in Mexico. Corruption combined with drug production and trafficking prevented crime rates from falling even more.
Even though inequality has been identified as linked to high crime rates, I cannot find this association in the Mexican data. Inequality seems to be unrelated to crime in Mexico. This makes sense, since Becker’s standard crime model does not take into account the possibility of protection against crime. Wealthy individuals living in an unequal society will spend high sums on private protection from crime that can range from a simple guard dog or bars on the windows to electric fences, alarms systems and armed private security companies that offer police services. This implies that in an unequal society, it is incredibly hard if not impossible for a person from the poorer part of society to steal from a wealthy individual. Consequently, “increasing inequality can actually lead to less crime if […] richer people spend a higher proportion of their income on protection (i.e. protection is a superior good)” as in the model developed by Heufer (2011). Most of the previous studies that found causality running from inequality to crime did not take into account the possibility of spurious regression, which might have resulted in significant results even though inequality does not affect crime.

6. Conclusions
This study examined the development of violent crime in Mexico during the 20th century and the causal factors behind this development.

First of all, the data examined confirms the common hypothesis that the recent increase in homicide rates since 2008 in Mexico is alarming, since it breaks with an almost century long trend of decreasing homicide rates. The recent outbreak of violence has been identified as a result of the “break of a gentlemen’s agreement” (Piccato 2012, p. 52) between the drug gangs and the government, in which criminal organizations were able to buy protection from the government.

In this study I have shown that the violent crime rates were indeed significantly related to the government activity throughout the 20th century. Assuming that an inflated public sector facilitates corruption, I was able to show that corruption has a robust and significant positive effect on homicide rates, even when controlling for a variety of confounding factors.

The second important result is that education was the single most effective factor reducing crime incidence. Literacy rates have a robust negative impact on homicide rates, indicating that education indeed increases the opportunity costs for potential criminals and they are more likely to choose legal alternatives. Surprisingly, GDP seems to have a positive impact on violent crime rates, indicating that higher overall wealth rather increases the probability of violent crime. This
is however not due to increasing inequality, since inequality has been found to be unrelated to violent crime.

In Mexico, the police force had almost no deterrent power whereas the judicial system seems to be more effective in deterring potential criminals. This might be explained by the fact that especially the police force is said to be penetrated by corrupt practices.

Demographic factors such as birth rate, urbanization rate or population growth are unrelated to crime, whereas the presence of indigenous population seems to reduce crime rates. Also crime rates tend to be higher when the area is more densely populated.

It remains to clarify that these results are probably of quite limited external validity, since Mexico seems to be a singular case due to the presence of powerful drug cartels.
7. References


Cook, Philip J.; Machin, Stephen; Marie, Olivier; Mastrobuoni, Giovanni (Hg.) (2013): Lessons from the economics of crime. What reduces offending? Cambridge, Massachusetts: The MIT Press (CESifo seminar series).

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Johnson, Eric A.; Salvatore, Ricardo Donato; Spierenburg, Petrus Cornelis (Hg.) (2013): Murder and violence in modern Latin America (The bulletin of Latin American research book series).


van Zanden, Jan Luiten; Baten, Joerg; d’Ercole, Marco Mira; Rijpma, Auke; Smith, Conal; Timmer, Marcel (Hg.) (2014): How was life? Global well-being since 1820. OECD Publishing.


8. Appendix

8.1. Sources

Most of the data has been obtained from the Archive of the Instituto Nacional de Estadística y Geografía in Mexico City. The information was found in statistical yearbooks that were available for the years from 1937 to 1988 (see Figure 7 for an example).

3.18 Defunciones por causas y entidades federativas. 1963–1965.—Continuación

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<th>Entidad y año</th>
<th>584,585</th>
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<th>760-776</th>
<th>760-785</th>
<th>800-902</th>
<th>960-903</th>
<th>964-965</th>
<th>980-999</th>
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<td>181</td>
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<td>88</td>
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<td>97</td>
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<td>Colima</td>
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<td></td>
<td></td>
<td></td>
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<td>113</td>
<td>110</td>
<td>217</td>
<td>1</td>
<td>61</td>
<td>284</td>
</tr>
</tbody>
</table>

The data on accused and sentenced for homicide for the years 1926 to 1929 were obtained from a data base provided by Pablo Piccato (Columbia University).
Since there is no official GDP data for Mexico available for before 1970, I used the estimated GDP series provided by Esquivel (1999).

