Dynamics and causes of crime in Colombia

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Abstract

This paper adds to previous research on the causes of crime in Colombia by using a new dataset and better econometric estimations. The paper is a "meta" study on the past empirical research on crime. Based on microeconomic foundations, it tests several hypotheses on crime in Colombia. In concrete, the first finding is that drug crimes are highly correlated with other crimes. As some theories suggest, drug activities affect the judiciary system and as a by-product, are correlated with other crimes. Also, the dynamics of drug trade suggest the use of criminal activities to enforce their own operations (e.g. homicides to enforce the law of silence). Second, guerrilla activity is correlated with several types of crimes, including drug crimes, homicides, kidnappings and bank robberies; paramilitary activity is correlated with kidnappings and drug crimes.

The article explores in a systematic way the relationship between the penal code and crime. In order to do this, an important effort is done in quantifying the legal code. The paper finds that the legal codes respond to criminal activity, but that laws have an impact on only few crime rates, such as kidnappings and terrorist attacks.

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Fourth, the paper finds that the probability of capture is an important determinant in all crimes; that "poverty" only explains kidnappings and homicide in those municipalities in which crime is low; and finally, that the presence of the State is a deterrence of terrorist attacks.

1. Introduction

The complexity of conflict and crime in Colombia is enormous. A quick review of some facts helps one to grasp the dimension of the problem. In summary, the country has been in conflict for many years and there are several groups involved in it. The objectives of the main illegal groups (the guerrilla and the paramilitaries) are diverse. The crimes rates for some types of offences are abnormally high, and for others the rates are in line with those in similar countries. These three facts all complicate the relationship between crime and conflict.

The objective of this article is to test some common and widely accepted hypotheses on the relationship between crime and conflict in the nation. The paper has four focal points. First, the article explores some of the dynamics of the "conflict", which we define as the internal war between the guerrilla, the paramilitaries, and the military, with the civil population left in the crossfire.[2] Second, the article presents an analysis of the dynamic of certain crimes in the country. For instance, it explores the relationship between drug crimes and homicide. Third, the paper explores the relationship between conflict and crime. Indeed, as some of the empirical tests show, conflict is a chief determinant of certain crimes. Finally, the article analyzes the relationship between crime and the legal code. In order to do this, we constructed a "legal index" for each crime based on the national legislation on the crime during the last decade. Our contribution to the existing literature is threefold. First, we construct an improved dataset at the municipal level by

[2] Unfortunately this path of analysis leaves aside some of the important crimes in the country. For instance, "Family Violence" is one of the most committed crimes and, given the data at our disposal, we cannot investigate this phenomenon.

including variables not used in prior studies. Second, we estimate an equation of crime, founded on well-developed theory, using a better battery of techniques than used previously. Third, we methodically estimate several hypotheses on the causes of crime.

This work is centered on the recent period of the conflict (1990-2002). This choice of years limits the study in several ways, but it also has two main benefits. First, the rationality of the conflict is more or less homogenous during this period of time. Second, we believe that the quality of the data is better for this period of time than for prior years.

Besides this introduction, the paper has three parts. In the next section we give a short revision of the extensive literature on crime and conflict in Colombia. In general, these studies are grouped into two main categories. In one, led by historians and other social scientists, the historic view prevails, with complex, and rich descriptions of the facts and details of the conflict. In the second one, led by economists, there is an effort to measure and to test hypotheses. In this work we incorporate the two tendencies. In the description of the dynamics, we follow the historical approach, underlying the potential testable implications. In the general model, we apply rigorous economic methods. We try, however, to link both of these approaches as the rationality today is driven by the dynamics of yesterday. The third part presents the data, tests some hypotheses derived from the literature review, and estimates a general model on crime.

2. Dynamics

The literature on the dynamics of the conflict in Colombia is vast. We present some of the main ideas of an important study recently published by the UNDP, the "Informe Nacional de Desarrollo Humano 2003," (PNUD (2003)) which gives a global recount of the conflict in Colombia. Also, we base the discussion on works by Echandia (1997, 1999) and Rubio (2002).

Several authors claim that the increment of crime in the country has several links with the conflict (for instance, Sánchez, Díaz and Formisano (2003)).[3] In regions with high levels of conflict the majority of the law enforcement agents, both policemen and the army, are involved in deterring the conflict, and thus other crimes are less likely to be attended to. Moreover, the judiciary system is weak. Not only are there an important number of denounces relating to the internal war, but there also exists coercion by the illegal authors. In short, the conflict congests both the legal and enforcement systems. Finally, the guerrilla and paramilitaries are involved in drug production, which is an important source of income for the illegal groups. The presence of the drug business is correlated with several crimes (Gaviria, 2000).

Currently, the conflict in Colombia has five main authors: two important guerrilla groups, the FARC ("Fuerzas Armadas Revolucionarias de Colombia" of Revolutionary Army Force of Colombia) and the ELN ("Ejercito de Liberación Nacional" or National Army of Liberation) with different beginnings; the paramilitaries, who came into existence as a response of landlords and drug producers to the guerrilla activity; the government, especially the Military Forces; and the civil society who, for the most part, is in the middle of the conflict.

The FARC started as a peasant movement in favor of land reform. During the 70's, due to increasing inequality and lack of land reform, the movement started to grow, moving from the rural frontier to areas with large and unequal ownership of land. During the 80's, the movement expanded to the "Llanos Orientales", where it found a new financial source, the taxation of cocaine production. The FARC reached as well the Magdalena Medio, a region rich in cattle and gold mines that provided another two financial sources.

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[3] However, disagreement is common in the literature on the conflict in Colombia. For instance, two recent studies present completely opposite views of the relationship between guerrilla activity (conflict) with homicide rates. On one hand Levitt and Rubio (2002) state that "during the 90's the empirical evidence on the link between homicide and guerrilla activity is very weak," And on the other Sánchez, Díaz and Formisano (2003) find that "there exists a high correlation between conflict in Colombia and evolution of the homicide rate." (own translation)

The "Bloque Sur" of the group moved to the Tolima and Huila region, with the objective of creating a corridor for drug traffic. (See Map 1)

The escalation of the conflict between the guerrillas and the government, and the zonal concentration of this guerrilla were the main characteristic during the nineties. The escalation was the response to a frontal attack by the Army to the most important guerrilla camp in 1991. Since then, the motivation of the guerrilla movement has changed dramatically through time. In the beginning, the idea of redistribution was the main motor for the movement. In the following three decades, this objective changed dramatically. Currently the objective is mainly an economic one: secure sources of income by focalizing the action and gaining control of certain critical corridors through which the guerrilla can move fast and the drugs can be trafficked.

The dynamics of the ELN are quite different. First, it started as an ideological movement for the people in the lowest part of the income distribution. Second, it started in zones where petroleum and coal were an important source of income. During the 80's, this guerrilla promoted the *de facto* local government, supporting peasant councils, within certain and determined parts of the country. During the nineties, the ELN concentrated its action to specific departments, and retreated from regions where it had tried to enter, but was prevented from doing so by the paramilitaries.

The paramilitaries began in the mid eighties as a reaction to the guerrillas. On one hand, the movement is comprised of owners of large areas of land who were taxed and kidnapped by guerrilla. On the other, the movement includes drug producers. The paramilitaries have both property resources and resources from drug business. They have been fighting, with relative success, the ELN. The relationship between the FARC and the paramilitaries changes according to the region. In areas of drug production, there has been some symbiosis in which the paramilitary drug lords produce with the security provided by the guerrilla; in other areas there have been confrontations.

In conclusion, one can say that the main driving force in the conflict in the last decade has been drug traffic (discussed by Gaviria (2000)). The conflict is based on securing financial resources and controlling strategic geographical locations, and for this reason, the geography of the conflict has change dramatically in the last decades (discussed by Echandía (1997) and Sanchez, Díaz and Formisano (2003), among others).

