

**MAKING BRAZILIANS SAFER:**  
**ANALYZING THE DYNAMICS**  
**OF VIOLENT CRIME**



**THE WORLD BANK**

Sustainable Development Sector Management Unit

Latin America and the Caribbean Region

Document of the World Bank



## ABBREVIATIONS AND ACRONYMS

<b>AISP</b>	Áreas Integradas de Segurança Pública (Integrated Areas of Public Security)
<b>BOPE</b>	Batalhão de Operações Policiais Especiais (Special Police Operations Battalion – Rio de Janeiro Elite Squad)
<b>CAGED</b>	Cadastro Geral de Empregados e Desempregados (General Registry for Employed and Unemployed Persons)
<b>CCT</b>	Conditional Cash Transfer
<b>CISP</b>	Circunscrições Integradas de Segurança Pública (Integrated Circuits of Public Security)
<b>COMPSTAT</b>	Computerized Statistics (New York Police Department System)
<b>DATASUS</b>	Base de Dados do Sistema Único de Saúde (Brazilian Health System Database)
<b>GDP</b>	Gross Domestic Product
<b>GEPAR</b>	Grupo Especial de Policiamento em Áreas de Risco (Special Police Group for High-Risk Areas)
<b>IBGE</b>	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute for Geography and Statistics)
<b>IGESP</b>	Integração e Gestão da Segurança Pública (Integration and Management of Public Security)
<b>INESC</b>	Instituto para Estudos Socioeconômicos (Institute for Socio-economic Studies)
<b>Infocrim</b>	Sistema de Informação Criminal (Crime Information System)
<b>ISPCV</b>	Instituto São Paulo Contra a Violência (São Paulo Institute Against Violence)
<b>MIC</b>	Middle Income Countries
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>OLS</b>	Ordinary List Squares
<b>PAHO</b>	Pan American Health Organization
<b>PRONASCI</b>	Programa Nacional de Segurança Pública com Cidadania (National Public Security Program)

<b>RAIS</b>	Relação Anual de Informações Sociais (National Report on Social Information)
<b>RISP</b>	Regiões Integradas de Segurança Pública (Integrated regions of Public Security)
<b>RMSP</b>	Região Metropolitana de São Paulo (São Paulo Metropolitan Region)
<b>SEDS</b>	Secretaria Estadual de Defesa Social (Secretariat of Social Defense)
<b>SIM</b>	Sistema de Informação sobre Mortalidade (Mortality Information System of the Ministry of Health)
<b>UPP</b>	Unidade de Polícia Pacificadora (Police Pacification Unit)
<b>WHO</b>	World Health Organization Report

Vice President:	Hasan A. Tuluy
Country Director:	Deborah Wetzel
Sector Director:	Ede Jorge Ijjasz-Vasquez
Sector Manager:	Maninder Gill
Sector Leader:	Gregor Wolf/Paul Kriss
Task Team Leader:	Rodrigo Serrano-Berthet
Co-Task Team Leader:	Laura Chioda

# TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b>	<b>9</b>
<b>OVERVIEW</b>	<b>11</b>
<b>Chapter 1. Trends and Shifts in Violent Crime in Brazil</b>	<b>17</b>
Gradual decline at the national level	18
Marked Differences Across Regions	19
Persistence of youth violence	22
<b>Chapter 2. Reducing Crime in Brazil: The Factors Driving the Change and Regional Heterogeneity</b>	<b>27</b>
Potential Drivers of Change	28
Channels through which these Factors affect the homicide rate	30
Factors that correlate with national trends	32
Factors that correlate with changes across and within regions	39
Analysis of the “Residuals”—a Potential Role for Policy?	45
<b>Chapter 3. The Success of the Southeastern States: A Role for Policy?</b>	<b>51</b>
Reforming the Police and the Public Security System	54
Reducing Environmental Risks: Guns, Alcohol, and Unsafe Urban Spaces	58
Targeting Hotspots and Populations at Risk through Multisectoral Strategies	63
Integrated and Multi-Stakeholder Subnational Citizen Security Strategies	69
Applicability to other states?	73
<b>Chapter 4. Reducing Crime among Youth: The Role of Education Policy</b>	<b>77</b>
Channels	79
Evidence from São Paulo	81
Summary of results	85

<b>Conclusions and way forward</b>	<b>77</b>
<b>REFERENCES</b>	<b>95</b>
<b>ANNEX</b>	<b>105</b>
Annex I. Data Sources	106
Annex II. Kernel density distributions tests for equality	108
Annex III. Fixed effects regressions of the Log Homicide rate per 100,000 for Brazil and its regions	110
Annex IV. Oaxaca Blinder Decomposition 2008 v. 2003	111
Annex V. Changes in Homicide rates per 100,000 inhabitants from 2003 to 2008 by state and state capital	112
<b>List of tables</b>	
Table 1. Homicide Rates and Black Victimization Index by Region	23
Table 2: Elasticities of macro, contextual and micro factors and the homicide rate in Brazil 1998-2008	32
Table 3: Correlation Coefficients and changes in risk factors and homicide rate across regions (1998-2008)	39
Table 4: Changes in macro, context and micro factors by region 2003 v.2008	42
Table 5: Frequency-Weighted Largest Positive 100 Overall Residuals	46
Table 6: Frequency-Weighted Largest Negative 100 Overall Residuals	47
Table 7: Residuals ranking (negative to positive)	48
<b>List of graphs</b>	
Graph 1. Brazil Homicide Rates 1980–2008	19
Graph 2. Brazil Kernel Densities of Homicides 2003–2008	19
Graph 3: Homicide Rate Trends in Brazil and Latin America	19
Graph 4. Homicide Rates by Region, 1997–2008	20
Graph 5. Kernel Densities of Homicides by Region	21
Graph 6. Male Homicides Rates in Brazil per Race and Age, 2006	24
Graph 7: Decomposition of Changes Homicide rates for Brazil and its regions	34

Graph 8: Decomposition of Changes of Endowments in Factors	36
Graph 9: Decomposition of Changes of Characteristics in Factors	37
Graph 10. Contributions of endowments for Brazil, the Southeast region, and the Northeast region 2008 v.2003	38
Graph 11: Contribution of coefficients for Brazil, the Southeast region, and the Northeast region 2008 v.2003	43
Graph 12: Contribution of coefficients for Brazil, the Southeast region, and the Northeast region 2008 v.2003	44
Graph 13. Homicide Rates for State and State Capital of São Paulo, Rio de Janeiro, and Minas Gerais, 1998-2008	52
<b>Boxes</b>	
Box 1. IGESP Impact Assessment Provides Evidence of Strong Effect on Crime	56
Box 2. The Impact of Guns on Youth	58
Box 3. Neighborhood Disorder and Crime Victimization in São Paulo	62
Box 4. Impact Evaluation of <i>Fica Vivo</i>	66
Box 5. Extending the Right to live in Peace to Favela Residents by Changing the Rules of the Game for Rio de Janeiro's Drug Traffickers: <i>Unidades de Polícia Pacificadora (UPP)</i>	67
Box 6. Municipal-level strategies for crime prevention in Diadema	69
Box 7. Exploring the Perceptions of Frontline Workers about the Drivers of Crime Reduction – A Positive Deviant Analysis in Belo Horizonte	72
Box 8. Policy Details (1) Conditional Cash Transfers	82
Box 9. Policy Details (2): Change in School Shifts	84



## ACKNOWLEDGEMENTS

This study was led by Rodrigo Serrano-Berthet and Laura Chioda. Other members of the team include João Pedro Azevedo, Valentina Calderón, Flávia Carbonari and Jim Shyne. Background papers were prepared by Rodrigo Soares, João Mello, Fundação João Pinheiro, Leandro Piquet, and Erik Alda. Melissa Zumaeta, Priscilla Burity, Christian Borja, Jessica Varat and Darwin Marcelo provided technical inputs. Maninder Gill provided overall guidance and coordination. Makhtar Diopp, Sameh Wahba and Tito Cordella contributed with valuable and detailed feedback throughout the process. The team is also grateful to the reviewers Andrew Morrison, William Sedlacek and Alexandre Marc, and to Maribel Cherres for the excellent administrative support.



# OVERVIEW



**Brazil is a country of strong internal contrasts;** crime and violence is no exception. Over the course of this decade, the southeast region has experienced a massive decline in its homicide rate, which combined with the rapid increase in the northeast and north regions have led to an overall modest decline in the national average. In other words, while some Brazilians have become substantially safer others have seen their levels of safety deteriorate considerably.

Although modest, the recent decline in the national average represents an important change in trend. The annual homicide rate, the leading indicator for levels of crime and violence, has gradually come down from its peak of 28.9 in 2003 to 25.2 in 2007, 26.4 in 2008, and has had a slight increase more recently, to 26.8 in 2009 and 27.2 in 2010 (per 100,000 inhabitants). Despite the marginal increase of the past two years for which data is available, the overall trend over the decade is still a significant accomplishment. Several decades of continued increases in violence have made Brazil an outlier with respect to similar middle-income countries inside and outside the region. While Brazil's homicide rate has always scored much higher than the Latin American average, 2008 was the first time in which it scored lower, due in part to the growing problem of violence in other countries in the region. This shift in the trajectory of crime over the last decade signals that important forces are working to drive homicides down.

Still, the overall national decline masks an enormous heterogeneity in trends across regions, states and municipalities. Unlike other countries, such as Colombia or the United States, which have experienced similar drops in crime, crime trends at the subnational level in Brazil have not accompanied the national decline in a homogeneous manner. In fact, the dramatic decline in homicides in the Southeastern region contrasts with the equally dramatic *increase* in the Northern and Northeastern regions. While states such as São Paulo saw their homicide rate drop by 67% percent between 2000 and 2010, others like Bahia (+303%), Alagoas (+160%), and Pará (+252.9%) witnessed their homicide rates double or triple during the same period. Pernambuco is an exception to these regional trends (-28%). A particularly worrisome trend is the persistence, and deterioration in some respects, of violence among male youth. Risk of involvement in homicide, as victim or perpetrator, is strongly associated with youth, male gender and nonwhite race. Afro-Brazilians are victims of homicide to a disproportionate degree: they are twice as likely to be murdered as their white peers.

What factors were driving the overall crime decline in Brazil? Why is violent crime declining in some states while it is increasing in others? What types of interventions could help to reduce youth violence? These are the questions that motivated this report. Understanding what has gone right to bring crime down in some areas during the past decade is crucial to tackling the challenges presented by the new decade, including the more recent marginal increase in the national homicide rate. The purpose of this report is to enhance that understanding. To do so, we examine the determinants of the crime shift at the national level, review the experience of the high-performing states, and generate new evidence on the impact of education policies on youth violence prevention.

As a first step toward understanding the drivers behind the change in homicide rates, we estimated the correlation between six well-known risk factors and homicide rates. We compiled a unique database with 32,000 observations (in contrast to other studies in Brazil that have used at most 300 observations). We found that the decline at the national level is strongly correlated with the reduction of the male youth cohort (ages 15 to 19), the reduction in inequality, and to a lesser extent the reduction in the dropout rate among public high school students.

There is much variation across regions and states. The Southeastern region, particularly São Paulo, has been the driver of the national drop in violent crime between 2003 and 2008. If the States of São Paulo, Minas Gerais and Rio de Janeiro are removed from the national average, the homicide rate would have increased by 29 percent instead of having declined by 7 percent over that period. This is due mostly to worsening trends in the Northeastern (NE) and Northern regions, where rates climbed from 18 to 28.8 per 100,000 (NE) and from 22.50 to 32.97 (North) between 2003 and 2008.

The experience of the Southeast offers important lessons for states with deteriorating conditions. First, there is no silver bullet to bring down violent crime. Similar to findings in the literature on the North American crime drop during the 1990s, in Brazil no single factor is sufficient to explain the overall decline. While factors that are not directly related to subnational policies appear to have played an important role (i.e., demographic change and reduced income inequality), a wide range of policies also appear to have contributed to this decline. The report reviews some of the key policies implemented in these states and presents evidence about the results achieved.

What are the policies that have distinguished the Southeast from the rest? At the top of the list are results-oriented policing, gun and alcohol control, and programs targeting youth at risk and hot-spots of crime and violence, all guided by integrated and multi-stakeholder citizen security subnational strategies. These policies are not offered as prescriptions of what governments should do since the evidence basis on their effectiveness is not strong enough to establish causal relationships; even when they are, their external validity or transferability is not established. Instead they are offered as examples of policies that are worth learning more about through more robust analytical work, impact evaluations and other forms of controlled policy learning. In particular, this learning agenda should include five themes that appear to have been important in the policy experience of the southeastern states:

- Reduce youth fragility by addressing risk factors and strengthening protective factors. In particular, the study on correlates suggests that keeping youth in school could be an important protective factor. This report presents original findings on the impact of conditional cash transfers (CCTs) for schooling on violent crime, focusing on the marginal enrollment of 16- to 17-year-old males attributable to the CCTs. It finds that each additional student receiving a CCT at a given state school is causally related

to 0.39, 0.46, 0.25, 1.50, and 0.78 percent declines in all crimes, robberies, violent crimes, drug-related offenses, and crimes against minors, respectively.

- Develop comprehensive crime prevention strategies that combine territorially based interventions targeting crime and violence hotspots with generalized policies that reduce risks across the board.
- Sequence and integrate crime control and crime prevention activities in hotspots of violence. On the one hand, a pacified territory facilitates social development activities oriented to address crime and violence risk factors. On the other hand, manifest social development gains in the immediate wake of public security improvements can play a crucial role in making the peace process socially sustainable.
- Introduce a results orientation that rewards innovation and performance accountability, as through results oriented policing.
- Build monitoring and evaluation systems that enable shared diagnostics and policy learning and experimentation among the key actors involved in the public safety agenda.

The future research agenda should also focus on understanding the dynamics of violent crime in the states that have suffered rapid increases in violent crime, particularly in the Northeast and North regions. From a policy perspective, looking ahead, Brazil needs to consolidate and deepen the gains made in the Southeast and tackle head-on the challenge of the Northeast and North regions. Fortunately, there is good news coming from the Northeast as well. Pernambuco and its capital city, Recife, which for much of the past decade had the dubious distinction of being by far the country's most violent major metropolitan area, have seen homicide rates decline since 2008. Perhaps not coincidentally, Pernambuco has implemented substantial public security reforms based on successful experiences from the Southeast. Other Northeastern states, including Bahia, have pledged to follow suit.

The Federal Government has launched a renovated National Public Security Program (Programa Nacional de Segurança Pública com Cidadania, PRONASCI) and is investing in information systems to better understand data on crime and public security and develop stronger impact evaluations of potentially transformative programs such as the UPP and UPP Social in Rio de Janeiro. A new legislation (SINESP) has been approved with the objective of pressuring states to integrate all police, health and justice sectors databases, systematizing the methodologies on data collection used across the country, and promoting the use of evidence in the design of citizen security policies.

**Roadmap of the report.** The report is organized in four chapters. Chapter 1 sets the stage for the issues covered in the report. Chapter 2 estimates the correlation of the change in crime in Brazil and across regions and states. Chapter 3 reviews the evidence on the policies implemented to reduce crime and violence in São Paulo, Minas Gerais and Rio de Janeiro.

Chapter 4 presents findings on the impact of school enrollment on youth crime and violence prevention. The last section concludes and summarizes key lessons.

**Crime and violence are two distinct concepts.** While highly correlated, “crime” and “violence” may result from different causal channels that predispose individuals to commit crimes or acts of violence in different measure. Sedlacek (2010) defines crime as the *means* to obtain a goal or gain, while violence in many cases is an *end in itself*. Committing a crime can be modeled as a rational decision, taken after the valuation of its costs and benefits. Committing an act of violence, on the other hand, can result both from rational decisions and from exposure to risk factors that incline individuals toward this type of behavior.

**In this report we use “homicide” and “violent crime” interchangeably.** It should be noted, however, that violent crime is a broader concept that includes all *criminal homicides* as well as any crime in which the offender uses or threatens to use violent force upon the victim. The criminal threat or use of violent force covers assaults, rapes, robberies, attempted homicides, kidnappings, and other crimes. In this report we concentrate on homicide rates for three main reasons. First, homicides serve as rough proxies for all incidents of criminal violence better than any other single crime statistic. (Fajnzylber, Lederman and Loayza, 2002; Kovandzic and Vieraitis, 2006). Second, homicide rates are measured more completely and more accurately than any other crime indicator, and thus suffer less from measurement error problems. Third, homicide data is available for all Brazilian municipalities for the period 1998–2008, which allows us to construct a municipal level panel to calculate elasticities between demographic and socioeconomic factors and the homicide rate.