The information on the cultivation of poppy seed in the different states was extracted from Mexico - Country Brief, U.S. Drug Enforcement Agency, DEA-01002, January 2001.

8.1. Unit Root Testing
Since the time dimension of the underlying data is substantially large, it is important to scrutinize the data structure in order to avoid spurious regression. In order to check for the presence of unit roots in the data, I follow the procedure proposed by Kappler (2006).

8.2. Single Cross-Section Tests
In a first step, I will use the traditional Augmented Dickey-Fuller test to test for the presence of unit roots in the single time-series. This will provide an overview of the possible diffusion of integrated time series in the sample. In the tests, I included an intercept, since it is plausible to assume that the homicide rates do not vary around zero.

Since the data is suspicious of a linear time trend upon visual inspection, tests including a trend have also been performed. The results are displayed in Table 1.
On the 5% significance level, in the case of the specification with only intercept, the H0 of a unit root can be rejected only in 10 cases; indicating that possibly two thirds of the series are
integrated of some order. When including a linear trend, this number is reduced to only six cases. Overall, these results point out that regarding the homicide series as non-stationary is favored.

The problem with the individual ADF-tests is that they lack power relative to the alternative that the series are persistent, but stationary processes. In a panel framework, the power of a unit-root-test can be increased by using panel tests.

8.3. Testing for Cross-Sectional Dependence

In order to check for cross-sectional dependence, a test suggested by Pesaran (2004) is applied. He uses the residuals of the individual ADF(li) regressions to compute the following test statistic:

<table>
<thead>
<tr>
<th>Residuals from ADF(li) regression with</th>
<th>intercept only</th>
<th>intercept and trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD statistic</td>
<td>40.04</td>
<td>41.50</td>
</tr>
<tr>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>average of the pairwise correlation coefficients</td>
<td>0.266</td>
<td>0.276</td>
</tr>
</tbody>
</table>

Pij are the pairwise correlation coefficients from the residuals. The results can be seen in Table 2. Good performance of this test in small samples, hence it is well suited for 32 cross sections and 47 time observations.

The hypothesis of cross-section independence can be rejected at the 1%-significance level in both cases, using the residuals from the ADF-regressions with intercept only and the residuals from the ADF-regressions including both intercept and trend. This implies the presence of error-dependence across the countries, even though the average residual correlation is quite low.

When testing for the presence of unit roots in the homicide series, it is important to take into account the cross-sectional dependence. Hence, second-generation unit root tests that allow for cross-sectional dependence have to be applied.
8.4. Panel unit root tests

In this section, two different panel unit root tests will be applied to check for the presence of unit roots in the homicide series.

8.4.1. Pesaran 2005

The Pesaran test assumes that the cross-sectional dependence is caused by one or more common unobserved factors. The error terms are modeled with a single common factor structure, and subsequently the common factor is approximated by the cross-section mean at each time period. The test then performs standard individual ADF-regressions that are augmented with current and lagged cross-section averages. The individual test results are then combined to a single test statistic in a Fisher-type fashion.

The results of the Pesaran test are represented in Table 3:

<table>
<thead>
<tr>
<th>CIPS-statistic</th>
<th>CADF with constant</th>
<th>CADF with trend and constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6.348</td>
<td>-4.790</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

In both specifications, the Null hypothesis of the presence of a unit root in all series can be rejected at the 1%-significance level. Thus I can conclude that a significant fraction of the series in the panel does not contain a unit root. The problem with this test is that it does not provide any “guidance as to the size of this fraction or the identity of the cross-section units that are stationary” (p. 2, Breitung & Pesaran 2005 (Bundesbank)). In order to eliminate the possibility of finding a spurious regression, I decided to reduce the number of time periods by using decade averages.
## 8.5. Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Observations</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Variance</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decade</td>
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<td>1955</td>
<td>1930</td>
<td>1980</td>
<td>293.1937</td>
<td>17.1229</td>
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<td>Homicide Rate</td>
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<td>1.950713</td>
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<td>690.0382</td>
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<td>3.605646</td>
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<td>Death Penalty</td>
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<td>Jurisdiction</td>
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<td>lagged birth rate</td>
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