Gaviria (2000) tackles the problem of the relationship between drugs and crime. Since the beginning of the eighties, the homicide rate in Colombia has increased significantly, despite the fact that there have not been any significant changes in the "main" variables that explain crime. Gaviria forms the hypothesis that the chief factor that has caused the change in the crime equilibrium is the boom of drug activity in the country. He bases his hypothesis on two ideas. First, that crime, as a variable, has two equilibriums: one in which crime rates are low, the other in which crime rates are high. This last equilibrium emerges in a situation in which the rule of law is highly eroded, and different types of crimes live together reinforcing one and other, creating a high congestion in the judiciary system. The second idea of Gaviria places drug traffic as the detonator that has changed the state of the world from the low crime rate equilibrium to the high one. Gaviria presents indirect evidence that is in line with his hypothesis.

With respect to the geography of the conflict, Echandia (1997) maps the geographic change in the conflict and the implicit correlation with crime. In essence, the zones that have been affected by the conflict are strategic zones such as corridors of easy movement of troops and drugs. Also, they are zones prone to the absence of the government. According to his maps, violence is extremely high in those zones with high presence of guerrilla and paramilitaries and lack of legal forces. Velez (2003) ratifies the results using statistical data. She finds that the FARC and ELN have expanded lately towards bigger municipalities, municipalities with difficult access, and richer municipalities.

During the 90's several economists in Colombia undertook an ample agenda of estimating some hypotheses on the relationship among crime, violence and the so call "objective causes" of violence, mainly poverty and inequality. The agenda began when

more data became available. In one of the earliest studies, Montenegro and Posada (1994) regress homicide and robbery rates at the departmental level against the log of GDP per-capita, the change in the index of basic necessities, the increment of education covertures, infant mortality, the change in the urbanization index, GDP growth, and the ratio of people accused and the number of crimes committed. Their conclusions are diverse: first, poverty is not correlated with violence; second, growth is positively related with violence; and more importantly, a weak judiciary system is a determinant of crime.

In a more complete study carried out early on, Levitt and Rubio (2002) explore five hypotheses of crime in Colombia. These five hypotheses are as follows. First, drugs are one of the main determinants of crime. Second, weak judiciary system is positively correlated with crime. Third, guerrilla activity is positively correlated with crime. Fourth, poverty and income inequality are positively correlated with crime. Fifth, there is a higher propensity for violence among Colombians than for other nationalities. Among these five, Levitt and Rubio find, through indirect evidence that the first two are important in explaining crime, the third one is unclear, and the last two are without support. Again poverty does not seem to matter but the strength of the legal system and the presence of drugs do matter in determining crime rates.

The relationship between the judiciary system and crime and the unimportance of poverty is further reinforced by the findings of Sánchez and Núñez (2001). They regress homicide rates against the Gini coefficient of income inequality, presence of guerrilla, a proxy for drug traffic, and political participation, among others. Using a decomposition technique in which the differences among municipal homicide quintals is explained, they find that guerrilla presence, drug traffic and judiciary weakness are the main explanations of crime. They find as well that inequality and poverty explain a minimal part of the difference in homicide rates.

Other studies, however, have found support of poverty causing crime. Sarmiento (1999), using municipal level data, finds that the Gini coefficient of income distribution is one of the most important factors in explaining homicides. Inequality, according to the author, explains an important part of violence. This paper gives one of the most important empirical supports to the theory of "objective causes" of violence, mainly poverty and

inequality (see below for a description of objective causes). Similarly, Bourguignon, Núñez and Sanchez (2003) also find a relationship between violence and inequality. More precisely, they link violence with a specific part of the income distribution, mainly, the population below 80% of the mean income.

Sanchéz, Díaz and Formisano (2003) present the most serious econometric effort to date to analyze violence in the country. They take four types of crimes (homicide, kidnappings, robbery and piracy) and regress each one against a large array of variables using a spatial technique. Again, the general conclusions are quite similar to those of Sánchez and Núñez (2001). However, they also find that the spatial component and persistence of crime are also important determinants of crime. In particular, they find that contiguous municipalities and time persistence induces an increased dynamic in crime (for each homicide, four more are created in nearby municipalities), as well as a generalized contagious effect of violence.[4]

Some empirical research has also been carried out to determine the locational choices of the guerilla. Rubio (2002) tries to explain guerrilla presence by regressing indicators of their presence in municipalities against several variables. He finds that presence of guerrilla is prone in municipalities with energy production (oil, etc), with a young population, and with a more unequal distribution of income. He does not find a statistically significant relationship between poverty and guerrilla presence. Also, against

[4] This study poses several unanswered questions. The geographical component of the study is the contagion of crime from neighboring municipalities. The authors find that for each crime in a municipality, four other crimes occur in the neighboring municipalities. However, given the literature on the dynamics of the conflict, the spatial component observed in the conflict is quite different. The corridors, where an important amount of the conflict occurs, are well-delimited zones that leave outside parts of the country. The evidence is very clear: there is an enormous amount of dispersion in violence rates across municipalities. We expect that municipalities within a corridor (or close to a corridor) will be affected by violence. In the building of the corridor the violent agent will go from one municipality to the next one within the corridor, and during that transit, the illegal group may encounter other authors, and as result cause more crime and violence.

all conventional and empirical knowledge, he does not find a relationship between guerrilla and the production of drugs.

From the literature review, we can gather four general, facts that are also the hypotheses tested in this paper. First, *the evidence on the relationship between conflict and crime is not clear.* The majority of studies do not find a relationship between poverty and violence; however, a few of them find a relationship between inequality and crime. However, probably with good data of the sixties and seventies, it would be possible to find a relationship between poverty and violence given that the guerilla groups arose as a response to fight poverty and inequality. Currently, the guerrilla and paramilitary activity in the territory is based on another rationality: they are close to financial sources, in areas without the presence of State, and in strategic corridors that may not correspond to areas with higher indices of poverty.

Second, *crime occurs in zones where the presence of the State is weak.* Fedesarrollo constructed a set of variables that allows for the direct testing of this hypothesis. Concretely, we measure the amount of municipal investment, which is a direct way to capture governmental investment.

Third, *crime is higher in richer zones*: a higher return of illicit activities will lead to higher crime rate. As argue by Bourguignon *et al.* (2003), the return of illegal activities can be modeled as an increasing function of municipal income where the crime is committed. We use several different measures of income in order to test this effect.

Finally, *crime is a decreasing function of the probability of capture.* Apparently, this is one of the most stable regularities in the empirical literature of crime in Colombia. In our analysis we test whether or not with our expanded dataset we reach the same conclusions.

3. Data, estimation and results

a. Data and four hypothesis

We use two sources of data on crime rates. First, information by the Departamento Nacional de Planeación (DNP) gives the number of homicides, massacres, total number of victims of massacres, bank robbery, kidnappings, and terrorist attacks per municipality. The data are broken down into the affiliation of the perpetrator (FARC, ELN, Paramilitary, other). Second, data from the Judiciary Police (SIJIN) reports the number of extortions, robberies, car robberies, house robberies, terrorist attacks, jail escapes, robberies of state property, and drug traffic at the departmental level.

Table 1 presents the basic crime data. We divide the presentation across three periods: between 1990 and 1993; between 1994 and 1997; and between 1998 and 2002.[5] At the municipal level, homicides, massacres, and kidnapping are per 100,000 inhabitants. There is no clear and consistent temporal tendency. Whereas homicides and bank robberies are declining through time, massacres, kidnapping and terrorist attacks are increasing. In order to see the dispersion of crimes across municipalities, we calculate the coefficient of variance (from now on, c.v.), which is the standard error divided by the mean. Usually, if the c.v. is increasing, the population is becoming more heterogeneous, e.g. there is more dispersion of crimes across municipalities. Dispersion is decreasing for all crimes, except for massacres, at the municipal level.

[5] This chose of periods is driven by the political timing (presidential periods), but it is somehow arbitrary.