# CHAPTER 1. TRENDS AND SHIFTS IN VIOLENT CRIME IN BRAZIL



This chapter describes three trends that lead logically to the three research questions at the core of this report: What is driving the reduction in violent crime in Brazil? Why is there so much variation across regions? What can we do to reduce youth violence?

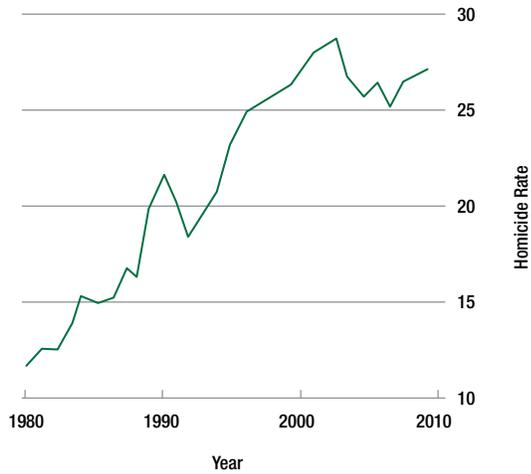
## GRADUAL DECLINE AT THE NATIONAL LEVEL

**Starting in the mid-1980s and for two decades, Brazil saw its homicide rate grow to levels atypical of any middle-income country.** Brazil's homicide rate grew at a much faster annual rate than any other middle-income country not affected by war, except for South Africa where violence increased dramatically after 1994. From the mid-1980s until 2003, the homicide rate grew an average of 20 percent per year. The Brazilian literature has suggested a number of factors for this increase. Among the most salient ones are increased urbanization, volatile and unstable economic conditions that led to high levels of income inequality and social exclusion, an upward shift in population demographics, and rapid expansion of drug-trafficking groups in the main urban areas and the associated proliferation of firearms (Landman 2003; Briceño-León and Zubillaga 2006).

**The development and welfare costs for Brazilians have been enormous.** Homicide has been the leading cause of death among youth (between the ages of 15 and 24) since the 1980s, as well as the main cause of lost life-years in the country. Direct costs of violent crime are estimated at about five percent of the country's gross domestic product (GDP), calculated as the sum of public and private investments directed toward security rather than other areas; lost business investments; and changes in patterns of consumption due to security concerns (Cerqueira et al. 2007). As a result, more than half of Brazilians recently reported feeling unsafe in the cities and neighborhoods where they live (IBGE 2010).

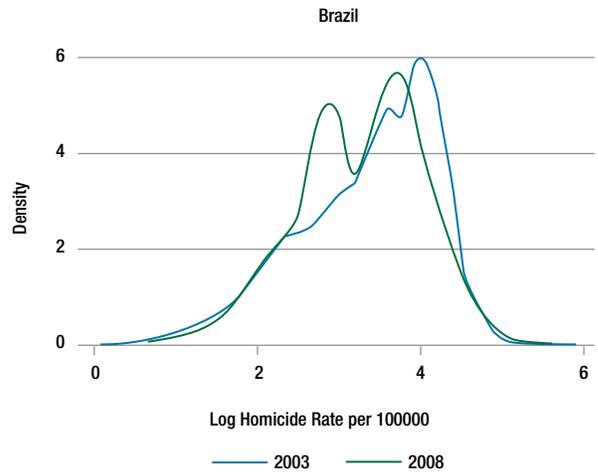
**Since 2003, Brazil's homicide rates have finally begun to drop.** The annual homicide rate, the leading indicator for levels of crime and violence, has come down from its peak of 28.9 per 100,000 population in 2003 to 26.4 in 2008 (see Graph 1). Graph 2 presents kernel density distributions of log homicide rates per 100,000 from all 5,565 municipalities in Brazil in 2003 (red line) and 2008 (broken blue line). The shift down and toward the origin represents a global fall in the means of these rates from the earlier to the later time period. A Kolmogorov-Smirnov test reveals the shift to be statistically significant.

**Graph 1. Brazil Homicide Rates 1980–2008**



Source: Datasus

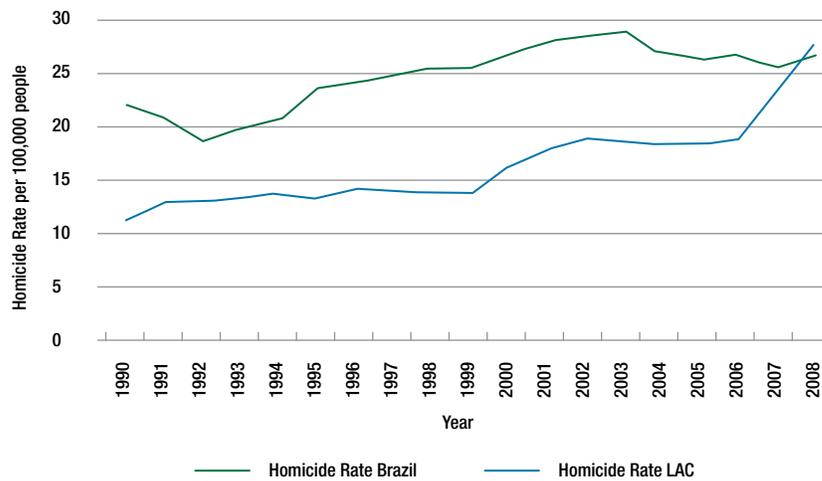
**Graph 2. Brazil Kernel Densities of Homicides 2003–2008**



Source: Datasus

**Brazil is improving, but it still has a long way to go.** Brazil is doing better than the rest of Latin America. In 2008, for the first time in decades, the average homicide rate in Brazil was lower than the average for Latin America and the Caribbean (see Graph 3). However, when compared to countries at similar levels of economic development, Brazil continues to display significantly higher levels of violence. Organization for Economic Co-operation and Development (OECD) countries (1.62, in 2008), such as India (2.87), Russia (14.2), Argentina (5.8) and even Mexico (12) all had much lower homicide rates over the past decade.

**Graph 3: Homicide Rate Trends in Brazil and Latin America, 1990-2010**



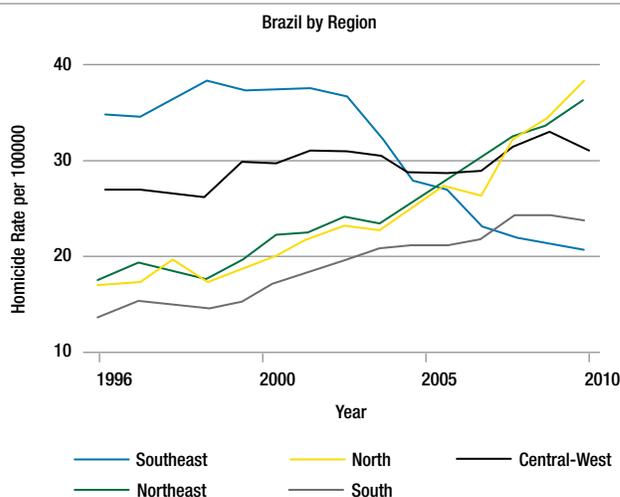
Source: DATASUS (BR) National sources (LCR)

**Many factors could be driving this reduction in violent crime.** In fact, the few studies that have tried to explain instances of crime decline at the national level (such as the crime shift in the US or Canada) have made strong arguments in favor of multicausality (Blumstein and Wallman 2006; Zimring 2007). Zimring concludes his review of the crime decline in the US with the statement that “the crime decline of the 1990s was a classic example of multiple causation, with none of the many contributing causes playing a dominant role”. As a first step toward better understanding the case of Brazil, Chapter 2 estimates the correlation between six well-known risk factors and changes in homicide rates during 1997–2008.

## MARKED DIFFERENCES ACROSS REGIONS

**Depending on the region where Brazilians live, they have seen their environment become considerably safer or alarmingly more violent over the last ten years.** In other words, there is strong spatial heterogeneity in the distribution and evolution of violent crime in Brazil. Specifically, the Southeast is moving in a sharply different direction than the Northern and Northeastern regions. Indeed, only in Southeastern Brazil are homicide rates falling, while across the rest of the country, trends are deteriorating more or less precipitously.

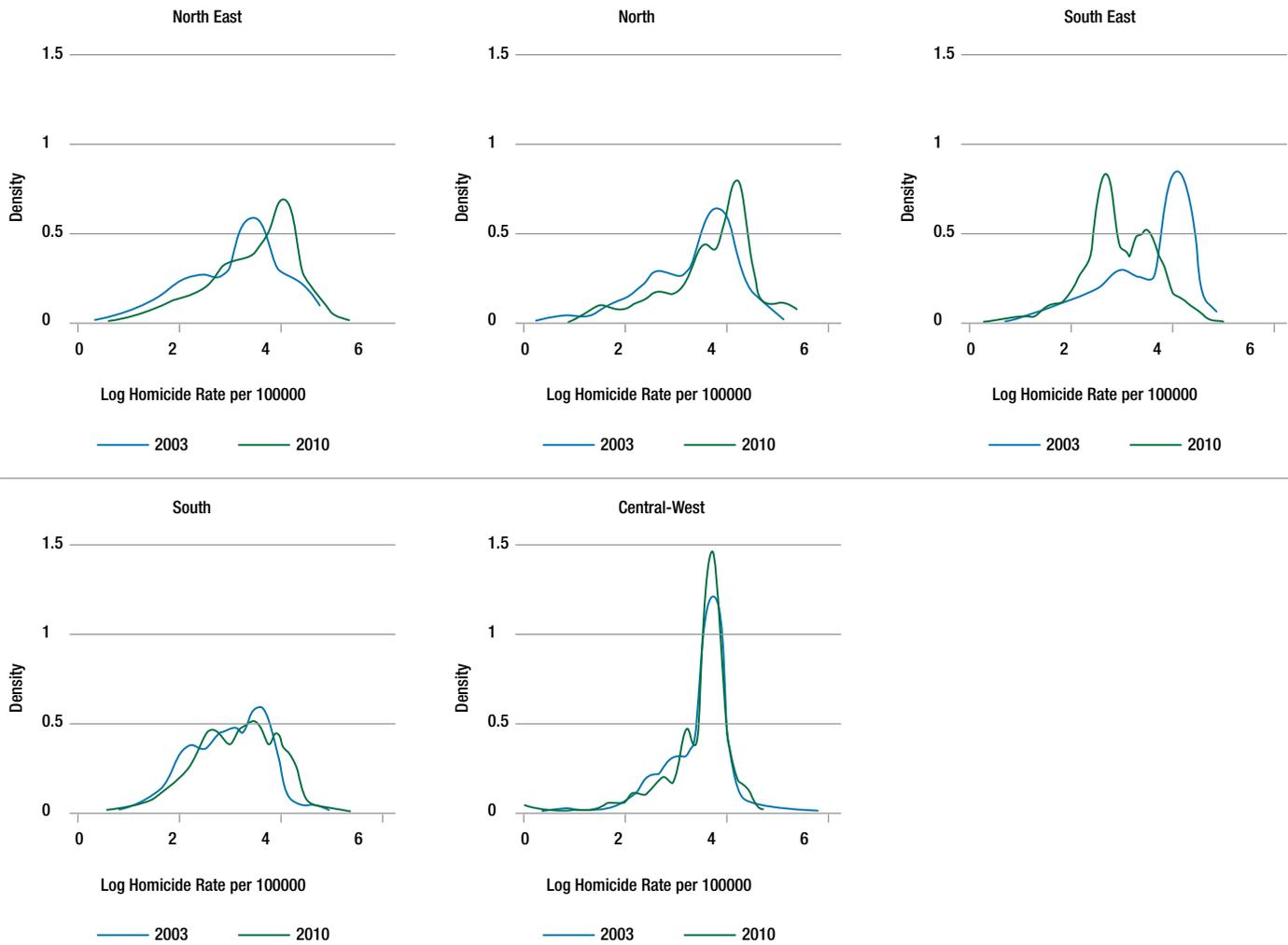
**Graph 4. Homicide Rates by Region, 1997–2010**



Source: Datasus

**All regions in Brazil, except the Southeast, experienced increases in the volume and rate of homicides between 2003 and 2008.** The nationwide kernel density distribution for crime in Brazil presented at the beginning of this chapter, comparing 2003 to 2008 mean log homicide rates for all of the country's municipalities, showed a decline not only among average homicide rates from one period to the next, but also a shift to the left in their overall distribution, with more than half of the country's municipalities in 2008 falling below the 2003 mean. The same analysis disaggregated by region tells a very different story, bringing attention to the great regional heterogeneity underlying the decline in homicide rates at the national level. Graph 5 shows that falling homicide rates concentrated in Southeastern Brazil have been driving the national trend.

**Graph 5. Kernel Densities of Homicides by Region**



Note: Bandwidth 0.25. Source: Own estimations based on DATASUS/SIM data and IBGE.

**The Southeast experienced by far the sharpest decline in homicides over the 2003–2008 period, dropping from an average of 36.3 per 100,000 in 2003 to 21.74 per 100,000 in 2008.** In fact, this decline was not homogeneously distributed even among states within the Southeastern region. On the one hand, São Paulo and Rio de Janeiro experienced spectacular declines in homicide rates starting in late 2002. In São Paulo, the rate fell from 36.03 per 100,000 in 2003 to roughly 14.96 per 100,000 in 2008, with this declining trend beginning in 1999. In Rio de Janeiro, homicide rates fell from 52.69 to 33.98 per 100,000 over the same period, while rates in Minas Gerais declined only moderately from 20.97 to 19.84 per 100,000. Homicide rates in Espírito Santo actually increased over this period, from 50.45 per 100,000 in 2003 to 56.40 per 100,000 in 2008.

The kernel density graphs by region also show that the Northeastern and Northern regions experienced an increase in crime rates and the incidence of higher crime rates, as depicted by heavier left-side tails, while in the South and Center-West homicide rates remained largely steady between 2003 and 2008. In the Northeast the homicide rates between 2003 and 2008 rose from 18.02 to 28.78 per 100,000, while in the North they climbed from 23.5 per 100,000 in 2003 to 33.5 per 100,000 in 2008.

From 2003 to 2008 alone, heterogeneity in the percent change in homicide rates across states was substantial: São Paulo showed the largest rate reduction (a staggering 59 percent), while Amazonas, Maranhão, Paraíba, Rio Grande do Norte, Bahia, Alagoas and Pará experienced increases of more than 50 percent in their homicide rates over this five-year period. Annex II shows the differences in homicide rates by state from 2003 to 2008.

**The decline in the state capitals of the Southeast was even more striking than that at the state level.** The City of São Paulo reduced its homicide rate by 76 percent (2000–2008), Belo Horizonte by 32.5 percent (2003–2008), and Rio de Janeiro City by about 25 percent (2003–2010).

The wide variation across regions and states can be explained largely by differences in economic performance, demographics, degrees of urbanization, and school attainment among at-risk youth. Chapter 2 analyzes the factors that help to explain the observed heterogeneity across regions and states.

## PERSISTENCE OF YOUTH VIOLENCE

**The most common face of the victims of violence in Brazil is that of a poor, young male Afro-Brazilian.** This is the case now and has been for a long time. Ninety-two percent of homicides have men as their victims. Young men and adolescents in the 15 to 24 age cohort represent 18.6 percent of the population and 36.6 percent of all homicide victims; 15- to 29-year-old males represent 25.5 percent of the population and 54.7 percent of homicide victims (2007 PAHO data). Afro-Brazilian youth are more than twice as likely to be victims of

homicide than are white Brazilians of the same age. For example, data for 2000 show that the homicide rate for young Afro-Brazilians was more than 74 homicides per 100,000, whereas the rate for young white Brazilians was 41 homicides per 100,000 (Silva and Begin 2005). Moreover, poor Afro-Brazilian youth are disproportionately affected by the levels of violence (INESC 2007).

**Despite a slight decline in the homicide rate among youth since 2003, the percentage of total homicides accounted by youth has slightly increased.** While in 2003 a youth was 2.52 times more likely to be victimized than the rest of the population, in 2008 the likelihood increased to 2.58 times (Sangari 2011). This is despite the fact that homicide rates among youth have declined slightly.

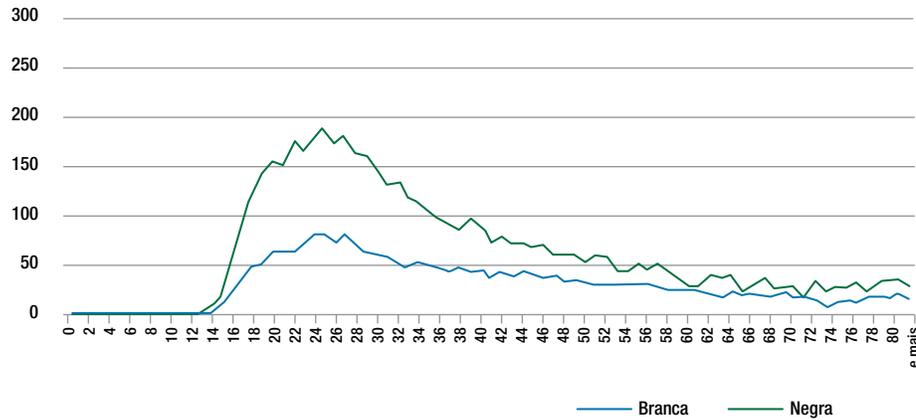
**The homicide epidemic among Afro-Brazilians continues to worsen.** Brazilians of African descent have historically been over-represented among homicide victims, and this trend shows no sign of abating nationwide. Only in the far Southern region, where a relatively small percentage of the nation’s Afro-descended population resides, have rates of black victimization begun to fall, while in major Afro-Brazilian population centers such as the Northeast, rates have skyrocketed in recent years, from 185.7 per 100,000 in 2002 to 375.2 per 100,000 in 2008 (see Table 1).

**Table 1. Homicide Rates and Black Victimization Index by Region**

Region	Homicide Rates per 100,000						Black Victimization Index		
	White			Black			2002	2005	2008
	2002	2005	2008	2002	2005	2008			
North	17.8	13.6	12.9	32.1	27.9	36.1	79.9	80.2	169.6
Northeast	8.2	7.7	9	23.4	26.3	37.8	185.7	227.3	375.2
Southeast	26	19.2	14.6	50.5	37.7	28.6	94.3	71.1	73
South	17.7	19.9	23.9	18.7	22.8	22.6	5.7	16.1	-6.4
Center-West	20.6	17.2	17.4	33.7	34.8	39.3	63.3	85.7	127.8
Brazil	20.6	17.1	15.9	30	31	33.6	45.8	67.1	103.4

Source: Walsefisz 2011. Mapa da Violência 2011 – Os Jovens do Brasil.

The following graph shows that Brazilian men of color (“Negra” below) suffer consistently higher homicide rates than their European-descended peers across the lifecycle, with Afro-Brazilian youth in the 12 to 35 age cohort more than twice as likely to be victims of homicide than white Brazilians of the same age. As a response to this concerning and historically neglected trend, at the end of 2012 the federal government launched a National Plan for the Prevention of Violence Against Black Youth, also called Youth Alive (“*Juventude Viva*”).

**Graph 6. Male Homicides Rates in Brazil per Race and Age, 2006**

Source: INESC 2010.

**There is an urgent need to build evidence on what works to reduce youth violence in Brazil.** There is a growing evidence base on what works in developed countries. However, the literature in Brazil is very incipient. Chapter 4 reviews the international literature and explores the contribution that education policy can have on youth crime and violence.





**CHAPTER 2.**  
**REDUCING CRIME IN BRAZIL:**  
**THE FACTORS DRIVING THE CHANGE**  
**AND REGIONAL HETEROGENEITY**



**This chapter presents evidence on some of the factors** correlated with changes in violent crime between 1998 and 2008. The chapter estimates the correlation between six risk factors and national homicide trends at the national, regional and state levels, using a novel data set for all Brazilian municipalities. The results presented here are part of background paper on the trends of crime rates across regions in Brazil.

## POTENTIAL DRIVERS OF CHANGE

**Violent crime is an exceedingly complex phenomenon, caused by multiple factors, which has given birth to a large body of literature in economics, sociology, and psychology, among other disciplines.** An area of agreement among the different disciplines is that there is no one direct cause in personal development that leads automatically to violent behavior. Instead, there are characteristics of an individual's biology, personality, and environment that impose stresses, which increase the risk that he or she will perpetrate or experience violence. The accumulation of these stresses, or *risk factors*, is associated with an increased tendency to be a victim or a perpetrator of violence. Conversely, *protective factors* can be understood as characteristics of an individual and his/her environment that strengthen the capacity to confront stresses without the use of violence. Studies in the US and elsewhere suggest that the *accumulation* of risk and protective factors is more influential than the impact of any one risk factor (see citations in World Bank 2010).<sup>1</sup>

We focus on six socio-economic factors that can be classified into 3 different categories:

<b>Macro Factors</b>	<ul style="list-style-type: none"> <li>• Economic cycles (business cycle measured by the GDP)</li> <li>• Income inequality (measured by the GINI coefficient)</li> <li>• Labor market conditions (formal jobs creation and destruction)</li> </ul>
<b>Context Factors</b>	<ul style="list-style-type: none"> <li>• Urbanization</li> <li>• Population density</li> </ul>
<b>Micro Factors</b>	<ul style="list-style-type: none"> <li>• Demographic factors include e.g. age and sex (in particular the cohort size of young males)</li> <li>• Education as protective factor, by considering the role of high school dropout rates and their correlation with crime.</li> </ul>

<sup>1</sup> The most common conceptual model to organize preventative and risk factors has been the ecological risk model. This model identifies four levels through which specific factors can influence whether or not individuals engage in criminal behavior: societal, community, relationship/interpersonal and individual (WHO 2002). While this is a compelling model, we do not use it to frame our analysis because we do not have individual level data but rather municipal aggregates.

The suggested hierarchical grouping of factors provides a simple and practical organizational structure for discussing the results of this chapter. Due in part to the abundance and variety of municipal level data available for the entire country, the set of factors considered is not an exhaustive list of the main determinants of crime. However it does allow us to measure crime elasticities with respect to some variables that are or can be influenced by policy, and have received considerable attention in the policy debate as well as in the literature.

Macro factors include economic conditions (business cycle measured by the GDP), income inequality (measured by the Gini coefficient), and labor market conditions (formal jobs creation and destruction). Contextual factors include measures of urbanization and population density. Micro factors include demographic characteristics such as age and sex (in particular the cohort size of young males); in addition we capture the role of education as a protective factor, by considering the role of high school dropout rates and their correlation with crime. In discussing some of the results we will also comment on inertia of crime rates.

This decomposition allows estimating the contribution of endowments and coefficients to the crime reduction observed between 2003 and 2008. The analysis identifies three of these factors as powerful predictors of the reduction of homicide rates in this time frame at the national level, namely, changes in the distribution of income, measured here by the Gini coefficient; the demographic reduction observed in the cohorts of young males aged 15-19, and the reduction in school dropout rates. These three changes emerge as the most important factors associated with the decline in the homicide rate between 2003 and 2008 for Brazil as a whole.

**At the regional level we observe wide heterogeneity in how these factors affect crime rates.** The correlations of all of these factors with respect to the homicide rate at the regional level vary substantially in sign and magnitude. The Southeast and Northeast appear to have divergent trends in crime rates following 2003. The Oaxaca decomposition of these two regions suggests that the potential key factors driving the differences are changes in the coefficients of urbanization, the concentration of income measured by the Gini coefficient and the high school dropout rate. Most notably, changes in coefficients for urbanization are particularly important for the Northeast.

We carry out a detailed residual analysis that allows us to make inferences on how the factors not controlled for in the estimations explicitly correlate between and within the regional heterogeneity of homicide rates in Brazil for the 1998–2008 period. We present weak and only suggestive evidence on the unexplained component and how it relates to variables that are in principle controllable by policy. These variables affect crime either by raising the expected cost of crime or by deterring criminals.

**The rest of the chapter is organized as follows.** In the second section we present the channels through which these factors affect the homicide rate. In the third section the panel regression analysis results and the elasticities of these factors with respect to the homicide rate are discussed, followed by the Oaxaca-Blinder decomposition results. In the fourth sec-

tion we present the regional elasticities and decomposition results. In the fifth and final section we present the analysis of residuals.

## CHANNELS THROUGH WHICH THESE FACTORS AFFECT THE HOMICIDE RATE

The relationship between these different factors and crime can be either positive or negative. In some cases, opposing forces are involved when these factors increase or decrease. We present a description of the mechanism through which these factors can affect crime rates, and conduct empirical analyses to better understand the magnitude and signs of the correlations.

### Macro factors

**Economic conditions (business cycle measured by the GDP).** There are two opposing forces that operate when the relationship between the business cycle and crime is estimated. On the one hand, crime could be countercyclical, because it is a substitute for legitimate sources of income (Bushway, Cook and Phillips 2010). But crime can also be pro-cyclical if one assumes that more goods and services produced in the economy represent more opportunities for criminal activity. The first assumption is likely to outweigh the second one for crimes involving direct financial motivation such as burglary, robbery and auto theft, but is less important for homicide, assault and rape (Levitt 2004).

**Income inequality (measured by the GINI coefficient).** The literature has found a strong association between levels of inequality and crime rates. High levels of inequality place poor individuals who have low returns from market activities in close proximity to high-income individuals who have goods worth taking (Kelly 2000). The effects of inequality on crime appear to be large even when controlling for poverty levels and racial composition of the population (Buonanno 2003). In the US context, several papers find evidence linking the large increase in wage inequality to criminal behavior (Chiu and Madden 1998; Kelly 2000). One cross-country study found that higher inequality results in higher homicide rates (Fajnzylber, Lederman and Loayza 1998).

**Labor market conditions (formal job creation and destruction).** Most studies linking labor markets to crime have used unemployment rates as a proxy for labor market conditions. However, this association is ambiguous. Although a large number of papers have found positive association between crime rates and unemployment rates (Fleisher 1966; Ehrlich 1973; Grogger, Freeman 1994; Imrohroglu et al. 2000), this association is at best weak. The weak relationship between unemployment and crime appears to be associated with two factors. First, as shown by Imrohroglu, Merlo and Rupert (2001) most criminals are in fact employed

and only a smaller fraction is actually unemployed.<sup>2</sup> Second, unemployment rates for youth and not total unemployment rates are the ones that appear to matter the most. Grogger (1998) explores the relationship between property crimes and wages. His results suggest that declining wages partially explain rising youth crime during the 1970s and 1980s in the US. In order to address these specific concerns, our estimates control for formal job creation and destruction, both for the total population, as well as for younger males.

## Contextual factors

**Urbanization and population density.** A recent World Bank study found that a city's growth rate appears to have a stronger relationship with homicide rates than the city's size or density. The annual rate of city population growth correlates positively with the homicide rate ( $r=0.27$ ) and is statistically significant ( $p<0.06$ ) (WB 2010). Fast growing urban centers with weak labor markets are predisposing factors that breed urban criminality. With respect to urban density, there is no consensus in the literature on the direction of the effect. Some studies found positive correlations (Schuessler 1962; Galle, Gove and McPherson 1972), while others found the opposite (Kvalseth (1977) and still others found non-significant relationships between the two variables (Freedman 1975). These studies indicate nonlinearities of the effects of urbanization on crime. It is probable that if urbanization levels are low, an increase in the urban population share can decrease crime, as more collective policing can take place. But as urbanization levels increase, additional population pressures can generate congested living conditions that are likely environments for crime.

## Micro factors

**Demographic factors such as age and gender** appear to be strongly related to criminal activity. Because young males are more prone to violence, changes in the cohort size of young males will likely have an effect on crime rates (Wilson and Herrnstein 1985; Freeman 1991, 1996; Grogger 1991, 1995, 1998). In addition, larger youth cohorts may also have a detrimental effect on legal labor market options of other youth; therefore, demography plays a key role in explaining crime.

**Education (high school dropout rates).** A number of papers study the relationship between crime and education, stressing that education increases the returns to legal activities, raising the opportunity cost of illegal behavior (Buonanno 2003). If the returns to education and other human capital are low, youth will be more inclined to drop out of school. Dropouts have

---

2 Imrohrogglu, Merlo and Rupert (2001) show that for the US about 79 percent of criminals are employed while only 21 percent are unemployed.

the free time to engage in theft, the sale of illegal drugs, and other criminal activities (Becker 2007).

Education may reduce the incentive to engage in criminal activities through several channels (Buonanno and Leonida 2005). First, schooling significantly reduces the probability of incarceration (Lochner and Moretti 2003); higher levels of education are associated with higher returns in the labor market, which in turn increases the opportunity cost of engaging in illegal activities. Second, education changes personal preferences affecting the decision to engage in criminal behavior through a civilization effect (Fajnzylber et al., 2002). Third, school enrolment alone, independent of the level of educational attainment, reduces the time available for participating in criminal activity (Witte and Tauchen 1994).

## FACTORS THAT CORRELATE WITH NATIONAL TRENDS

In order to understand how these factors correlate with national homicide rates, we base our analysis on fixed effects regressions using data for all municipalities in Brazil, as well as for all five regions for 1998–2008. In addition to the regression analysis, we use Oaxaca-Blinder to decompose the contribution of endowments and coefficients to the crime reduction observed between 2003 and 2008. The analysis is based on an original database that contains information for the six risk factors and homicide rates for the 5,564 Brazilian municipalities for the 1998–2008 period.

Estimates presented here are those reported in Calderón and Chioda, 2011. Homicides in Brazil decreased from 28.16 per 100,000 inhabitants in 2003 to 26.21 per 100,000 inhabitants in 2008, a reduction of 6.922% in the national homicide rate.

**Table 2: Elasticities of macro, contextual and micro factors and the homicide rate in Brazil 1998-2008**

	Correlation	Changes in Factors 2003 v. 2008
<b>Macro Factors</b>		
1% increase in the <b>GDP</b>	+0.08 %	The GDP increased 59%
1 percentage point increase in the value of the <b>Gini Coefficient</b>	+1.01%	The Gini coefficient declined in 3.13 percentage points
1% increase in the number of <b>formal jobs created for males 15-29</b>	-0.049%	Jobs created increased 65%
1% increase in the number of <b>formal jobs destroyed for males 15-29</b>	+0.063%	Jobs destroyed increased 67%
<b>Context Factors</b>		
1 percentage point increase the <b>Urban Population Share</b>	+10.52 %	The Urban population share increased 2.88 percentage points

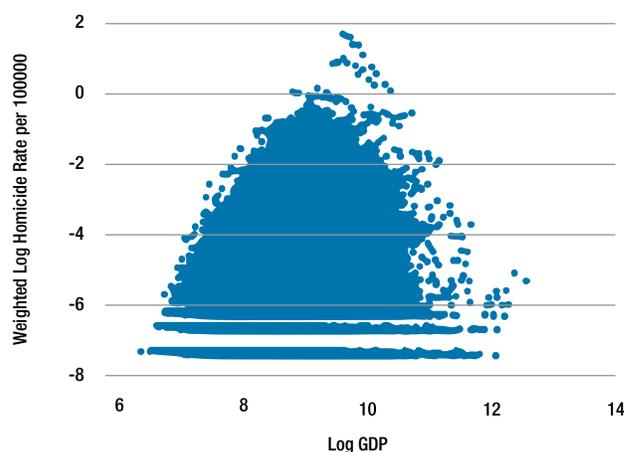
	Correlation	Changes in Factors 2003 v. 2008
<b>Micro Factors</b>		
1% increase in the number of males 15-19	+0.40%	The number of males 15-19 declined by 8.6%
1% increase in the number of males 20-29	+0.25%	The number of males 20-29 increased by 13.07%
1 percentage point increase in the public school dropout rate	+0.34%	The public school high school dropout rate declined 2.69 percentage points
Observations	19,121	
R-squared	0.714	

Note: All coefficients are significant at the 1 percent level. Source: Calderón and Chioda, 2011.<sup>3</sup>

From the analysis of the results presented in Table 2, it emerges that the GDP, the Gini coefficient, destruction of formal jobs for males aged 15-29, urbanization, the number of males 15-29 and 20-29 and the school dropout rate display robust positive correlations to the homicide rate. Formal job creation appears to be negatively correlated with homicide rates.