Table 1. Crimes

	1990-2002		1990-1993		1994-1997		1998-2002	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV
Municipal								
Homicide	64.33	1.69	72.49	1.76	61.64	1.82	59.95	1.53
Massacre	30.49	1.37	NA	NA	23.78	1.00	34.52	1.59
Kidnapping	8.84	2.68	NA	NA	5.48	2.65	10.86	2.69
Bank robbery	0.54	16.10	0.75	21.62	0.66	19.70	0.41	12.11
City attacks	1.15	4.89	0.63	6.82	1.11	4.83	1.29	4.55
Departmental								
Terrorist	3.87	1.56	2.11	1.38	3.98	1.24	5.52	2.07
Extortion	1.85	0.98	1.87	1.05	1.63	0.94	2.06	0.96
Robbery	51.77	1.36	96.89	1.07	39.82	1.33	25.23	1.63
Stolen cars	35.51	1.10	11.72	1.62	39.54	0.94	51.33	0.80
Robbery of residency	26.17	1.42	19.59	1.50	26.17	1.65	31.44	1.15
Drug crimes	444.88	1.76	313.07	1.51	414.95	1.60	574.26	2.08
Nation. econ. patrimony	3138.82	2.17	3038.50	1.95	3237.95	2.58	3139.76	2.02

With respect to the departmental data, all the crimes, except for robberies, are increasing through time and in general the c.v. is decreasing. It is important to point out that these tendencies can be the effect of more denounces or that the authorities are becoming more effective. Clearly, these types of crime measurement are prone to measurement errors.

In conclusion, there is not a clear tendency in crime rates or levels for the period of analysis. In contrast, the country tends to be more homogeneous in the level of crime. This convergence can be towards a lower level or a higher one.

Using these data we now analyze the four main hypotheses we derived from the existing literature

1. *There is a correlation between drug of crimes and other type of crimes.*

The most simple and direct way to test this hypothesis is to analyze the correlations between different crimes. Table 2 shows the pairwise correlations between drug crimes and others crimes, as well as between homicides and other crimes. Drug crimes are statistically significantly correlated with all crimes except with car robberies. All crimes, with the exception of terrorist attacks, have a positive relationship with drug crimes. The degree of correlation has changed through time. All correlations are higher during the

first half of the period under investigation (1990-1995) than in the second period.[6] Furthermore, the correlation with homicides also in decreased in its statistical significance. A potential explanation for these declines in the correlation between drug crimes and other crimes is that the major drug dealers (the heads of Medellin and Cali cartels) were free and in operating during the first half of the nineties. In contrast, during the second half of the decade the cartel of Medellin was dismantled and the main figures of the Cali cartel were in jail. Nonetheless, drug crime is still correlated with other types of crimes.

Table 2
Relationship between crimes:
Pairwise correlation

	Entire period		First half		Second half	
	Drug crimes	Homicide	Drug crime	Homicide	Drug crimes	Homicide
Drug crimes	1		1		1	
Homocide	0.1413*	1	0.3321*	1	0,0699	1
Terrorist atack	-0.1000*	0.2174*	-0,0994	0.2364*	-0.1173*	0.2442*
Extortion	0.1537*	0.3391*	0.2440*	0.4457*	0.1328*	0.2489*
Robbery	0,0032	0.1574*	0,0186	0.2318*	0,0656	0,0628
Car robbery	0.5587*	0.3507*	0.6978*	0.4158*	0.5407*	0.3828*
Residential rob.	0.2104*	-0.0854*	0.3139*	0,0471	0.1690*	-0.2002*

*Coeficient significant at 10 percent

2. *Guerrilla activity causes paramilitary activity.*

A direct way to test causality between guerrilla activity and paramilitary activity is to use the Granger test of causality. In simple terms, the test explores if the past observations of a variable are important in explaining the variable that it is thought to have a causal relationship with. In order to perform the test, the variable of attacks by one violent group

[6] Once more, the chose of periods is arbitrary. We opt to separate in this case the data between two periods and in this way, make the presentation easier.

is regressed against its own past values of attacks and the present and past values of the attacks of the other group. For example, if the past variables of paramilitaries are statistically significant in explaining the attacks by the FARC, then we can say that attacks by paramilitaries Granger causes attacks by the FARC.

Table 3 presents the results of the Granger causality tests. The first column shows the regression of attacks by paramilitaries against its own past attacks and the attacks by the FARC (and the past attacks by FARC). Lags 2 and 3 of FARC attacks are significant in explaining attacks by paramilitaries. Lag 1 of attacks by paramilitaries is significant in explaining present attacks. Running the Granger test, which is an F test, gives the value $F(4,11173)=7.44$, which supports FARC attacks causing paramilitary attacks.

The second column presents the other causality: attacks by paramilitaries causing FARC attacks. One interesting fact of the regression is the degree of persistence of FARC attacks, given by the positive and statistically significant coefficients of past attacks. The past paramilitary attacks are also statistically significant in explaining FARC attacks. As a consequence, the hypothesis of this causality is supported as well ($F(4,1173)=14.395$).

The third column shows the results for causality between paramilitaries and the ELN. In this case, none of the past attacks of ELN are statistically significant in explaining the attacks of paramilitaries. The Granger test gives a value of 0.4, which indicates that the hypothesis of causality is rejected.

The last column presents the result of causality from paramilitaries to ELN. In this case as well, the persistence of ELN activity is clear (lag attacks are statistically significant). Past attacks of the paramilitaries, however, do not explain ELN activities ($F(4,11173)=0.86107$).

In sum, there is evidence of a mutual causality between attacks of paramilitaries and the FARC. Contrary to previous research, we find that attacks of ELN and paramilitaries are

not connected, and there is no evidence of Granger causality.

Table 3. Causality among illicit groups

	Depend. var: attack of			
Indep. var: attack of	Paramilitaries	Farc	Paramilitaries	Eln
Paramilitaries		-0,0441		0,1074
Paramilitaries(-1)	0,0780 *	1,2353 *	0,0797 *	0,1432
Paramilitaries(-2)	-0,0088	-0,2970 ***	-0,0077	-0,3765
Paramilitaries(-3)	-0,0049	0,2094	-0,0027	-0,1843
Farc	-0,0002			
Farc(-1)	0,0004	0,3890 *		
Farc(-2)	0,0010 ***	0,2812 *		
Farc(-3)	0,0031 *	0,0047		
Eln			0,0002	
Eln(-1)			-0,0001	0,4712
Eln(-2)			0,0004	0,0832
Eln(-3)			0,0000	0,1681
R2 adjusted	0,008	0,197	0,005	0,377
F stat	13,840	392,970	9,820	965,540

* Sign. at 99%
** Sign. at 85%

3. *Conflict (guerrilla and paramilitary activity) is correlated with other crimes (e.g. total homicides and drug traffic)*

As stated in the introduction, one underlying hypothesis is that the armed conflict is correlated with some types of crime. For the purposes of this analysis we model conflict as the number of municipal attacks by the three main illegal players: paramilitaries, FARC and ELN.

Table 4 presents the pairwise correlations between attacks by each armed group and different types of crime. For the entire period, the attacks by FARC and ELN are positively correlated, and statistically significant, with drug crimes, homicides, kidnappings, and bank robberies. The attacks by paramilitaries are correlated with drug

crimes and kidnappings. The Table indicates that the correlation is not stable through time. The correlation between FARC attacks and homicides and kidnappings is increasing in time.

Table 4
Pairwise correlation: conflict and crimes

Period:	Entire period			First half			Second half		
Attacks of:	FARC	ELN	Paramil.	FARC	ELN	Paramil.	FARC	ELN	Paramil.
Crimes:									
Drug	0.0996*	0.0558*	0.0447*	0.0955*	0.0363*	Low d.f.	0.0816*	0.0527*	0.0432*
Homicide	0.0632*	0.0336*	0,0046	0.0244*	0,0059	Low d.f.	0.1011*	0.0578*	0,0095
Massacres	-0,0679	-0,0719	0,0101	-0,1682	-0,3193	Low d.f.	-0,0659	-0,0714	0,0073
Kidnapping	0.1051*	0.1180*	0.0521*	0.0520*	0.0782*	Low d.f.	0.1035*	0.1189*	0.0509*
Bank rob.	0.2817*	0.2030*	0,0115	0.5624*	0.3199*	Low d.f.	0.2093*	0.1531*	0.0192

*** Correlation significant at a 95% confidence**
Low d.f: low level of observations

One interesting fact that appears from these correlations is the negative relationship between guerrilla attack and massacres. The relationship between paramilitaries and massacres is positive, but statistically not significant. In sum, there is a clear correlation between conflict and most measures of crime in the country. It is important to keep in mind that the sources of variation of these data are both spatial and temporal. Municipalities with higher attacks by guerrilla are the ones that observe more crimes; years with more attacks also present higher crime rates. Still, with the simple correlations the question of what causes crime is not solved.