All results have significant coefficients, and tell us about the direction of the correlation of these factors and the homicide rate. We observe a positive correlation between the GDP and the homicide rate. Ehrlich (1973) identifies GDP per capita and the growth rate of the GDP as proxies for the general level of prosperity in the provinces, as well as indicators of illegal income opportunities. While additional resources in an economy appear to suggest that there is more prosperity, if the gains of economic growth are not evenly distributed in the economy then people may take recourse to crime. The positive correlation we observe is a combination of opportunity v. additional resources, where opportunity appears to dominate. It is important therefore not only to study the correlation between the GDP and the homicide rates, but also to understand the correlation between inequality and crime. We find that the correlation of the GDP and the homicide rate is 0.08. In addition, our results suggest that the relationship between GDP and crime may be non-linear. The empirical results suggest that crime is positively correlated to GDP growth for low and medium levels of income. However, crime is negatively correlated to GDP for high levels of income, even after controlling for levels of inequality. Graph 6 below shows the relationship between log homicide rates and the log of the GDP. The non linearity of the relationship is not picked up in a simple regression that does not include polynomials. The graph shows that for lower income levels the relationship is positive, and it only becomes negative after a given threshold.

3 Clustered standard errors by municipality in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Source: DATASUS, IBGE and RAIS, CAGED from 1997 to 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions. Year, Regional and State fixed effects are included in the regressions, as well as the log of the population at the municipality level.

**Graph 7. Scatter plot of the Homicide rate and the GDP in log scale**

Source: Calderón and Chioda, 2011.

The observed relationship between inequality and crime also suggests an opportunity story: the more inequality, the more it would be profitable for certain segments of the population to engage in criminal activity. The semi-elasticity of crime with respect to inequality measured by the Gini coefficient is (1.01) for Brazil between 1998 and 2008. This result implies that in areas where inequality is high, crime is likely to be high. Inequality coupled with restricted options, in particular for groups at risk, likely translates into more criminal behavior.

We study the effects of labor markets and crime using formal job creation and destruction for male youth. We find that formal job creation appears to be negatively correlated with the homicide rate (-0.049), whereas formal job destruction appears to be positively correlated with the homicide rate (+0.063). Weak labor markets appear to be a risk factor associated with crime and the more opportunities available to males 15-29 the more likely we will observe lower levels of criminal behavior.

Urbanization is the key context factor we study. We find that urbanization is positively correlated with the homicide rate (10.52). Rapid urbanization processes are likely to involve poor migrant populations who find it hard to assimilate to their new urban environments and have difficulty finding jobs and licit opportunities at their destinations. However, we observe large non linearities in the relationship between crime and urbanization. For lower levels of urbanization, an increase in the urban population share can reduce crime as the larger population can better police criminal activity. Yet as urbanization grows, congestion effects take hold, increasing crime.

The youth cohort of males 15-19 and 20-29 also appears to be positively correlated with crime. The larger the cohort, the lower the economic opportunities will be for each individual member, making it more attractive for them to engage in criminal activities as an outside

option. A series of preventative measures can be taken by policy makers to increase individual chances of labor market success. Stronger labor market opportunities for youth as well as policies that keep youth in school longer may prove successful in deterring criminal behavior. Our estimates suggest that school dropout rates are positively associated with the homicide rate, and thus efforts to keep kids and specially males 15 and above in schools should be undertaken to prevent crime. Dropout rates as well as the size of the cohorts of young males suggest that there is a clear positive correlation between these variables and violent crimes. Policies aimed at keeping youth at risk in schools (such as conditional cash transfer programs) can thus be used as a tool for crime prevention.

We concentrate in this chapter on the link between high school dropout rates at the municipal level and the homicide rate. We believe that the correlation of these factors sheds light onto an important risk factor, namely unskilled male youth. The large correlations between homicide rates and the cohorts of school age males, as well as the high school dropout rate, suggests that policies targeting schooling and labor market opportunities for youth are likely to have large impacts on observed homicide rates. In chapter 4, this report further evaluates the effects of two educational policies on crime. The importance of these factors serves as key motivation of the potential role of these types of policy interventions for youth.

We estimate that incidence of violent crime appears to have some degree of persistence (CC, 2011). The results from the estimation suggest a sizeable inertia in homicide rates of about 30% in the first period that does not appear to vanish after six periods. Strong inertia of crime rates suggests that efforts to reduce crime are likely to be only moderately successful in the short run. Yet understanding the dynamics of crime is important if we are to learn more about risk and preventative measures that can be used in tackling current and future crime levels.

## Oaxaca Decomposition<sup>4</sup>

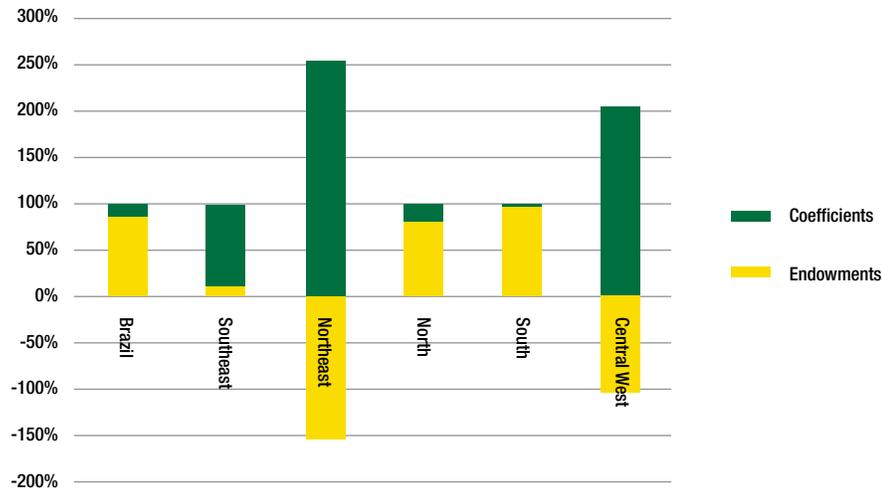
While the elasticities tell us how “sensitive” crime is with respect to a given factor in the 1998-2008 period, the Oaxaca Blinder decomposition (OB) provides us with descriptive statistics to understand how changes in these factors explain the observed trends in homicides. The decomposition allows separating the observed change in homicide rates between 2003 and 2008 into changes in coefficients and endowments. Changes in coefficients refer to changes in correlations, or the marginal effects of factors; while changes in endowments refer to changes in the mean values of these factors when comparing two separate periods. The procedure allows estimating how changes in the means of these factors as well as

---

4 The results from the Oaxaca Blinder decomposition presented here are not to be read as a causal interpretation of the results, the factors we are controlling for may be endogenous. If in fact these factors are endogenous we cannot establish if homicides are caused by changes in these factors, or if changes in these factors are produced by changes in the homicide rate.

changes in the correlation coefficients, impact the total observed change in homicide rates between two periods, in our case 2003 and 2008.

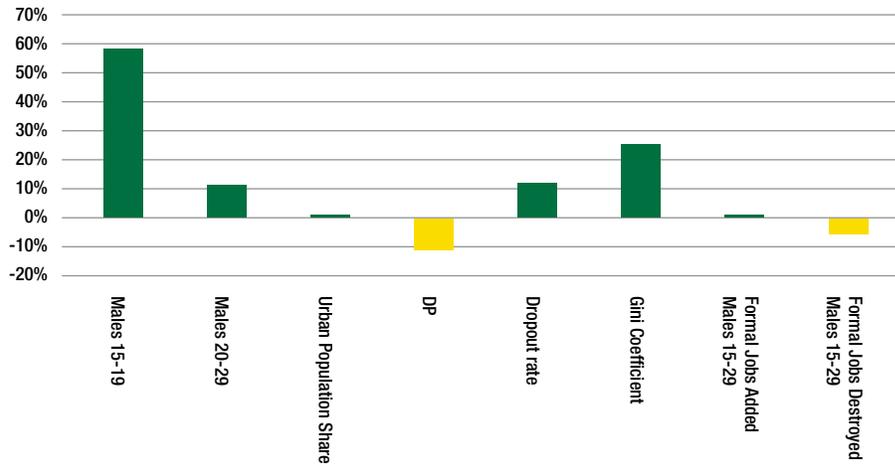
**Graph 8: Decomposition of Changes Homicide rates for Brazil and its regions  
(with Changes Shown as % of Overall Increase)**



Source: Calderón and Chioda, 2011.

Graph 7 shows the Oaxaca Blinder decomposition for Brazil and its regions between 2003 and 2008. Changes in coefficients and changes in endowments add up to 100% of the observed change. For Brazil as a whole, 85% of the total change in homicides observed between 2003 and 2008 is attributable to changes in endowments of the macro, contextual and micro factors, while 15% is attributable to changes in coefficients. The story is not homogeneous across regions. For the Southeast and Northeast we find that changes in coefficients are relatively more important, while for the North, South and Central West regions, changes in endowments appear to be more relevant in explaining the change in homicide rates. In Graph 7, the sum of positive bars less negative bars represents the total change in homicide rates (100% of the change). The darker gray bars embody the fraction of the total change that is explained by changes in the endowments (e.g. changes in mean values of the six socio-economic factors), while the lighter gray bars denote the portion of the change that results from changes in the returns to the corresponding characteristic between 2003 and 2008.

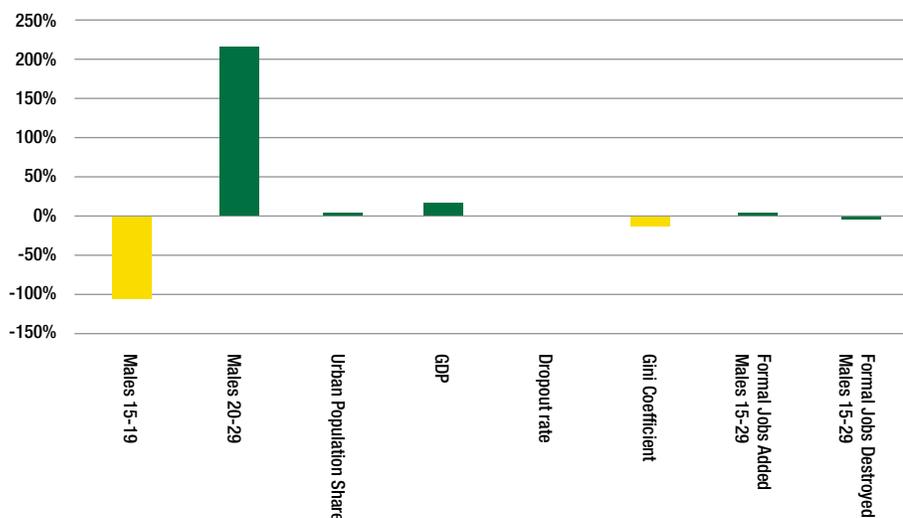
**Graph 9: Decomposition of Changes of Endowments in Factors  
(with Changes Shown as % of Overall change in endowments)**



Source: Calderón and Chioda, 2011.

Changes in endowments refer to changes in mean values of these factors. Graph 8 shows that 58% of the total change in endowments is due to changes in the male cohorts of 15-19 year olds, while changes in the Gini coefficient account for 25% of the change in endowments and the high school dropout rate accounts for 11% of the total change in endowments; and the rest of the factors account for less than 10 percent of the change in endowments. The sum of positive bars and negative bars equals the total change in endowments (100%). These results imply that changes in the mean values of these three factors explain a large portion of the change in homicide rates that took place between 2003 and 2008. As we mentioned before changes in endowments account for 85% of the observed change in homicides at the national level, this implies that changes in the mean values of these three factors account for more than 80% in the total change in homicide rates observed between 2003 and 2008.

**Graph 10: Decomposition of Changes of Characteristics in Factors  
(with Changes Shown as % of Overall change in characteristics)**



Source: Calderón and Chioda, 2011.

Changes in coefficients refer to changes in the marginal effects of factors or their relative importance. The sum of positive and negative bars adds up to the total change in coefficients (100%). Graph 9 shows that 213% of the total change in coefficients is due to changes in the male cohorts of 20-29 year olds, changes in the GDP account for 14% of the change in coefficients. The rest of the factors account for less than 10 percent in the change in endowments.

#### The main results are:

- changes in the male cohorts of 15-19 year olds is the single most important predictive factor for the decline in homicide rates. It consistently accounts for large shares of the change in every homicide rate in Brazil between 2003 and 2008 (26.28% overall change in endowments).
- changes the distribution of income (Gini coefficient) account for a second largest portion (25.72% of overall change in endowments).
- changes in high school dropout rates appear as a third relevant factor in the reduction of homicides at the national level (15% of the overall change).
- Increases in urbanization, while predicting a reduction in homicides between 2003 and 2008, have a more modest effect (1.23% of the overall change).
- Factors such as the GDP growth, the increase in the male cohorts of 20-29 year olds, and the destruction of formal jobs for males appear, on the contrary, to have had a positive effect on the homicide rate in this same time frame. Yet the overall effect is a reduction in the homicide rate at the national level.

## FACTORS THAT CORRELATE WITH CHANGES ACROSS AND WITHIN REGIONS

### Changes across and within regions

**As chapter 1 showed, the gradual decline in homicide rates at the national level masks the dramatic shifts that have been taking place across regions, states, and municipalities.**

We begin by presenting the panel regression estimates of the elasticities and semi-elasticities of crime with respect to the macro, context and micro factors at the regional level. As we show in chapter 1, the homicide rate only effectively declined in the Southeast region after 2003, driving the national average down. While in the South, North and West Central regions the homicide rate remained largely unchanged, the homicide rate substantially increased in the Northeast.

**Table 3: Correlation Coefficients and changes in risk factors and homicide rate across regions (1998-2008)**

	Brazil	Significance	Southeast region	Significance	Northeast region	Significance	North region	Significance	South region	Significance	Central West region	Significance
<b>Macro Factors</b>												
Log GDP	0.08	***	0.08	***	0.19	***	0.24	***	0.03		-0.01	
Gini Coefficient	1.01	***	2.63		0.87		3.69		0.39		-0.16	
Log formal jobs created for males 15-29	-0.05	***	-0.10	***	-0.02		0.02		-0.13	***	-0.06	
Log formal jobs destroyed for males 15-29	0.06	***	0.02		0.07	***	0.15	***	0.04		0.05	
<b>Context Factors</b>												
Urban Population Share	10.52	***	22.75		1.18		-18.20	**	23.33	**	6.86	***
<b>Micro Factors</b>												
Log males 15-19	0.40	***	0.49	***	-0.44	***	-0.70	**	0.96	***	0.31	**
Log males 20-29	0.25	***	0.42	***	0.39	***	1.09	***	-0.30	**	0.10	
Public school dropout rate	0.34	***	0.16		0.37	***	0.39		0.10		0.13	
Observations	19,121		6,802		5,318		874		4,304		1,823	
Adjusted R-squared												

Source: Calderón and Chioda, 2011.<sup>5</sup>

5 Clustered standard errors by municipality in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Source: DATASUS, IBGE and RAIS, CAGED from 1997 to 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions. Year and State fixed effects are included in the regressions.

## Panel estimates results

In the Southeast the macro, contextual and micro factors appear to explain about 78% of the variation in the homicide rate, while in the other regions the proportion is much lower. In the Northeast in particular, we observe a statistically significant increase in homicide rates after 2003, and the proportion of explained variation in homicides is 66%. Differences in the proportion of the variation explained across regions suggest that factors not explicitly controlled for in the regressions are at least partially responsible for the differences in homicide rate trends.

We also observe differences in the elasticities or correlations of these factors with respect to the homicide rate across regions. The elasticity of Homicide rate with respect to GDP appears fairly large and positive i.e. an increase in the GDP can increase opportunity for crime, but at the same time it may imply less necessity for crime; while the two channels exist, the opportunity channel appears to dominate the necessity channel as we find a positive correlation between GDP and the homicide rate at the regional level. This correlation appears to be substantially larger in the Northeast (0.19) and the North (0.24) than in the rest of the country (0.08).

The income Gini correlation coefficient appears to be particularly large for the North (3.69) and Southeast (2.63) regions, with correlations three and two times as large as those observed for the national average (1.01), respectively; these results are suggestive of a potential channel for crime reduction linked to concentration of income. Formal jobs created appear to be negatively correlated with crime rates across the board, yet with a statistically significant and large effect in the Southeast and in the South. This suggests that job creation for youth in these regions appears to be a potential key factor.

Urbanization is strongly positively correlated with crime in the Southeast (22.75) and South (23.33) regions, moderately positively correlated with crime in the Northeast (1.8) and Central West regions (6.86), and negatively correlated with crime in the North region (-18.20). These results make sense as we observe larger shares of urban populations in the Southeast and the South, and an urbanization process taking place in the Northeast and Central West regions, while in the North the urban population share is relatively small. For initial stages of urbanization, the rising concentration of individuals in towns reduces crime as people are less exposed to individual risks. If urbanization increases rapidly, however, there is a congestion effect that increases the likelihood of crime. These results are consistent with the levels of urbanization in the country and we find larger correlations in regions with a larger share of the population living in metropolitan areas.

The effects of the changes in the cohorts of younger males (15-19) are also not uniform across regions. In the Southeast (0.49), these cohorts appear to have a larger positive correlation with the homicide rate than in the rest of the country, while we observe a negative correlation of the size of these cohorts in the Northeast (-0.44) and North (-0.7) regions. The story is different for the size of the cohorts of males 20-29. In the Southeast (0.42), North (1.09), and Northeast regions (0.39), these cohorts appear to have a large and positive correlation with the homicide rate, while they have a small and negative correlation with the homicide rates in the South, and no correlation in the Central-West region.

Public school dropout rates appear to be positively correlated with the homicide rate both at the national and regional levels. The correlation, however, appears to be particularly large for the North (0.39) and Northeast (0.37) regions.

The panel data analysis allows us to estimate elasticities and semi-elasticities by exploiting the within and between variation in crime rates at the municipality level. This type of analysis provides cleaner estimates of the elasticity or semi-elasticity of these macro, contextual and micro factors with respect to homicide rates. These results show clear differences in the correlations of these factors to the homicide rate across regions.

Crime in the North, South and Center-West regions increased but relatively less than in the Northeast. Table 4 shows changes in the macro, contextual and micro factors between 2003 and 2008. We observe that while GDP substantially increased in all regions, the Gini coefficient declined, but to a lesser extent in the Northeast and Central-West regions, and net job creation for males 15-29 was positive in the Southeast and in the Northeast. Urbanization in percentage points increased in the Northeast, South and Central West regions. The cohorts of males 15-19 declined in all regions but more in the Southeast than in the other regions, and the cohorts of males 20-29 declined in this region while it substantially increased in all other regions. The high school dropout rates declined in all regions except the Northeast, where it increased by about one percentage point.

**Table 4: Changes in macro, context and micro factors by region 2003 v. 2008**

Homicide Rate	Homicide rate per 100,000		
	2003	2008	Change
Southeast	35.44	21.59	-39.08%
Northeast	17.64	28.53	61.73%
North	22.51	32.98	46.52%
South	19.31	24.19	25.26%
Central-West	29.47	30.77	4.43%

Macro Factors	GDP			Gini Coefficient			Jobs created males 15-29			Jobs destroyed males 15-29		
	2003	2008	Change	2003	2008	Change (Percentage points)	2003	2008	Change	2003	2008	Change
Southeast	400,000,000	66,500,000	66%	0.55	0.51	-3.87	59,618	112,155	88%	50,618	91,864	81%
Northeast	2,728,024	5,052,679	85%	0.58	0.55	-2.91	6,941	12,511	80%	5,956	10,111	70%
North	3,862,960	7,149,995	85%	0.53	0.50	-3.02	7,231	13,980	93%	6,024	12,228	103%
South	3,968,944	7,007,792	77%	0.53	0.49	-3.96	10,179	17,480	72%	8,952	15,372	72%
Central-West	13,200,000	25,600,000	94%	0.56	0.54	-1.52	18,640	29,962	61%	16,273	25,606	57%

Context Factors	Urbanization		
	2003	2008	Change (Percentage points)
Southeast	28.12%	27.99%	-0.13%
Northeast	30.55%	31.49%	0.93%
North	38.60%	38.37%	-0.23%
South	11.49%	11.65%	0.15%
Central-West	31.75%	32.17%	0.42%

Micro Factors	Males cohorts 15-29			Males cohorts 20-29			High School Dropout Rate		
	2003	2008	Change	2003	2008	Change	2003	2008	Change (Percentage points)
	102,322	86,123	-15.83%	198,523	194,590	-1.98%	12.2%	9.2%	-3.0%
	22,945	22,003	-4.11%	37,993	47,539	25.13%	18.2%	19.0%	0.8%
	22,866	21,445	-6.21%	39,622	43,706	10.30%	19.6%	18.4%	-1.2%
	13,652	12,833	-6.00%	25,041	27,666	10.48%	13.7%	11.3%	-2.4%
	31,950	31,779	-0.53%	60,368	67,652	12.07%	18.8%	15.1%	-3.7%

Source: Calderón and Chioda, 2011.

Similarly to our national level analyses, we also report the Oaxaca Blinder decomposition for two of the regions, namely the Southeast and the Northeast.<sup>6</sup>

## Oaxaca Blinder decomposition for the Southeast and Northeast regions

The Oaxaca-Blinder decomposition analysis complements the results from the panel regressions at the regional level by making it possible to determine which factors contributed to the reduction in the homicide rate in the Southeast and to the increase in the homicide rates in the Northeast in particular.

The changes in endowments are the changes in the mean values of these factors, and the changes in coefficients refer to changes in correlations. Changes in coefficients are particu-

<sup>6</sup> We only report the results for these two regions because they have divergent trends in the time frame of interest, but also because the availability of data for these regions allows performing the decomposition with no additional assumptions.

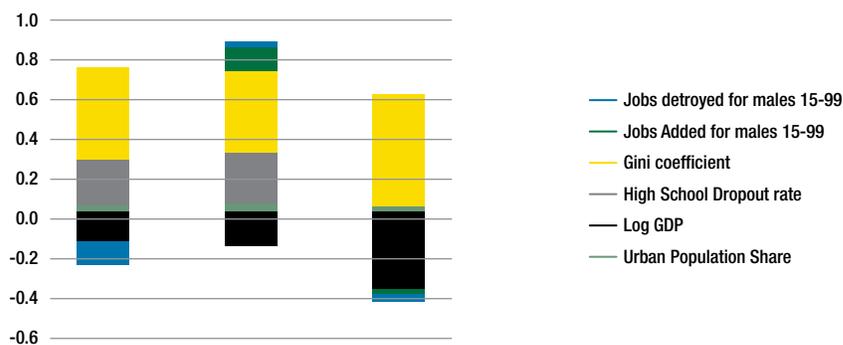
larly large for the Southeast and explain about 90 percent of the total change in homicides between 2003 and 2008 for this region. However, the Southeast follows the national trends in the importance of factors, i.e., the reduction in the younger male cohort of 15- to 19-year-olds and the Gini coefficients appear as the most prominent factors.

In the Northeast, changes in endowments only represent -154 percent of the overall change; the change in coefficients appears to explain 254 percent of the observed change in this region. Here the changes in correlations appear to more than double the contribution of changes in endowments; these changes in correlations mostly explain the observed change between 2003 and 2008 in the homicide rate in this region.

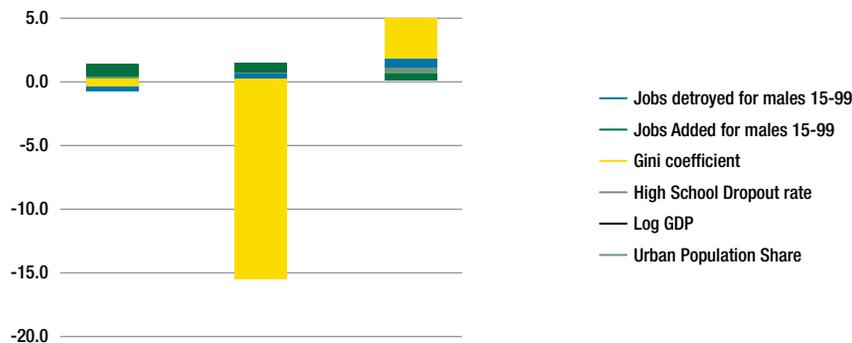
Similar to the Northeast, in the Southeast the bulk of the difference is explained by changes in the marginal effects, rather than by changes in means. However, for the Southeast most of the observed differences in homicide rates between 2003 and 2008 are due to changes in coefficients (marginal effects) of the youth cohort of males 15 to 19 years of age, changes in the concentration of income, and the dropout rate. The endowments and coefficients associated with the decomposition are large for the cohorts of males 15-29 in Brazil as well as in the Southeast and the Northeast regions. We decide to analyze graphically the contribution of the other factors to the changes in endowments and coefficients.

Graph 10 and 11 show the contribution of the GDP, the Gini coefficient, job creation and destruction, urbanization and high school dropout rates to total endowments and coefficients for Brazil, the Southeast region, and the Northeast region. As illustrated in these graphs, the bars depict the total size of the effect of endowments and coefficients, respectively.

**Graph 11. Contributions of endowments for Brazil, the Southeast region, and the Northeast region 2008 v.2003**



Source: Calderón and Chioda, 2011.

**Graph 12: Contribution of coefficients for Brazil, the Southeast region, and the Northeast region 2008 v.2003**

Source: Calderón and Chioda, 2011.

For the Northeast, the prominent factors are the changes in marginal effects associated with the Gini coefficient, the dropout rate and urbanization. First, changes in marginal values of urbanization in this region appear to have a more negative effect than in the Southeast and Brazil as a whole in this period. Second, the larger marginal effect of dropout rates in this region suggests a higher propensity toward violent crime among dropouts in this region in particular. Policies targeted to keep youth at risk in school should be implemented as crime prevention measures, in particular in the Northeast region, where the change in propensity to crime associated with this factor is large. Third, the larger marginal effect of the Gini coefficient also suggests that policies which reduce the concentration of income in the hands of a few will be a particularly effective preventive factor against violent crime.

#### The main results are:

- Although at the national level the proportion of the variation in homicide rates explained by the macro, context and micro factors described in this chapter is about 71 percent, it varies substantially at the regional level, explaining about 78 percent of the variation in the homicide rate in the Southeast and about 66 percent in the Northeast.
- The correlation of the Gini coefficient and the homicide rate is 2 and 3 times larger in the Southeast and North, respectively.
- The correlation between urban population share and the homicide rate is positive for all regions except the North, which is the region with the lowest percent of urban population. The correlations are particularly large for the Southeast and the North and substantially smaller for the Northeast and the Center-West regions.
- The cohorts of younger males (ages 15 to 19) appear to be negatively correlated with crime in the Northeast and positively correlated with crime in all other regions. The cohort of males ages 20 to 29 is positively correlated with the homicide rates for all regions.

- The dropout rate appears to be positively correlated with the homicide rate, but it is only statistically significant for the Northeast, which has a correlation three times larger than that observed at the national level.
- The Oaxaca decomposition of the Southeast and Northeast gives us a clearer idea of what changes took place between 2003 and 2008 in these regions. We find that for both regions, changes in coefficients appear to matter most, in particular in the Northeast. However, we find some striking differences on how changes in these marginal effects affected the differences in outcomes.
- **Over time, we observe a larger marginal effect of high school dropout rates, the concentration of income, and urbanization rates in the Northeast**, with coefficients more than twice as large as those observed at the national level.
- In the Southeast, most of the observed differences in homicide rates between 2003 and 2008 are due to changes in coefficients (marginal effects) of the youth cohort of males 15 to 19 years of age, changes in the concentration of income, and the high school dropout rate. When compared to the Northeast, we observe a smaller change in these coefficients, implying a larger marginal change in the Northeast relative to the Southeast or the national average.

Although the changes in these factors suggest that differences in endowments and coefficients account largely for the different regional outcomes, a large fraction of the variation is not explained by these factors, and could potentially be explained by variables that are in principle controllable by policies. We present some suggestive evidence of these controllable factors in the following section.

## ANALYSIS OF THE “RESIDUALS”—A POTENTIAL ROLE FOR POLICY?

The factors considered in the previous section deliberately did not include proxies for targeted government actions/policies aimed at reducing crime incidence. The observed trends in crime are thus decomposed in two parts: one that is explained by the macro, context and micro factors, and the other that is explained by all the factors we did not include in the regression, including policy actions. In light of this mechanical decomposition, the residual component can be interpreted as a noisy measure of the role of policies. It is important to stress that the residual component can at best only be correlated with policy action, because of our inability to control exhaustively for all those factors other than policy that could influence crime trends, for instance migration and displacements, endogeneity, etc.

**Therefore, the evidence presented in this section is at best suggestive of the role of policy, and so particular caution and thoughtfulness are needed in interpreting these results.**

- Larger positive overall residuals can be an indication of events or policies that positively affect the crime rates, while lower or negative overall residuals could suggest that a number of unobserved factors not controlled for explicitly in the regression are helping to explain a reduction in violent crime.
- Our estimates find large heterogeneity in all of these residuals across and within regions and states.
- The frequency-weighted means of these residuals suggest that we will observe more positive residuals, in particular in the North and Northeast, and more negative residuals in some municipalities in the Southeast. The results are not conclusive, because we find municipalities from all regions in the top 100 positive residuals, and municipalities from all regions in the top 100 negative residuals.
- We observe that larger positive residuals in municipalities in the Southeast correspond to areas that are not part of the metropolitan areas in the state. Lower (negative) residuals in municipalities in the Southeast correspond to municipalities in metropolitan areas, in particular those of Belo Horizonte and São Paulo.

**Table 5: Frequency-Weighted Largest Positive 100 Overall Residuals  
(after fixed effects estimation, 1997–2008)**

Region	State	Freq.	Percent
North	PARA	22	22%
South	PARANA	13	13%
Southeast	MINAS GERAIS	11	11%
Southeast	SAO PAULO	10	10%
Northeast	BAHIA	9	9%
Northeast	CEARA	6	6%
South	RIO GRANDE DO SUL	6	6%
Southeast	ESPIRITO SANTO	5	5%
Center-West	MATO GROSSO	3	3%
Northeast	PARAIBA	3	3%
Northeast	PIAUI	3	3%
Northeast	RIO GRANDE DO NORTE	3	3%
Center-West	GOIAS	2	2%
Northeast	ALAGOAS	1	1%
Northeast	MARANHAO	1	1%
Northeast	SERGIPE	1	1%
Southeast	RIO DE JANEIRO	1	1%
	Total	100	100%

Source: Authors' calculations based on DATASUS, IBGE and RAIS, CAGED from 1997 to 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions.

**Table 6: Frequency-Weighted Largest Negative 100 Overall Residuals  
(after fixed effects estimation, 1998–2008)**

Region	State	Freq.	Percent
Southeast	MINAS GERAIS	25	25%
North	PARA	17	17%
Southeast	SAO PAULO	13	13%
Northeast	BAHIA	12	12%
Northeast	GOIAS	11	11%
Center-West	MATO GROSSO	5	5%
South	PARANA	5	5%
Northeast	CEARA	3	3%
Southeast	ESPIRITO SANTO	3	3%
Northeast	MARANHAO	3	3%
Northeast	PARAIBA	1	1%
South	RIO GRANDE DO SUL	1	1%
Northeast	SERGIPE	1	1%
	Total	100	100%

Source: Authors' calculations based on DATASUS, IBGE and RAIS, CAGED from 1997 to 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions.

While the evidence presented here is only suggestive, one can associate these positive residuals with unobserved factors that are increasing the homicide rate, while we can associate the negative residuals with unobserved factors that reduce the homicide rate. While table 5 and 6 present evidence on the 100 largest positive and largest 100 negative residuals respectively, 7 shows the ranking for the overall means, median, 25<sup>th</sup> percentile and the 75<sup>th</sup> percentile.

**Table 7: Residuals ranking (negative to positive)**

State	Region	Ranking			
		Residual	Residual Median	Residual Percentile 25	Residual Percentile 75
Amazonas	North	1	18	16	6
Rio Grande do Norte	Northeast	2	16	8	4
Piaui	Northeast	3	14	13	3
Santa Catarina	South	4	1	19	1
Bahia	Northeast	5	9	3	16
Sergipe	Northeast	6	13	15	12
Mato Grosso	Central West	7	7	5	18
Sao Paulo	Southeast	8	5	7	13
Ceara	Northeast	9	15	2	17
Goiias	Central West	10	12	12	11
Rio Grande do Sul	South	11	4	17	5
Espirato Santo	Southeast	12	17	9	8
Para	North	13	8	1	19
Alagoas	Northeast	14	11	11	15
Paraiba	Northeast	15	10	10	7
Parana	South	16	3	6	9
Minas Gerais	Southeast	17	2	14	10
Maranhao	Northeast	18	6	4	14
Rio de Janeiro	Southeast	19	19	18	2

Residual estimates were calculated after fixed effects estimations of the saturated model. Residuals were ranked using state frequencies. Source: Calderón and Chioda, 2011.