4. *Increment in punishment by penal laws did not reduced crime.*

As the literature review shows, there is an apparent consensus that one of the major determinants of crime in the country is the strength of the legal system. To test hypothesis 4, we test for Granger Causality between the degree of punishment and the various types

of crime.[7] In this case we run a regression of each crime against its past values and against the present and past values of the punishment index that captures the severity of punishment for that particular crime. We test if the present and past values of the index explain the current levels of the crime. In theory, if the penal law works in reducing crime then as the index increases the level of crime should decreases since higher index values indicate more severe punishment..[8] Graphs 1 through 5 show the indices for several crimes.[9]

Each index is comprised of an array of the characteristics of punishment of the particular crime. The index includes such attributes as the length of maximum sentence, the amount of fines, and impact of aggravation or attenuation circumstances. It is based on the several Penal Codes of the country enacted during the period 1990-2002. Several intrinsic properties of the index need to be clarified. First, the punishment is higher if the value of the index is higher. Second, the absolute level of the index is not relevant. The relevant aspects are the degree and direction of change of the index through time. Third, the relative position of the index of a particular crime in comparison with other crimes is important.

Graph 1 presents the indices for robbery and appropriation of public assets. In general terms, there was a firming up of the code for all property crimes during the nineties (with the exception of simple robbery). It is interesting to observe that appropriation of public assets receives a harder punishment than any robbery, including aggravated robbery. Finally, there are two major reforms for the punishment of these crimes during the nineties: one in 1995 and the other in 2000.

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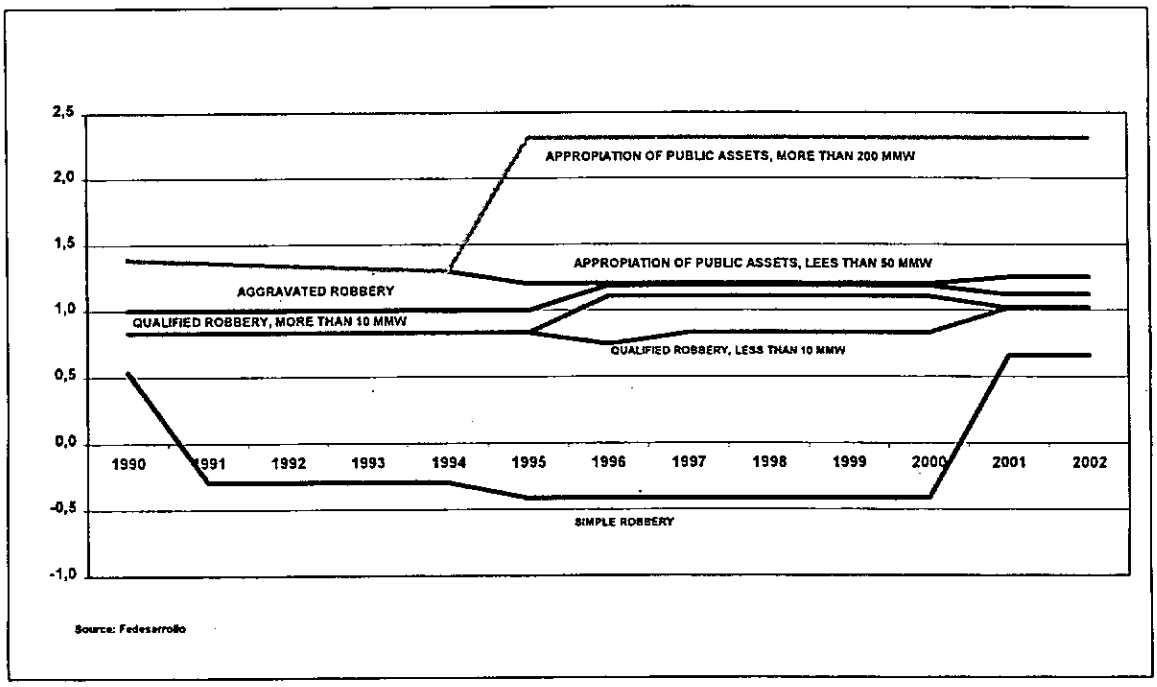
[7] Echeverry and Partow (1998) regress a measure of probability of capture against crime. They find that the juridical system is quite ineffective: as the degree of the crime increases, the probability of conviction does not

[8] Clearly, this method is not complete because crimes depend of other variables as well. We will estimate complete models part be of this section.

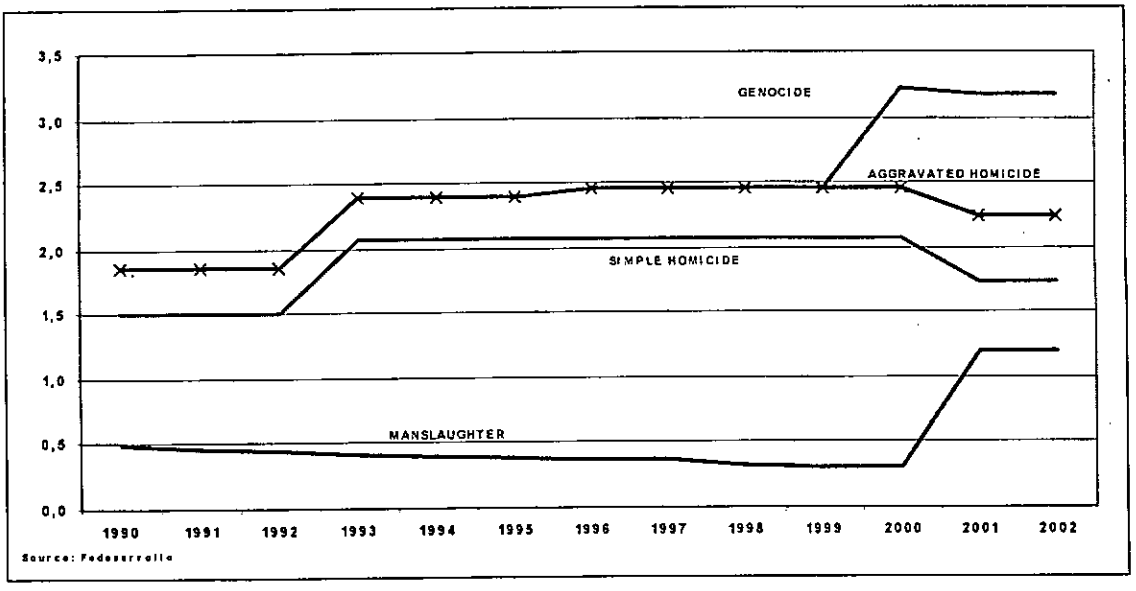
[9] The construction of the index is presented in Barrera and Latorre (2003),and is based on Gonzalez (2003):