Negative residuals imply that the observed homicide rates are below the predicted homicide rates, and positive residuals imply that predicted homicide rates are above the predicted homicide rate. We provide a description of the means following table 7. In the Southeast region, we observe that Rio de Janeiro and Minas Gerais have positions 19 and 17 respectively in this ranking. This implies these two states have the most negative, and the third most negative residuals in the sample (out of 19 states). In this ranking Sao Paulo is ranked as number 8, and Espirito Santo as number 11. In the Northeast region, Rio Grande do Norte ranks 2, Piaui 3, Bahia 5, Sergipe 6, Ceara 9, Alagoas 14, and Maranhao 18. In the North, Amazonas ranks 1, and Para ranks 13. In the South region, Santa Catarina ranks 4, Rio Grande do Sul ranks 11, and Parana ranks 16. In the Central West region, Matto Grosso ranks 7 and Goias ranks 10.

We observe four states (Rio Grande do Norte, Piaui, Bahia, and Sergipe) in the Northeast with a more positive residual than the first state in the Southeast (Sao Paulo). Only one state in the Northeast has a negative residual (Paraiba), whereas we find two of the states in the Southeast have negative residuals (Minas Gerais and Rio de Janeiro).

These rankings show that there are a larger number of states in the Northeast that are part of the top five residuals by size (most positive), while there are two states in the southeast

in the top five for negative mean residuals. Policies captured by these residuals could potentially explained some of the variation in homicide rates in these regions, as we observe a marked increase in homicide rates in the Northeast and a sharp decline in the Southeast following 2003.



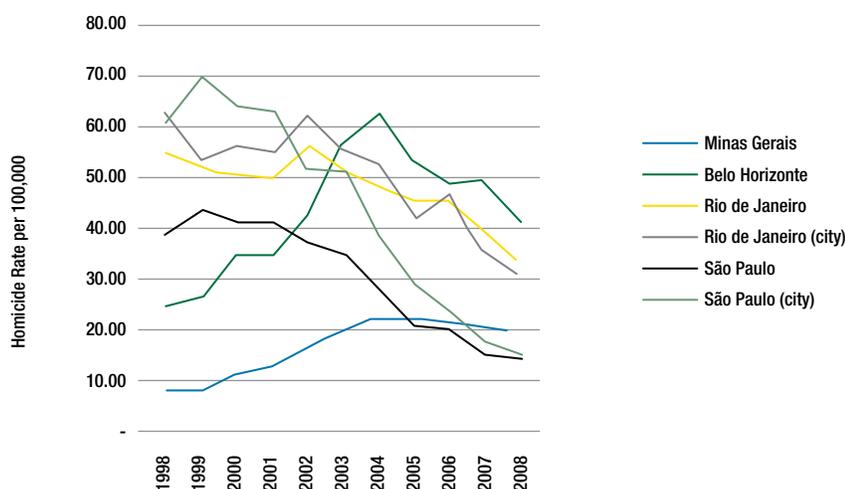
**CHAPTER 3.  
THE SUCCESS OF THE  
SOUTHEASTERN STATES:  
A ROLE FOR POLICY?**



**This chapter provides an overview of the citizen security policies implemented by some of the top-performing subnational governments in Brazil:** the State Governments and capitals of São Paulo, Minas Gerais and Rio de Janeiro. As Chapter 2 suggests, a significant part of the decline in violent crime in these states is strongly correlated with factors that are not directly related to sub-national government policies, such as the reduction of the youth male cohort, or reductions in inequality. However, the forgoing analysis of “residuals” also suggests a potential role for the policies implemented by these states. This chapter reviews some of the evidence on the potential contribution of these policies to the decline in violent crime and the lessons that could be drawn from them.

**The nationwide drop in violent crime since 2003 has been largely driven by steep declines within Brazil’s three most populous states and their respective capital cities,** all of them located in the modern, industrialized Southeastern region. Although Minas Gerais did not perform as well the other two, the state was included in the analysis because of the sharp decline in the capital city of Belo Horizonte and its metropolitan region (Graph 10).

**Graph 13. Homicide Rates for State and State Capital of São Paulo, Rio de Janeiro, and Minas Gerais, 1998-2008**



**There are important similarities and differences in the characteristics of the crime drop across the three cases:**

- **In terms of size of the change,** São Paulo shows the largest drop of the three. Its municipality went from being the second most violent of the 28 state capitals to the second *least* violent between 1999-2008 (76 percent decline from 61.1 to 14.8 homicides per 100,000). The State of São Paulo went from being the second most violent to the third *least* violent in the country, with its homicide rate falling 66 percent, from

44.1 to 14.9 per 100,000 over that period. The state of *Rio de Janeiro* was next with a 60 percent drop between 2002-2008 (from 56.5 to 34 per 100,000) and the city of Rio de Janeiro with a 50 percent drop in the same period (from 62.4 to 30.9 per 100,000). While the decline in the state of *Minas Gerais* was small (5.3 percent between 2003-2008), its capital of Belo Horizonte had a drop of 32.5 percent.

- **In terms of timing**, São Paulo was a precursor to the change in the other states and the country overall. The crime drop began in 1999 in São Paulo, while in Rio de Janeiro only in 2003, and in Minas Gerais not until 2004/2005.
- **In terms of spatial coverage**, all three cases show higher drops in their capital cities than in the rest of the state. In São Paulo the drop was more spread out across the state (affecting 500 out of 645 municipalities) than in Minas Gerais and Rio de Janeiro where it was more focused in the capital.
- **In terms of the evolution of different types of violent crime other than homicide**, São Paulo saw a decline among car robberies but an increase among thefts and bodily injuries. In Minas Gerais, the rate of violent crimes (including robbery, bodily injury, homicide, homicide attempt, rape, and rape attempt) decreased 45 percent in the state of Minas Gerais, and property crimes decreased by 45 percent between 2003-2009. In Rio de Janeiro, the crime drop has been largely restricted to homicides and, to a lesser extent, all intentional lethal crimes. Total property crime indicators have only been improving since 2008; before that, they actually worsened. Rates of theft and larceny have been on the rise state-wide since 2004, plateauing but not yet entering into decline even in the Capital City as late as 2010.

**Multiple, concurrent factors appear to have contributed to falling crime rates in all three states.** In addition to the structural factors identified in the previous chapter, the Brazilian literature and our own analysis suggest that specific policies have probably played an important role in the crime drop. The literature has identified a wide range of potential suspects, from programs to control guns and alcohol consumption, to efforts to improve police efficiency, increased incarceration, increased spending on public security, increased social spending, etc. It is difficult to identify one single factor as *the* cause of the crime decline in any of the three states. This is consistent with the conclusions of studies that attempt to explain the crime shift in the USA, and particularly in New York City, as well as in Canada during the 1990s (see Blumstein and Wallman 2006; Zimring 2007). Instead, the explanation seems to lie in a number of factors, perhaps none of which would have been sufficient to explain the drop in crime.

**These states and capitals have been at the forefront of innovative citizen security policies in Brazil.** These three states stand out not only because of their substantial crime drop but also because of the innovative policies that they have implemented to improve citizen security. A review of the evidence on the policies implemented in these states suggests the importance of four types of policy interventions:

- Strengthening the results orientation and managerial capacity of the police and public security system.
- Reducing the presence of key environmental risk factors, particularly guns but also alcohol and unsafe urban spaces.
- Targeting territories and populations at risk through multi-sectoral prevention strategies.
- Integrated and multi-stakeholder subnational citizen security plans.

**The rest of the chapter is organized along these four types of interventions.** The purpose is not to be comprehensive but to give a quick summary of the main evidence produced on the types of policies claimed by the literature to have made a difference in reducing violent crime in these states and cities. It is important to keep in mind that the evidence basis on the effectiveness of most of these policies is not strong enough to establish causal relationships; even when it is, the external validity or generalizability of any given policy is not established. At the same time, there is evidence for the effectiveness of similar types of interventions in developed countries. These interventions correspond to the three most common and complementary approaches to deal with crime and violence: criminal justice, public health focused on risks, and cross-sectoral approaches.

## REFORMING THE POLICE AND THE PUBLIC SECURITY SYSTEM

**Poor performance by the criminal justice system, and particularly by the police, has been identified as one of the key systemic roadblocks to citizen security improvements in Brazil** (Veloso and Guimarães Ferreira 2008). Some of the key factors that have contributed to this situation include: (a) a culture of reactive policing that is concerned with responding to each incident rather than identifying crime trends and preventing future incidents (World Bank 2006), which is partly related to (b) the lack of information and management systems to learn about crime patterns, and (c) the existence of two police forces (one responsible for ostensive patrolling—Military Police—and another one responsible for crime investigation—Civil Police) that lacked coordination, information sharing, and trust.

**This section highlights three innovations promoted by São Paulo and Minas Gerais to confront these challenges.** São Paulo led Brazil in adopting state-of-the-art, results-oriented public security management systems and providing policy makers with high-quality information for decision making. Minas Gerais followed São Paulo's lead and established a consolidated results-oriented management system for all law enforcement and public security agencies operating in the state. In Rio de Janeiro, progress in this area has been more recent but is moving in a similar direction, with the highlight of the reform being the introduction of Police Pacification Units (Unidades de Polícia Pacificadora, UPP), presented in the third section of this chapter.

**Results-Oriented Police Reforms in São Paulo.** Toward the end of the 1990s, as a response to the dramatic crime increase in São Paulo, the State Government began a comprehensive set of reforms to introduce a results orientation in its police force. Although there is no robust evaluation of these policies, strong anecdotal evidence has led many observers to credit them with having an important effect on São Paulo's drop in crime. These consisted of a broad set of changes, including the introduction of performance assessments; the territorial coordination of military and civil police forces; and community policing (Lima 2010). Key goals and initiatives for strengthening the results orientation of the police included:

- *Gathering accurate and timely empirical data and using it to plan and evaluate programs.* An intergovernmental communications network was established to link the military and civilian police. The Crime Information System (*Sistema de Informação Criminal, Infocrim*) linked 93 police districts and 79 Military Police battalions and allowed police to create strategies for 39 municipalities in the São Paulo Metropolitan Region (*Região Metropolitana de São Paulo, RMSP*). It began operating in 2000 along with Copom Online, an online database allowing for real-time monitoring of emergency calls. Fotocrim, which began in 2002, was a database with 207,903 photographs of people caught committing crimes and of prisoners (Waiselfisz and Athias 2005).
- *Capturing multiple-homicide perpetrators.* In 2001, the government restructured its Homicide Department to give it a more strategic orientation. It created an Intelligence Analysis Service within the department and developed a Plan to Combat Homicide focused on "hardened killers," or perpetrators of multiple homicides. As a result, the police were able to solve 65 percent of homicides (compared to an average of 7 percent for Brazil) and 93 percent of multiple-homicide cases in that year (Veloso and Ferreira 2008).
- *Engaging citizens in reporting crime.* The "*Disque Denúncia*" Crime Hotline, rolled out in 2000, provided citizens with a free channel to anonymously report crimes or provide tips to the police, and contributed to the police's ability to prevent and resolve crimes. Created by the São Paulo Institute Against Violence (*Instituto São Paulo Contra a Violência*), Disque Denúncia received more than 1.6 million calls and 300,000 formal complaints between 2000 and 2004 in the São Paulo Metropolitan Region. It led to 13,000 successful police actions: 5,760 homicide cases solved; 82 percent of all multiple homicides cases solved; 48 kidnapping victims freed; 9,420 arrests of criminals caught in the act; 1,965 arms and munitions seized; and 1,647 vehicles recovered (Kahn 2005; Disque Denúncia/ISPCV/SSP).

**Integrated Management of Public Safety (*Integração e Gestão da Segurança Pública, IGESP*) in Minas Gerais.** The main objective of IGESP was to allow the free and immediate flow of information between the Military and Civilian Police forces and the coordination of integrated planning within the public safety community. The lack of coordination, information sharing, and trust between the Civilian and Military Police have posed problems in many Brazilian

states and in the country as a whole. IGESP introduced modern technologies for information monitoring and targeted policing, using a dynamic updating system and constant evaluation of strategies and actions by the police organizations. The program was implemented in Belo Horizonte in 2005 and subsequently expanded to 56 municipalities by 2008. IGESP became the backbone of public security policy in Minas Gerais for improved management and the monitoring and evaluation of public strategies to control and prevent crime and violence in the state (Cruz, 2005). **Its adoption in the state was part of a more comprehensive and results-oriented public security strategy launched by the State Government in 2003 (see section below on integrated strategies).** An impact evaluation of IGESP showed it had a causal effect on crime reduction (Box 1.)

**IGESP consisted of five key reforms:**

- *Data consolidation and management.* IGESP consolidated all of the data and intelligence gathered by different police forces, including calls to emergency telephone lines and police vehicle dispatches, through an integrated information system.
- *Streamlined decision making.* The program consolidated and streamlined decision making at the level of the Integrated Area of Public Security (*Áreas Integradas de Segurança Pública*, AISP), through the territorial coordination of strategic actions involving the various law enforcement agencies. Under IGESP in Belo Horizonte, for example, Civil and Military police from certain AISPs began meeting weekly to define strategic plans and objectives, which facilitated the integration of these two police forces.
- *Spatial analysis.* The program adopted a georeferenced system to identify crime hotspots and target police responses.
- *Results-based management.* The program established performance indicators and state-level targets for all law enforcement agencies, consolidating a results-oriented approach that improved police performance.
- *Improved police training.* Finally, police training was intensified and modified to include subjects such as human rights education, and more adequate incentives were introduced, including more generous pay raises and promotions.

**Box 1. IGESP Impact Assessment Provides Evidence of Strong Effect on Crime**

A recent evaluation estimated the program's impact by applying a difference-in-differences strategy that exploited the staggered adoption of the program by municipalities and the evolution of the variables of interest before and after implementation. The study found a causal effect of IGESP on crime. The most conservative estimates indicate a 24 percent reduction in property crimes and 13 percent in personal crimes. There is also

evidence that IGESP is associated with improved police response to crime, measured by the number of weapons apprehended and clearance rates. It found a negative but non-significant effect on homicides (Soares and Viveiros 2010).

**Rio de Janeiro.** For most of the past three decades, several factors have prevented the successful implementation of a comprehensive statewide public security strategy along the lines of those pioneered by São Paulo and Minas Gerais. This dynamic has improved over the past several years, among other things by the increased coordination among city, state and Federal Government agencies with regard to public security policy in Rio. The police in Rio de Janeiro have created a system similar to the IGESP model, establishing the integration of police forces at the regional (*Regiões Integradas de Segurança Pública, RISPs*), area (*Áreas Integradas de Segurança Pública, AISPs*), and circuit (*Circunscrições Integradas de Segurança Pública, CISPs*) levels and a performance system that rewards results. Targets are therefore broken down by city, neighborhood and police unit, and evaluated based on a set of indicators that includes number of car thefts, homicides, robbery and bodily injury. A new indicator, death by confrontation with the police (“autos de resistência”) is also being added to the system, a significant progressive step, since in previous decades policemen had been rewarded for killing criminals. The results are tracked monthly, and if targets are met, police officers can receive a bonus that can reach three times the salary of a soldier. When the results fall behind, an action plan is mandatory, but officers are not punished (Alzir and Cesário de Sá 2011). This results-management approach is fairly recent in Rio (2009). There are no rigorous evaluations of its impact to date.

**The innovative managerial and information collection and sharing model adopted in the three states followed a trend inspired by the COMPSTAT model pioneered by the New York City Police Department** (NYCPD) in the mid-1990s, which involved new “management for results” techniques that changed the way performance information was used to improve police action.<sup>7</sup> The system is also in use in other major cities in the US and other developed countries including Canada, Australia and New Zealand that have witnessed significant declines in crime rates. In an overview of the eight key police policies that could explain the decline in crime in NYC, which represent since mid 1990s the largest and longest sustained drop in

---

7 COMPSTAT, short for COMPuter STATistics or COMParative STATistics, is the name given to NYCPD’s accountability process and has since been replicated in many other departments. COMSTAT is a management philosophy or organizational management tool for police departments. It is a multilayered dynamic approach to crime reduction, quality of life improvement, and personnel and resource management. It employs Geographic Information Systems and was intended to map crime and identify problems. In weekly meetings, ranking NYPD executives meet with local precinct commanders from one of the eight patrol boroughs in New York City to discuss the problems. They devise strategies and tactics to solve problems, reduce crime, and ultimately improve quality of life in their assigned area.

street crime ever experienced by a big city in the developed world, Zimring (2011) considers management and data mapping COMPSTAT system as one of the major shifts that was *probably* successful, but acknowledges that specific effects due to this policy can't be proven. According to Kelling and Souza (2001), the impacts of this initiative are one of the most difficult to statically measure because they are based on the "problem-solving" premise that police tactics need to be flexible to specific crime related problems as they are identified via the Compstat system. Hence, both problems and tactics are constantly changing, which makes it difficult to establish a single measure of police activity that can be used as a proxy. Furthermore, in order to be effective the system needs to be linked to the reforms, such as those followed in the three Brazilian states and described in the next sections (Bratton and Andrews 2010).