Graph 1. Crimes Against Property



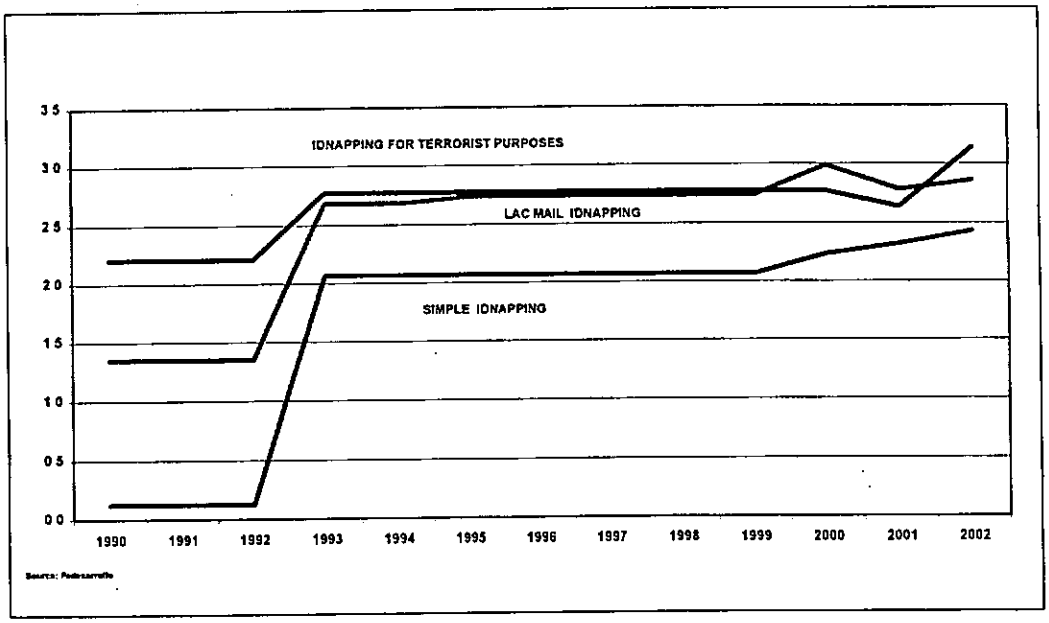
As Graph 2 shows, there is a tendency towards the greater punishment for homicide and genocide. The decline in the punishment for manslaughter is caused by a fine set in current pesos, a value that declines with inflation. There were two main reforms one in 1993 and the other in 2000.

Graph 2. Crimes Against Life and Personal Integrity



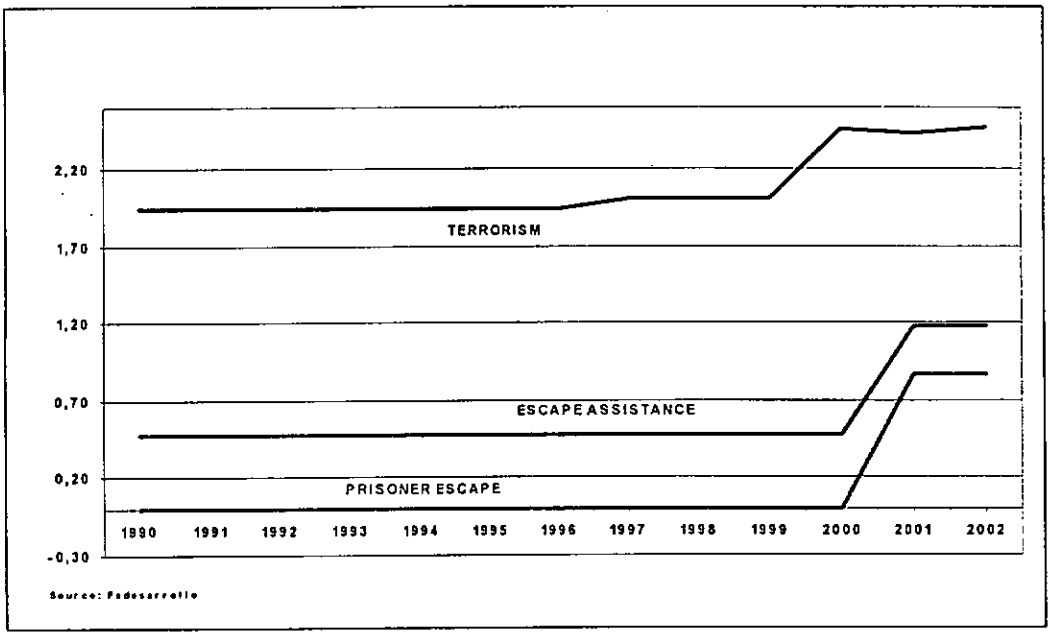
The punishment for kidnapping has gone through two major changes, both of them towards the toughening of the punishment (Graph 3). First, in 1993 the degree of punishment almost doubles with respect to the original level; second, since the 2000 the potential punishment has been increasing slightly. The tendency is the same for the three types of kidnapping – for terrorism, for blackmail or just simple kidnap.

Gra 3 Cr es A a s Perso al Freedo



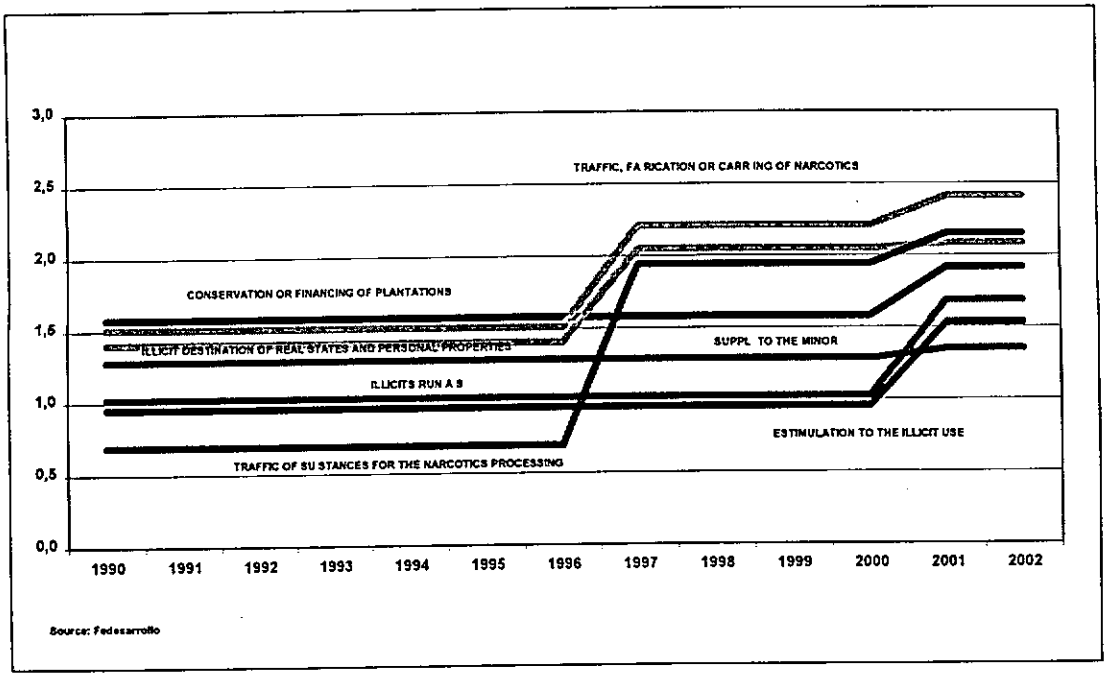
In terms of terrorism and prison escape (Graph 4), the penal code did not change until 2001, with Law 599 when crimes against public security were toughened.

Gra 4 Cr es A a s Pu l c Secur a d Pr so Esca e



Finally, punishments for drug related crimes were stable until 1997 (Graph 5). In that year the punishment increases especially crimes related with the inputs of the drug manufacturing processes. Finally, the potential punishment for all of the drug related crimes increased in 2001 with Law 599.

Graph 5. Drug Related Crimes



In order to analyze the causality we run the Granger Causality tests. Table 5a presents the regression results from these analyses. A common characteristic that emerges from the table is the persistence of crime across time. For all crimes, the coefficients on its own past values are positive and statistically significant. The only exception is homicides in which the second lag is negative

A second common characteristic is that the current value of the legal index does not affect any crime rate. Apparently for homicides, as well as for robberies, the legal code is totally ineffective, from a purely statistical viewpoint. Kidnappings are affected negatively by the past values of the legal code such that the higher the punishment was in the previous periods, the lower the kidnapping rate in the current period. The results for drugs crimes are difficult to interpret: while the first lag of the index is positive (the higher the punishment in the previous year the higher the amount of crime), the second lag is negative. Given the size of the coefficients, the effects cancel each other out and

thus effectively the degree of punishment does not impact drug crimes. Finally, for attacks (by guerrilla and paramilitaries), the past values of the legal code have some effect.