## REDUCING ENVIRONMENTAL RISKS: GUNS, ALCOHOL, AND UNSAFE URBAN SPACES

The availability of guns and alcohol are two important risk factors associated with violence. Policies to curb their influence are credited in part for the decline in crime in São Paulo and Rio de Janeiro. The most compelling evidence stems from the effect of gun control in São Paulo.

### Gun Control in São Paulo and Rio de Janeiro

The risk of dying from wounds caused by guns is 2.6 times higher in Brazil than in any country in the world (Dreyfus and Purcena 2009), and about 70 percent of homicides in Brazil are committed with firearms (Ministry of Health 2008). The alarming growth in the percentage of deaths caused by firearms led the Federal Government to enact gun control legislation in October 2003. These laws limited the imports of firearms, made it illegal to own unregistered guns or to carry guns on the street, and increased the penalties for violation of gun control laws.

#### Box 2. The Impact of Guns on Youth

**The externalities of armed violence** mean that guns can have an impact on children's welfare even if they never touch a weapon. A recent paper finds a statistically significant negative relationship between local rates of armed violence and school attendance as well as student performance on standardized mathematics exams in a sample of Rio de Janeiro public schools. The same study found a positive relationship

between local armed violence and grade repetition and dropout rates, with this effect stronger among non-white students. The authors find evidence linking local violence to poor school attendance and performance, through direct channels such as teacher absenteeism and school closures, as well as through less direct channels, whereby high levels of local violence affect household welfare even during periods of school vacation (Monteiro and Rocha 2010). Four of every ten apprehended arms in Brazil are in possession of youth.

There is evidence to suggest that gun control policies implemented by the State and Municipality of São Paulo since 1997 have played an important role in the decline of homicides, and that these effects were further amplified by the effective implementation at the state level of the 2003 federal Disarmament Law (*Estatuto do Desarmamento*). Between 1997 and 2002, the police increased the number of arms apprehended from 7,000 to 9,000 arms per trimester. This resulted from a 600 percent increase in police searches in the state between 1997 and 2006 (Kahn 2007). The Disarmament Law and the 2004 subsequent gun buyback program were evaluated by Souza et al. (2007). Both studies found positive results. São Paulo is considered to be an example at the national level because of its strict enforcement of the law (Souza et al. 2007). The state accounted for 25 percent of the nationwide decline in firearms deaths (Kahn 2010).

**Two recent studies have used more disaggregated data and stronger econometric techniques.** One of them found that gun control policies in the state can explain 21 percent of the decline in homicides in the Municipality of São Paulo. It further calculated that one life was saved for every 18 weapons apprehended; a total of 13,000 lives were saved between 2001 and 2007. To achieve these results, the authors used the number of weapons apprehended as a proxy for the flow of guns, and the number of suicides per firearm as a proxy for the stock of guns for 647 municipalities in the state between 2001 and 2007, in a fixed-effects panel model analysis (Cerqueira and Mello 2010). The other study found smaller but similar results, specifically that a 60 percent reduction in the stock of weapons in the state between 2001 and 2007 led to a 9 to 12 percent decline in homicides over the same period (Hartung 2009).

**In Rio de Janeiro, the 2003–2004 Federal Gun Control Legislation and Small Arms Buy-back Campaign have been associated with drops in rates of armed violence statewide.** A study commissioned by the United Nations Small Arms Survey and carried out by Brazilian researchers at ISER/Viva Rio in Rio de Janeiro found a 12 percent drop in firearm-related deaths nationwide and an 11 percent drop in Rio de Janeiro attributable to the ban on carrying small arms and the accompanying 18-month-long handgun buyback campaign (Dreyfus et al. 2008). The timing of the sharp onset of the crime drop in Rio, beginning in 2003, coincides with the passing of nationwide gun control legislation that same year, accompanied by

aggressive efforts at the state and local levels by government and civil society in support of a successful small arms buyback campaign.

**The Brazilian evidence of the impact of disarmament and stricter gun control laws on crime reduction is widely accepted in the country.** In other places where carrying arms is legally easier and culturally more accepted, such as the United States, gun control policies have been historically controversial, with influential authors and works providing evidence both in favor (Cook and Ludwig 2002) and against (Leott 2004) them. However, some of the most successful and internationally known interventions in the country, such as the pioneer “Ceasefire Operation” in Boston, Massachusetts, which was replicated in other major cities like Chicago, had direct law-enforcement attack on illicit firearms traffickers supplying youth with guns as one of its key elements. A time series analyses of this program suggest a 63 percent decrease in the monthly number of youth homicides in Boston; 32 percent decrease in the monthly number of citywide reports of gunshots fired; and 25 percent decrease in the monthly number of citywide gun assault incidents (Braga et. al. 2000). A similar intervention that involved the confiscation of illegal arms in Kansas City also yielded a 49 percent decrease in firearm-related crime. In Colombia, an evaluation of similar programs in Cali and Bogotá showed a decrease of 14 and 13 percent, respectively, in homicide rates on a weekend when the ban was enforced, compared to another one when it was not (Villaveces et al. 2000, in Cunningham et. all 2008).

## Regulating Alcohol Consumption through Bar Closures and Road Blocks

The Dry Law (*Lei Seca*) was implemented in São Paulo Metropolitan Region between 2001 and 2004. The law consisted mainly of bar closures between 11 p.m. and 6 a.m. in order to limit the sale and consumption of alcohol, and was implemented by 16 different municipalities (Waiselfisz and Athias 2005). According to the difference-in-difference model used by Biderman et al. (2010), the 10 percent of the drop in homicides in the São Paulo Metropolitan Region could be attributed to the law, and similar results were found for other crimes such as battery. Using a causal model and intervention analysis, Kahn (2005) found a decrease in homicides in 6 of the 16 cities that had adopted the Dry Law by 2004. However, he points out that homicide also rose in some places that had adopted the law, and concludes that, although the Dry Law helped deepen the decline in homicide in the places where it declined, it cannot be considered sufficient as a causal factor. The municipality of Diadema became the best-known example of all the cities that implemented the Dry Law in São Paulo [see Box 6].

In recent years Rio de Janeiro has also adopted a Dry Law, which is enforced with zero tolerance and relative transparency at police road blocks, or “blitzes.” Any alcohol detected by the on-the-spot breathalyzer test administered to motorists suspected of being inebriated is sufficient to result in an immediate loss of driving privileges. And unlike in the past, when Rio’s

police officers might be expected to negotiate informal solutions with motorists stopped for moving violations, no such discussion is permitted at Dry Law roadblocks, which are sometimes attended by journalists from Rio's local television and print media outlets.

## Improving the Safety of Urban Spaces

**During the great crime drop in São Paulo, parts of the city experienced an important process of slum upgrading and urban renewal** (Cities Alliance 2009, Peres et al 2010). A similar process happened in Belo Horizonte and is currently taking place in Rio de Janeiro. In recent years, the municipal government of São Paulo has devoted significant resources to improving the urban environment and reducing urban poverty.<sup>8</sup> These major urban improvements include the regularization and upgrading of slums under the *Bairro Legal* program, as well as the resettlement of households living in hazardous areas or the rehabilitation of the city center, which was one of the city's crime hotspots (Martin and Jenkins 2008).

**An important strand of crime theory posits that there is a direct association between physical disorder in a neighborhood and crime.** The so-called 'broken windows' theory argues that disorderly and petty criminal behavior, such as the presence of abandoned and derelict buildings, very noisy, and poorly lit, may lead to more criminal activities (Kelling and Cole 1998). The implementation of responses to this theory in certain places, such as NYC, where it was originally 'tested', coincided with declines in rates of different crimes, inspiring a series of empirical studies supporting this type of policy.<sup>9</sup> Thus, it is not surprising that some scholars have identified urban renewal processes as one of the factors that have contributed to reduce the risk of victimization in São Paulo and Belo Horizonte (Peres et. al 2010, Peixoto 2010). While we were not able to test this hypothesis, we were able to estimate whether there is a relationship between neighborhood disorder and crime in São Paulo. Results are summarized in Box 3 and in (Alda 2011).

---

8 Some of the most important programs include Programa Manaciais, Programa de Urbanização de Favelas, Programa de Regularização Fundiária em Favelas, Programa de Regularização e Urbanização de Loteamentos Irregulares, and the Programa de Mutirões.

9 Using misdemeanor arrests as a measure of the broken-windows approach, Cormann and Mocan (2002) found that the model explains between 33 and 86 percent of the observed decline in robbery and motor vehicle theft in NYC between 1990 and 1999. Keizer, Lindenberg, and Steg (2008) tested the model in the Netherlands by selecting and monitoring several urban locations and arranging them in two different ways ('orderly and disorderly'), at different times. They concluded that examples of disorder, like graffiti or littering, "can indeed encourage another, like stealing."

### Box 3. Neighborhood Disorder and Crime Victimization in São Paulo

As part of this report, we relied on a victimization survey done in São Paulo to assess the role that particular community characteristics, neighborhood disorder in particular, have on probability of criminal victimization from occurring. Research around communities and crime has shown that higher levels of neighborhood disorder or broken windows theory may actually encourage criminal activities as they signal offenders that there are lower levels of guardianship in the neighborhood (Kelling and Cole, 1998).

**Data, Methodology, and Results.** The survey had 1,986 respondents in 9 regions of São Paulo in 95 districts and 220 census tracts. Using multi-level model analysis, we examine the potential association between social cohesion and neighborhood disorder and a set of covariates at the individual and neighborhood levels on the likelihood of criminal victimization. The victim measure captures information on whether respondents have been victims in either one of the crimes explored in the survey (1 if the respondent has been a victim of crime in the past 12 months and 0 otherwise).

**The most salient findings of this preliminary** analysis suggest that:

- *Neighborhood disorder* appears to be statistically significant and strongly associated with higher levels of victimization in the researched neighborhoods after controlling for other individual and neighborhood characteristics.
- *Social Disorder*, a measure that captures the degree of disturbance in the neighborhood—for example, loud music or loud noises late at night or hearing gun shots during the night hours—is not associated with increased odds of being a victim of crime in São Paulo.
- *Social cohesion* doesn't seem to be associated with lower levels of victimization in São Paulo. These results are consonant with previous studies on *social cohesion* and crime victimization in Brazil where the levels of social cohesion in a neighborhood are not statistically significantly associated with a lower probability of crime victimization.

**Conclusion.** We tested the effect that social cohesion and neighborhood disorder have on criminal victimization using the results of a victimization survey conducted in São Paulo in 2008. Using multi-level modeling, our results suggest that there is a strong and statistically association between higher levels of neighborhood disorder and greater odds of being victimized.

## TARGETING HOTSPOTS AND POPULATIONS AT RISK THROUGH MULTISECTORAL STRATEGIES

**The spatial and demographic concentration of violent crime has led policy makers to design crime-prevention approaches that address the multiple factors placing these territories and populations at risk.** One of the empirical regularities of homicides is their spatial clustering in what are known as “hotspots” of crime and violence. These hotspots tend to suffer from multiple forms of urban risk or deprivation (high levels of poverty, lack of public services, high exposure to natural disasters, urban decay, etc.). Another empirical regularity, as we saw in Chapter 1, is for homicides to be disproportionately concentrated among poor male youth, most of whom also suffer from multiple disadvantages at the individual level (e.g., malnutrition, low education), family level (lack of parental monitoring), relationship level (friends are gang members), and community level (living in violence hotspots). This *accumulation* of disadvantages and risk factors either at the territorial or demographic level is what the literature has identified as the main driver of violent crime.

Decades of research evidence, increasingly supported by new computer systems and software, has helped to confirm this uneven distribution of crime according to physical and social characteristics of particular areas. As a result, a great body of analyses has also focused on evaluating policy responses targeted at these specific areas. For example, in an evaluation of nine cases of hotspot policing, including five large cities in the United States and one suburb in Australia, Braga (2007) found significant levels of crime reduction in seven of the selected studies. The most successful of these initiatives are usually complemented with social interventions targeted at different risks faced by the most vulnerable populations, such as youth.

**One approach to deal with multiple risks is to have multiple interventions that address risks one at a time.** For instance, one way to deal with the risk of being out of school and idle in high violence communities is to have policies targeting children in these communities to keep them in school or providing incentives to return to school. For instance, small monetary transfers to families provided through conditional cash transfer programs targeted to the poor have proven to be an effective way to encourage disadvantaged young people to complete secondary school in both Colombia and Mexico (Cunningham et. al. 2008). Chapter 4 presents evidence on the effectiveness of CCT Bolsa Família in having this kind of impact in São Paulo. In general, all three cities studied in this chapter had several examples of single programs dealing with single risks. For instance, the Family School (*Escola da Família*), rolled out in São Paulo in 2003, aimed to reduce violence in schools by involving the community in school activities and the lives of students. The program opened 5,306 public schools on the weekends in 645 different municipalities. A study found a 36 percent reduction in criminal acts within the school or its surroundings between 2002 and 2005 (Waiselfisz and Athias 2005).

**Another approach is to have single interventions addressing multiple risks at the same time.** This can be done either by making sure that multiple programs give priority to specific territory or population target or by designing a program with multiple components dealing with different risks. Each of the three cities has had a high profile example of this type of approach: Jardim Angela in São Paulo, Fica Vivo in Belo Horizonte, and Unidades de Policia Pacificadora in Rio de Janeiro.

**Targeting hotspots through comprehensive local prevention strategies in Jardim Ângela, São Paulo.** In the mid-1990s, Jardim Ângela was a hotspot, a São Paulo neighborhood declared one of the most dangerous places on the planet by the United Nations in 1996. As one of the most underprivileged neighborhoods in the city, Jardim Ângela was the first area to benefit from an initiative launched by the São Paulo Municipal Government in 2000 to direct social programs toward the most violent districts in the city. This initiative included programs such as *Renda Mínima*, *Bolsa Trabalho* and *Começar de Novo*, designed to assist the most vulnerable families, to help youth find jobs, and to support the reentry of people over age 40 into the workplace. This initiative was accompanied by a series of community and youth programs focusing on conflict resolution, gun and alcohol control, and partnerships with the police. These programs are also believed to have contributed to the early onset of the decline in violence that is unique to São Paulo. All these efforts were guided by a local violence prevention program designed and implemented by a broad-based movement that included community and civic associations, nongovernmental organizations, police agencies, local government officials and others. Between 2001 and 2007, homicides fell 76 percent in Jardim Ângela (Mizne 2008). Unfortunately, the lack of impact evaluations makes it impossible to know the extent to which these policies were responsible for the decline.

**Similar comprehensive local prevention interventions in other cities and neighborhoods that have been evaluated show significant impact in crime reduction.** This is the case of the Safer Cities Programme (SCP) implemented in England in the late 1980s in an attempt to reduce crime and fear of crime, with the ultimate goal of creating safer environments for community economic and social development. Although the program was part of a national initiative, its implementation was carried out at the local level. Among the different impact evaluations of the program, Ekblom et. al. (1996) found an overall reduction of 21 percent in burglary risks.