Ta le 5a Re ress o o Cr es a a s Le al Codes

I de e de ar a les:	Ho c de	d a	De e de ar a le Dru s cr es	Ro er	A ac s
O La 1	1,08 *	0,74 *	0,25 *	0,47 *	0,32 *
O La 2	-0,13 *	0,24 *	0,77 *	0,16 *	0,51 *
I de Le al Code	6,25	28,65	-59,71	21,02	2,66
I de Le al Code La	-76,61	-130,86 *	413,40 *	-38,72	-1,53
I de Le al Code La	91,58	-89,81 *	-405,59 *	-15,51	-12,77 *
Co s a	-3,20	543,51 *	95,34	47,27	23,74 *
R2 ad us ed	0,98	0,82	0,78	0,48	0,52
F s a s c	3332	184	254	65	77

* Statistically significant at 95%

We also test for Granger causality between crimes and legal indices. Table 5b shows the results. With respect to terrorism, we find double causality (crime "changes" the legal code, the legal code affects crime). With respect to robbery, only causality from crime to the severity of law is established. The law affects drug crimes; apparently drug crimes do not affect the severity of the law. For kidnappings, we find double causality as well, but clearly the probability of causality of the crime towards the law is stronger in a statistical sense. Finally, for homicides, only causality from the crime to the law can be established.[10]

[10] However, as it is show below, once we control for other covariates, the law reduces homicide.

Ta le 5 Gra er Causal e ee La a d Cr e		
Terror s		F stast
	La c a es cr e	12,49857 *
	Cr e c a es la	8,319349 *
Ro er		F stast
	La c a es cr e	0,667247
	Cr e c a es la	8,208441 *
Dru cr e		F stast
	La c a es cr e	3,043543 *
	Cr e c a es la	0,511039
d a		F stast
	La c a es cr e	6,485487 *
	Cr e c a es la	1226,606 *
Ho c de		F stast
	La c a es cr e	0,714841
	Cr e c a es la	2,586912 *
*: Sign (95%)		

In conclusion, for three types of crimes (terrorist attacks, kidnappings and drug crimes), the law has induced changes in the behavior of criminals. For robbery and homicide, the law is ineffective in reducing the number of these types of crimes from a purely statistical viewpoint.

A micro explanation of the behavior has two components. Robbery and homicide are "old" crimes, whereas terrorist attacks, kidnappings and (to some extent) drug crimes are "new". New crimes induced the use of new strategies and resources from the authorities. For instance, with the large increment in kidnappings during the nineties, the Fiscalia Nacional de la República (the Office of the General Attorney) created a special unit for the fight against this type of crime. In fact, the efficiency of the code against kidnappings

can be the combination of new units and strong legislation.[11]

b. Model estimation

Becker (1968) led the path for the economic study of violence. In essence, the importance and innovation of Becker's model lies in a new way to think about crime: crime is a rational activity, in which individuals weight the costs and the benefits of being a criminal.

Some of the most relevant conclusions of Becker's model can be synthesized in one simple equation (Becker (1968), Ehrlich (1996) and Freeman (1999)). Let $c_{i,j}$ be an indicator (0 or 1) that a person i commits crime type j; let w_i be the wage that person i can receive in a legal activity; let $h_{i,j}$ be the (monetary) return that person i will get for crime j if the crime is successful; let p_j be the punishment (measure in monetary terms) for crime j; let $(1-\rho)$ be the probability of capture if the person i commits a crime (and ρ the probability of no capture); finally, let $u_i(.)$ be the utility level of person i. The condition for person i to commit the crime j is as follows:

$$c_{i,j} = 1 \quad \text{if} \quad u_i(w_i) < \rho(u_i(h_{i,j})) + (1-\rho)(u_i(p_j)) \qquad (1)$$

In words, a person will commit crime j if the expected payoff is larger than the payoff from legal activity.[12]

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[11] I am indebted to Rómulo Gonzales, ex-minister of Justice and expert on the topic for this comment.

[12] The form of the utility function captures different degrees of risk aversion. For individuals with higher risk aversion, Equation (1) is less likely to be true. Also, the utility function can capture other characteristics, like the "moral standards" of the individual.

If the payoff of illicit activities increases, the individual probability of committing a crime increases as well. Also, if the penalty or the probability of getting arrested increases, the individual probability of committing a crime decreases. Finally, if the payoff of legal activities (the opportunity cost) increases, the individual probability of committing a crime decreases.

This simple equation can have several correspondences with the problem of crime in Colombia. In the first place, the absence of the government in several places of the territory can be captured by the parameter ρ. One implication of the model is that crime is increasing with the probability of non-capture ($\partial c_j / \partial \rho_j > 0$). Another parameter related with this issue is the relationship between the degree of punishment (p_j) and crime: in theory, crime decreases as the punishment increase $\partial c_j / \partial p_j < 0$.

As argued in the previous section, the dynamics of the conflict have been changing in the last decade. Now, there is a clear incentive for the illegal groups to go were there are the sources of financing of their activities This can be capture by the parameter $\bar{h}_j$. Drugs enters the equation not only through $\bar{h}_j$, but also via the effect their effect on ρ.

In the model, the relationship between poverty and crime is capture by the variable $\bar{w}$. If the returns from legal activities are low, then the crime rate can be expected to be high. Wealth measures the cumulative returns from legal activities, and therefore, the higher the poverty the higher the crime rate. The relationship between inequality and crime can be argued along the same lines. Inequality is a relative measure of the degree of poverty. Therefore, violence increases with inequality.

To get the aggregate supply function of crime from Equation (1) is quite difficult, as is the aggregation of any market. The total amount of crime j, $C_j = \sum_i c_{i,j}$, will depend on

the characteristics of the individuals and on characteristics of the society. In short,

$$C_j = f(\rho, h_{1,j}, \ldots h_{n,j}, p_j, w_1, \ldots w_n; \Omega) \qquad (2)$$

where n is the total number of individuals. The variable Ω represents a series of other factor affecting crime, e.g. other institutional factors like the "moral" values of society; interactions between crime j and crime k; or risk aversion (which will be discussed in greater detail later).

Under some assumptions, the amount of crime depends on an average return of illicit activities ($\bar{h}_j$) and some representative price for legal activities ($\bar{w}$):

$$C_j = f(\rho, \bar{h}_j, p_j, \bar{w}; \Omega) \qquad (2a)$$

Empirically Equation (2a) can be estimated as:

$$C_j = \beta_0 + \beta_1 \rho + \beta_2 \bar{h}_j + \beta_3 p_j + \beta_4 \bar{w} + \beta_5 \Omega + \varepsilon \qquad (3)$$

The strategy is, therefore, to estimate a specification of Equation (3). However, there are important problems in this estimation that are worth spelling out. These issues can be split in two: first, causality problems and, second, measurement errors.

The potential of double causality in Equation (3) is enormous. Consider the following example. Typically, empirical estimations take the income of the geographic region as the proxy for potential returns from crime. The theory predicts that a higher income implies a higher "potential" return from crime and therefore, more crime (e.g. a positive relationship). More crime can produce, however, lower income for several reasons: crime may lead to lower investment; crime may imply the destruction of capital; etc. Therefore, the sign of the relationship between crime and income, as a proxy of potential return from

crime, can be positive or negative.

In more formal terms, $E(\varepsilon / \rho, \bar{h}_j, p_j, \bar{w}, \Omega) \neq 0$, and therefore, estimates of $\beta_0 ... \beta_5$ will be inconsistent. This problem permeates almost all the variables in the estimation. The probability of detention, $(1-\rho)$, can be endogenous to crime: if crime increases, the authority can respond with more policemen in the street. Therefore, the causality can be both ways. Same reasoning applies to the severity of the punishment, p_j. As discussed above, a higher payoff of crime ($\bar{h}_j$) can induce more crime (as the model predicts), but more crime may induce the destruction of capital or lower investment and therefore, lower the potential payoff.

Measurement errors are also important in the empirical research of crime. If a variable is measured with error, and the error is correlated with the dependent variable, then again the estimates of the parameters of Equation (3) will be biased. If the error is not correlated with any intrinsic characteristic, estimator of Equation (3) is consistent.

With respect to this problem the literature has identified measurement errors in the dependent and in the independent variables. Apparently homicides are measure with accuracy, but other types of crimes have more problems. For instance, it is possible that information from police sources may try to inflate certain types of crimes (robbery) in order to obtain more resources. In this case, and if one of the proxies of probability of detention in Equation (3) is the size of the police force, the estimate of β_1 will be inconsistent. With respect to measurement error in the independent variables, if the error is correlated with the dependent variable the estimates will be inconsistent.

The solution for both types of problems is instrumental variables. However, finding proper instrumental variables is quite difficult. Part of the contribution of this research is to use instrumental variables techniques to get consistent estimators of Equation (3). In simple terms, a good instrumental variable is one correlated with the independent variable

that is problematic, but nor related with the dependent one. For this paper, we used several instruments, each of them discussed at length when used.

We argue that Equation (3) is relevant in explaining some of the important implications from the literature of violence in the country. As described above, the drug business as a financing source determines nowadays to a large extent the dynamics of crime. As an example we can look at the stylized facts of Medellín, from where Pablo Escobar ran his drug business.

The "sicarios," or hit men, were usually young, poor people who were part of the army of the Medellín Cartel. They killed, for money, people who were a threat for the cartel (policemen, lawyers, judges, and politicians). Usually the span of life of the typical "sicario" was very low because he / she also resulted killed in order to ensure the silence code. Does this pattern fit a model *a la* Becker? We believe that it does. First, the opportunity cost of crime, both in terms of the probability of capture and the returns from legal activities, was very small for a "sicario." Second, the return from crime was upfront, and usually high, in relative terms. Still, one may wonder what impact had the short lifespan of those involved in the business in the individual's decision process. The implications probably was minimal given that the span of life in the "Comunas" (the poorest neighborhoods of Medellín and the origin of the majority of the "sicarios") was quite low. Third, the crime that induced this behavior definitely followed *a la* Becker model rationality: drugs are a well-defined example of a crime in which the criminal balances expected returns and costs.

Does the model apply to the other crimes studied in this paper? Again, our answer is a yes. One clear example is the robbery of sport utility vehicles. During the previous presidency (1998-2002), the guerrillas were given a safe haven in the jungle region of the country where drug production is rampant. The rationality for giving control of the zone to the guerrilla was to advance peace talks. During the time that the guerrilla were in control of the zone, they started to pay large amounts of money for each sport utility vehicles (SUVs) capable of managing in the jungle. Gangs of thieves started to appear

in main cities, and the robbery of cars, especially of SUVs, increased. Once the peace talks failed and the government took control of the area again the robbery of cars dropped significantly. This is an example of how thieves seized an opportunity when the payoff of the particular crime was high.

Table 6 presents basic data on the independent variables of Equation (3). With respect to the proxies of illicit income, we look at four variables: income per capita in the municipality, expenditure per capita of the municipality, transfers per capita to the municipality, and the per capita tax collected on property, industry and commerce. In essence, the assumption is that the revenues of illicit activities are increasing in these variables, as argued by Bourgnioun et al. (2003).

Table 6 Independent variables

	1990-2002		1990-1993		1994-1997		1998-2002	
	Mea	CV	Mea	CV	Mea	CV	Mea	CV
Expenditure p.c.*	143,06	1,65	40,96	1,98	106,13	1,71	226,32	1,45
Income p.c.*	142,22	1,73	41,52	2,16	101,10	1,86	230,61	1,41
Transfers p.c.*	111,31	1,60	32,78	2,04	79,51	1,70	179,89	1,31
Prop.tax p.c.*	8,15	0,82	2,82	0,91	6,42	0,80	12,24	0,83
Indust.tax p.c.*	4,32	0,34	1,50	0,32	3,16	0,35	6,82	0,33
NBI	47,96	2,09	49,49	2,17	49,21	2,17	45,74	1,95
Criminals apprenhended**	188,03	1,70	144,19	1,54	161,18	1,85	244,59	1,70

*Thousand of $
**Per 100.000 inha.

The Index of Unsatisfied Basic Necessities (NBI) captures poverty, and it is a proxy for licit income. As the index increases, there are fewer opportunities for licit activities and therefore, we expect to observe a higher crime rate.

The probability of capture is measured by the number of criminals apprehended (per 100.000 inhabitants). As Table 2 shows, the number is increasing through time.

We run Equation (3) at the municipal level for three different types of crimes, homicides, kidnappings and terrorist attacks.

Homicide

Table 7 shows the regression results for the homicide rate per 100.000 inhabitants. The basic model includes municipal transfers (as proxy for potential illegal return), the index of basic unsatisfied necessities (proxy for legal return), number of criminals apprehended per 100.000 (proxy of probability of capture), the legal severity index of homicide (proxy of potential punishment), the municipal investment (proxy for governmental presence) and the level of drug activity.

Municipal transfers are a good proxy for the potential return from crime because these transfers are used by local authorities (mayors) to sign contracts, to pay the payroll, etc. In some way, they are cash money, and the guerrilla and paramilitaries pressure mayors in order to grab some of these transfers.

The index of basic unsatisfied necessities is a good proxy of legal returns because it measures poverty. A high level of the index implies more poverty and fewer legal alternatives.

The results of an OLS regression of the basic model are quite interesting. All of the signs are as expected, with the exception of the coefficient of the index of basic necessities, which is negative and significant. If the illicit return is higher, the crime activity is higher; if the probability of apprehension increases, the crime decreases; if drug activity increases, homicide crime increases; if the legal index increases, the crime decreases; finally, if the presence of the State increases, crime decreases. The explanation of the total variation of the crime by the model is, however, quite low.

If the same model is estimated using fixed effects by municipality (column two), some of the results change. In concrete, the coefficient of drug activity becomes negative. A

potential explanation for this is that drug activity is predominant in few municipalities of the country, and once we control for others characteristics of the municipality with the inclusion of fixed effects, the effect of drug activity vanishes.

Ta le 7
De er a s o Ho c des
De e de ar a le: Ho c de er 100,000

	Basic Model		Fixed Eff.		Fixed Eff. Homi<mean		Fixed Eff. Homi>mean		IV		IV Homi<mean		IV Homi>mean	
Municipal transfers	0.016		0.024	*	0.003		0.100	*	0.010		-0.009	*	0.078	*
Index of basis necesities	-0.282	*	-0.228		0.147	*	-0.395		-0.210	*	-0.050		0.120	
Criminals apprehended	-0.038	*	-0.014	***	0.002		-0.043	*	-0.161	*	-0.023	*	-0.128	*
Drug crime	0.025	*	-0.012	*	-0.001	*	-0.004		0.064	*	0.015	*	0.036	**
Penal index hom.	-191.939	*	-90.444	*	-45.101	*	-95.481		-104.010	*	-24.770	*	-139.052	
Munic.investment	-7.030E-08	*	1.37E-08		-7.61E-09	.	-3.18E-08		-1.47E-07	*	-3.00E-08	*	-2.62E-07	
Constant	535.14	*	303.80	*	125.91	*	395.66	*	317.84	*	84.91	*	453.94	*
Number of obs.	6395		6395		4174		2254		6323		4118		2238	
F statistic	49.52		11.22		7.39		3.39							
R2 adjusted	0.04		0.67		0.55		0.75		0.04		0.06		0.02	
Wald statistic									113.15		68.42		20.11	

The results are more interesting when we separate the municipalities to those that have high homicide rates and those that have low homicide rates. Column three presents the results for the low-homicide municipalities, and column four for those with high rates. The results are quite different for each group. For those municipals with low homicide rates, the index of basic necessities is positive and statistically significant and the law induces changes in the behavior of the criminals. For those municipalities in which the crime rate is high, the potential amount of illicit return (captured by municipal transfers) and the number of criminals apprehended are the most important determinant of the crime.

As argued in the previous section, problems of endogeneity can be severe in the estimation of Equation (3). In order to correct for these effects, we estimate the equation using three instruments: the distance of the municipality to next main market (variable constructed by Fabio Sanchez); availability of water in the municipality; and dummy indicators for the appointment periods of district attorneys in the country. The rationality of using the first and second variable is that that variables are correlated with potential income from the illicit activities; the third one provides an instrument for changes in the legal codes and the war against drugs.

The results of the IV estimation are presented in column five. The model gives similar results as the previous ones, with the exception of the coefficient of drugs. Now, the coefficient is, as expected, positive and statistical significant. Still, the coefficient on the index of basic necessities is negative. However, when the same estimation is separated between municipalities with high and low criminal rates, the index loses significance in both regressions. Municipal transfers affect positively crimes only in municipalities with high homicide rates. Drug crimes impact positively homicide crimes in both types of municipalities. Finally, municipality investment reduces homicide crimes only in those places with low levels of homicide.

In conclusion, several main regularities emerge in the explanation of homicide rates. First, municipal transfers, as proxy for potential return of crime, explain homicides in

those municipalities with high rates of homicide. The index of basic necessities does not yield stable results. At best, it explains crime in those municipalities with low level of homicides. Number of apprehended criminals and the penal index yields stable results: in general, an increment in those two variables reduces crime rates. However, the index works "better" for municipalities with low criminal rates and apprehension of criminals in those municipalities with high criminal rates. Finally, presence of the state works in reducing crime in those places where the crime rate is low.

Kidnapping

Several differences appear between the determinants of kidnapping and of homicide. With kidnappings we use income of the municipality as proxy for illicit return of crime[13]The basic model presents all the expected signs, with the exception of the legal index. As argued before, the probability of causality between the index and the crime is from the crime to index. In other words, the law is changed, as the crime is more prevalent, and that explains the positive sign on the coefficient (Table 8). With respect to the other main difference between this regression and the analogous one for homicides, the coefficient for the index of basic unsatisfied necessities is positive and statistically significant. Once the model is run using fixed effects by municipality, the only two variables that explain the rate of kidnappings are drug crimes and the legal index.

[13] As noted, we use several proxies for illicit returns of crime. We present the one that gives the best results. However, they we quite similar, independent of the variable.

Ta le 8 De er a s o d a De e de ar a le: d a er 100,000					
	as c Model	F ed E	IV	IV Ho ea	IV Ho ea
I co e o u c al	0,005 *	0,004	-0,007 *	-0,002 *	0,038 *
I de o as s eces es	0,090 *	0,030	0,140 *	0,005 **	0,266 *
Cr als a re e ded	-0,005 *	0,002	-0,006 *	-0,001 *	-0,007
Dru cr e	0,003 *	0,003 *	0,003 *	0,000 *	0,003 *
Pe al de d a	16,810 *	14,076 *	71,132 *	6,620 *	62,902 *
Mu c es e	-1,11E-08 *	-6,99E-09	-9,33E-09 ***	7,84E-10	-1,54E-07
Co s a	-44,654 *	-35,801 *	-195,383 *	-16,937 *	-166,495 *
Nu er o o s	4805	4805	4751	3654	1186
F s a s c	27,69	10,89			
R2 ad us ed	0,03	0,1984	0,0202	0,01	0,04
ald s a s c			155,5	63,21	50,88

As presented before, probably the results of the basic OLS model are biased due to endogeneity problems. The third column presents the IV estimation, using the same set of instruments as were used in the homicide regressions. All the variables keep the same signs, with the exception of the municipal income. However, once we split the sample into municipalities with high and low kidnapping rates, the sign on the municipal income has the expected direction for municipalities with high kidnapping rates. For the low kidnapping municipalities it is still negative. This result is analogous to the one found for homicide. Another main difference between municipalities with high and low kidnap rates is the asymmetry of the effect of criminals apprehended. It seems that greater number of apprehended criminals reduces kidnappings where kidnapping is low (contrary to the effect in the homicide case).

As in the case of homicide, we see differences of behavior between municipalities with high and low crime rates. One striking difference between homicides and kidnappings is the effect of poverty in the determinant of the crimes. While the relationship between homicide and the index of basic necessities is instable, the relationship between the index and kidnappings is stable, positive and statistically significant.

Terrorist attacks

In order to analyze the causes of terrorist attacks, we first add the attacks by paramilitaries, FARC and ELN to get an aggregate measure. Then we run the model given by Equation (3). The results are presented in Table 9.

Table 9 Determinants of terrorist attacks
Dependent variable: attacks reported

	Basic Model	IV	IV Attacks<mean	IV Attacks>mean
Property tax	1.07E-06 *	3.14E-07 *	5.65E-08 *	3.84E-07 *
Index of basis necesities	-0.004205	-0.018242 *	0.001115 *	-0.0696 *
Criminals apprehended	-0.002521 *	-0.001249 ***	-0.000341 *	0.000988
Drug crime	0.000274 *	0.000677 **	0.000128 *	-0.000821
Penal index terrorist	0.848947 *	0.206162	-0.025669	1.940723 ***
Munic.investment	-1.22E-07 *	-3.16E-08 *	1.71E-09	-3.74E-08 *
Constant	-0.187633	1.421577 *	0.138705 *	4.615077 **
Number of obs.	6416	6344	5303	1041
F statistic	949.42			
R2 adjusted	0.4701	0.3957	0.018	0.4472
Wald statistic		431.32	73.1	124.85

In this case, the proxy for illicit return is property tax. The basic model (OLS, first column) presents the same characteristics as the counterparts for homicide and kidnapping. As in the case of homicides the index of basic necessities has a negative coefficient, but it is statistical insignificant. The sign of the coefficient on property tax is positive and statistically significant. The IV estimation presents almost the same properties as the OLSFor this case, the separation between municipalities with high and low crime rates, gives three main differences. First, drug crime affect positively terrorist attacks for municipalities with low crime rates. Second, the number of criminals apprehended reduces terrorist attacks in municipalities with low crime rates. Finally, presence of the State reduces crimes for those municipalities with high crime rates.

5. Conclusion

The conclusions from the existing empirical literature are disappointing and contradictory. While some authors find that one variable is an important determinant of crime and violence, others find the contrary. For this paper we tested some of the most controversial conclusions of the literature by using a new dataset and techniques.

Our findings are the following:

1. Drug crimes are a critical determinant of all other types of crimes.

2. Guerrilla activity is correlated with drug crimes, kidnappings, homicides and bank robberies. Paramilitary activity is correlated with drug crimes and kidnappings. The correlation between FARC activity and kidnappings and homicides has been increasing in the last decade.

3. Laws are ineffective in reducing homicide rates and robberies; they are effective in reducing kidnappings, terrorist attacks and drug crimes. Causality from crime to laws (increments in crimes inducing changes in law) is apparent in homicides and robbery; double causality is detected in kidnappings and terrorist attacks.

4. Regarding the determinants of crimes, there is variation across the type of crimes and across the type of municipality.

5. The return of illicit activities is a determinant of crimes for those municipalities with high crime rates.

6. Poverty determines homicides in municipalities with low crime rates; it determines kidnappings in all type of municipalities. For terrorist attacks (guerrilla and paramilitary attacks), poverty has asymmetric results.

7. The probability of capture is a quite stable and statistically significant determinant of the three types of crimes under investigation. The higher the probability less crimes there are.

8. The presence of the State is an important and significant determinant of reducing terrorist attacks; it is not significant for kidnappings and it is significant for reducing homicide in municipalities with low levels of crime.

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