**Sequencing of these multiple interventions seems critical in contexts where social interventions, whether carried out by the state or by NGOs and the private sector, are hindered by the overt control of the territory by drug traffickers.** It is very difficult to provide opportunities in contexts where local governance is in the hands of gangs or organized crime, as in the case of Rio's favelas. A certain level of peace seems to be a precondition for social development, and social development is a core ingredient for the sustainability of the peace process. As a result, good performing policies have usually combined three stages: first, breaking the cycle of violence by retaking control of the territory from the hands of violent

groups, second, placing substantial community or proximity police forces in those territories to help maintain that level of peace, and third, ensuring the provision and improvement of social services delivery, as well as additional social interventions targeted at specific at risk groups. Two examples of this are Fica Vivo in Minas Gerais and UPPs in Rio de Janeiro.<sup>10</sup>

**In other contexts, where this territorial control is not so present, sequencing may be less of an issue, and control and prevention actions can be implemented in parallel.** This was the case of successful hotspot interventions such as the already mentioned Operation Ceasefire in Boston, and several other US cities, which focused on gun violence (illicit drug trafficking) and gang violence. Under these programs, stricter law enforcement and patrol in targeted areas was accompanied by extensive work with youth at risk and gang members, aimed at changing criminal behavior. Operation Peacekeeper in Stockton, California, trained youth outreach workers in community organizing, mentoring, mediation, conflict resolution, and case management, to use them as mentors and positive role models for youth in their respective communities. A pre/post comparative analysis showed that the program was associated with an overall 42 percent decrease in the monthly number of gun homicide incidents in the city during the period in which it was implemented (1997–2002)(Braga 2008).

**Fica Vivo in Minas Gerais: combining hotspot and youth targeting through a sequenced strategy.** The principal objective of the *Fica Vivo* program in Minas Gerais is to reduce homicides, particularly among youth, in urban areas with the greatest vulnerability to violent crime. It combines police interventions with social programs, carried out in cooperation with multiple stakeholders (military and civilian police, different municipal departments, NGOs, and the community itself). Minas Gerais's *Fica Vivo* program, in addition to carefully targeting at-risk youth in high-crime neighborhoods, is also noteworthy for the sequencing of its crime control activities. *Fica Vivo*'s police intervention has two phases. First, a strategic police force aims to capture hardened criminals living in the neighborhood and to remove guns from the community. This phase is followed by the introduction of a community police force, the Special Police Group for High-Risk Areas (*Grupo Especial de Policiamento em Áreas de Risco*, GEPAR), which seeks continuous interaction and collaboration with the community. A local community forum is organized monthly to discuss crime-related problems and coordinates strategies with the GEPAR police. For young people, the program offers social support, as well as educational, recreational, and sports components, including workshops on violence prevention. The *Fica Vivo* program was inspired by the CeaseFire Project implemented in Chicago since the 1990s and was piloted in Belo Horizonte in 2002. In the following year the

---

10 Medellín, which during the 1980s and early 1990s became the most violent city in the world as drug cartels and later guerrilla militias took over control of the city's marginalized hillside communities, followed a similar approach to the one being implemented by the UPPs in Rio. The unprecedented peace period witnessed in the Colombian city in 2003–2008 was largely a result of increased preventive presence through the increasing establishment of police stations and patrols, coupled with increased municipal investments in local public works projects (WOLA 2011).

program was institutionalized by the Minas Gerais State Government, becoming the responsibility of the SEDS.

#### **Box 4. Impact Evaluation of *Fica Vivo***

An evaluation of the pilot program showed a reduction of 34 homicides per 100,000 inhabitants every six months in the neighborhood where it was piloted, Morro das Pedras, leading to a 40 percent decline just in the first 12 months of the project (Beato Filho 2005). An external impact assessment of the program showed that *Fica Vivo* reduced homicides, although the effect of the program was not homogeneous and increased with time. The evaluation used a difference-in-differences with propensity score-matching methodology (Azevedo, Peixoto and Andrade 2009). A more recent study revealed a 50 percent decline in homicide in the areas of the city where the program was implemented (SEDS 2010). A cost-benefit analysis of its impacts also showed that the program had a 99 percent rate of return for society (Peixoto 2008).

***Unidades de Polícia Pacificadora in Rio de Janeiro.*** UPP is a police peacekeeping initiative, launched in the City of Rio de Janeiro in December 2008, which aims to recapture territory until recently controlled by Rio's drug-trafficking gangs. The UPP implementation has three phases. It starts with the initial tactical invasion of the community, usually led by the Special Police Operations Battalion (*Batalhão de Operações Policiais Especiais*, BOPE). It is then followed by the establishment of a permanent community policing force whose members are selected specifically for UPP service from the Military Police Academy and receive specialized training in human rights, conflict prevention and mediation, and community policing. Finally, the public security aspects of the UPP program are accompanied by an integrated and targeted social program called *UPP Social*, administered by the Rio de Janeiro Municipal Government.

The UPP Social consists of a coordination mechanism that maps government, private sector, and civil society programs/interventions and channels them towards the achievement of specific goals aimed at consolidating peace and promoting long term social development of the favelas. These goals are operationalized through basic needs assessments and overseen locally by management teams based in each favela. The UPP Social is launched in each new community through a community forum, designed to provide a forum for debate, open among government representatives, service providers, local businessmen and entrepreneurs, community leaders and residents. Together, UPP and UPP Social seek to provide sustainable public security and full democratic participation to residents of UPP-receiving communities. UPP and UPP Social promises to be a game changer in the fight of Rio de Janeiro against drug traffic related crime and violence (Box 5).

**Box 5. Extending the Right to live in Peace to Favela Residents by Changing the Rules of the Game for Rio de Janeiro's Drug Traffickers: *Unidades de Polícia Pacificadora (UPP)***

**A long standing and seemingly intractable problem.** Conflict between and among Rio's three main drug-trafficking factions and the Military and Civilian Police have driven Rio's homicide rate for most of the past 30 years. Public security experts estimate that more than half of Rio de Janeiro's homicides are directly related to the organized drugs trade, resulting either from police action in faction-controlled areas or from conflict among and between faction members, often with innocent victims caught in the crossfire (Amnesty International 2007; G. Soares 2008). The launch in December of 2008 of the Police Pacification Unit (UPP) initiative in the capital aimed to seize back control over territory formerly dominated by the drug traffickers, and to provide public security and extend public services to the residents of *favelas* long cut off from the rest of the city.

**The UPP tries to change the rules of the game for drug trafficking in Rio de Janeiro.**

UPP does not represent a "war on drugs" with the explicit aim of capturing or killing as many gang members as possible and abolishing drug trafficking. Rather, the program seeks to deny drug-trafficking gangs control over territory, and to assert the state's monopoly of the legitimate use of force across the capital. The expectation is that this change in the rules of the game will compel Rio's drug-trafficking gangs to adjust their business model to conform more closely to the clandestine and less violent model employed by their counterparts in Europe and the United States, without provoking an all-out war between organized crime and the state, such as that now playing out in Mexico.

**The program is expanding rapidly.** As of December 2012[update], the program had deployed about 3500 in 28 UPPs throughout the city, covering more than 100 communities and reaching approximately 400,000 people. By 2014, the state government aims to deploy about 12,500 policemen in 45 favelas covering about 800,000 people or roughly 75 percent of favela residents in the city of Rio de Janeiro.

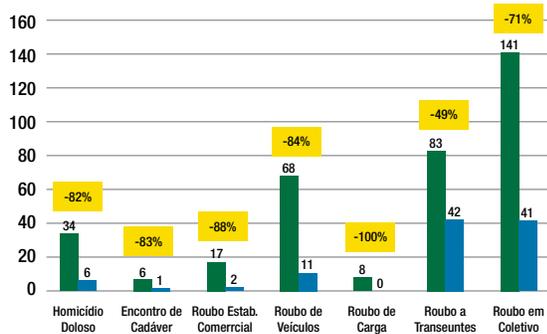
**Preliminary results are very encouraging.** In areas served by UPP violent crime has fallen dramatically, while property value has increased. A recent analysis led by professor Ignacio Cano, from the state university of Rio de Janeiro (UERJ), shows that violent deaths (e.g. homicides and deaths in encounters with the police) have decreased 78 percent in UPP areas from January 2006 to June 2011, while other non-violent crimes have substantially increased, such as threats (from 29.4 to 99 per 100,000 inhabitants), domestic violence (from 27 to 84.6 per 100,000) and rape (from 1.3 to 4.8 per 100,000) over the same period (UERJ and FBSP 2012).<sup>11</sup> The study argues that these types of

11 Universidade Estadual do Rio de Janeiro (UERJ) and Fórum Brasileiro de Segurança Pública (FBSP) (Coord. Ignacio Cano). 2012. "Os Donos do Morro: Uma avaliação exploratória do impacto das Unidades de Polícia

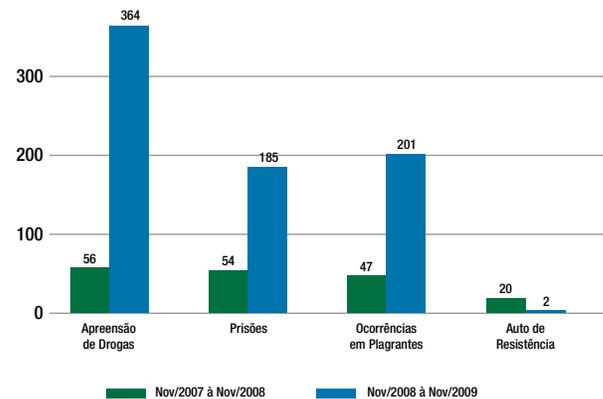
crime could have increased either because now there is no “parallel” power of drug lords brutally enforcing the order upon favela residents and their relationships with neighbors and family members, or that crime reporting has increased with the arrival of the UPPs.

Below are some earlier statistics for crime and police activity in *Cidade de Deus*, which according to police reports mirror results across pacified favelas. Preliminary results from public polls and ongoing research projects suggest the powerful effects that the pacification process is having in the lives of those communities. A survey of favela residents found that 86 percent of those interviewed in favelas with UPPs believed that safety had greatly improved and 72 percent felt that outsiders had greater respect for them after the UPPs were installed. Among those without UPP, 72 percent considered UPP a positive initiative and 70 percent would support receiving the program (IBPS, 2010). Residents report feeling a great sense of relief and are enjoying re-claiming their public spaces and the “liberty to come and go” as they please at any time of day or night. Some benefits have already started to spill over to the neighbours of the *favelas*. A study by the Housing Union (SECOVI) found that houses located near UPP favelas in the South Zone had increased their rental value by 149 percent and sale value by 59 percent after the arrival of the UPPs (O Globo, 3/12/2010). Citizens from the favela and the “asfalto” regard it as a major success in the fight against organized crime and is the main contributing factor to Governor Cabral Filho’s popularity.

Cidade de Deus - Crimes



Cidade de Deus - Atividade Policial



Fonte - ISP - Instituto de Segurança Pública (nov 07-08 e nov 08-09)

## INTEGRATED AND MULTI-STAKEHOLDER SUBNATIONAL CITIZEN SECURITY STRATEGIES

**Subnational governments' role in developing integrated and multi-stakeholder citizen security strategies is often mentioned as an important contributor to reducing homicide,** particularly in Minas Gerais and in some of São Paulo's most violent municipalities. These strategies bring together the three elements of policy mentioned before (results oriented policing, risk factors, and targeted interventions). In addition, they are key to mobilizing multiple stakeholders to participate in crime control and prevention activities. Cities and towns that participated in the Metropolitan Forum for Public Security—an initiative of the São Paulo Institute Against Violence (*Instituto São Paulo Contra a Violência*, ISPCV)—appeared to reduce their homicide rates by 6.3 percent per year between 1999 and 2003 (Waiselfisz and Athias 2005). The establishment of the Municipal Secretariat for Urban Security (2002) and the decentralization of the São Paulo Government allowed local governments to have more control over urbanization policies, such as the installation of street lighting and other key services (Kahn 2005; Sou da Paz 2008). Assessing the impact of this type of policy is very difficult given the multiple programs and interventions and changes that are part of them and take place at the same time. One of the best known examples of this type of approach is the municipality of Diadema in São Paulo (Box 6).

### Box 6. Municipal-level strategies for crime prevention in Diadema

In 1999, Diadema was the most violent municipality in São Paulo. Since then it managed to drop its homicide rate by 81.5 percent in eight years, from 111.62 per 100,000 in 1999 to 20.67 in 2007. Crime reduction was led by two municipal citizen security plans that encompassed a range of interventions including the three types of policies mentioned in this chapter (i.e. result oriented police reform, guns/alcohol control, hot spot and population at risk targeted programs). These plans and their preventive public policies were carried out through strong multi-stakeholder partnerships that included local, state and federal authorities, as well as civil society, religious and police groups.

In 2001 the municipality developed its **first citizen security plan** focused on investing in a new technology system for the police and in prevention programs. This included the incorporation of MapInfo in 2002, which allowed for the targeting of criminal hotspots that could be crossed with vulnerability and social inequality maps, and the signing of an agreement with São Paulo state Government to access InfoCrim. A few highlights include:

- Access to the newly gathered data allowed the identification of youth as the group most affected by crime and violence, as well as of a high number of vulnerable youth with learning disorders who had left school. Based on that, a project was

implemented to build life skills and strengthen citizenship among youth and prepare them to work.

- Data also showed that 60 percent of the homicides in the city in 2001 had occurred between 11 p.m. and 6 a.m. and were located close to establishments that sold alcohol for immediate consumption. The response to that was the establishment of the successful 'Bar Closure Law', which stipulated an 11 p.m. curfew for all bars in the municipality. Estimates show that the law saved 11 lives each month over the following two years.
- Other key interventions included public education on preventing crime and violence (including campaigns against the abuse of alcohol and firearms); community policing; and improvements in public security through environmental design (e.g. increased lighting, revitalization of public spaces, etc.) there was a 55% reduction in sexual violence against women, and an 80% reduction in alcohol-related problems received at 24-hour health centers.

In 2005, a second municipal security plan - "**Diadema em Paz**" - was developed, using the information collected in the previous years. The design and implementation of the plan followed a strong participatory approach that included public meetings with more than 800 community leaders and a traveling forum that brought together 1,500 people to discuss security issues during six months of meetings. This second plan focused on management, urbanization, criminality and risk factors, 17 security commitments involving the public authority, organized civil society, Military and Civil Police, and the municipal civil guard. It included the training of security forces in the use of the new technologies, the establishment of mediation centers to promote nonviolent conflict resolution, a *Disque Denúcia* hotline that allowed people to inform the police if they witnessed the illegal sale of alcohol, and an integrated video-monitoring center.

Source: Miki 2008.

**Bogotá represents another case of integrated and multi-stakeholder initiatives that are associated with significant crime reduction.**

A decade of multi-sector interventions in the city are linked to a decline in homicide rates from a peak of 80 per 100,000 inhabitants, in 1993, to 22 in 2004 (Cunningham et al. 2008). Strategies implemented included targeting risk factors such as gun and alcohol consumption control; capacity building of the police; initiatives that promoted to cultural changes of citizens' behavior; regeneration of urban spaces; and a set of institutional reforms. Another distinctive feature of this case was the establishment of an outside evaluation system through the program "How's Bogota Going" ("Bogotá como Vamos"), by which three independent organizations - the Bogota Chamber of Commerce, the newspaper El Tiempo, and a well-known local NGO - became responsible for following closely the implementation of the local Security Plan, while also monitoring citizens'

perceptions and indices of victimization. Bogota strategy also included a strong citizen participation component by providing training for community leaders on coexistence and citizen security at the community level. Although several studies have tried to measure the impact of several of these specific interventions, as in the case of Diadema it has also been difficult to know exactly what was the contribution of each of them in the overall positive results on crime reduction. Yet Bogota also suggests that there was an adequate combination of strategies (Cunningham et al. 2008).

**Institutional innovation to develop State level Public Security Strategy in Minas Gerais.**

The Minas Gerais State Government administration that took power in 2003 merged the Secretariats of Justice and Public Safety to create the new Secretariat of Social Defense (*Secretaria Estadual de Defesa Social*, SEDS). With the creation of the SEDS, for the first time in Brazil's history, all institutions and agencies in charge of public security in the state were integrated under one Secretariat. These include: civilian and military police organizations, penitentiary administration, the public defender's office, firemen, and agencies responsible for juvenile delinquents. Following the same results-oriented reforms that were applied in São Paulo, the SEDS defined a single strategy for public security in the state that included not only crime control but also proactive social and urban crime prevention policies. The strategy was part of a broader results-oriented reform process that the State Government introduced in several sectors; it involved defining goals and monitoring and evaluating the performance of state agencies in achieving those goals. SEDS's strategy was organized around three pillars: integrated management of public safety (through the implementation of IGESP), prison system reform, and social prevention of crime.

**The prison system reform is also considered in the literature as one of the key factors that led to crime reduction in Belo Horizonte.**

It included the unification of the state prison policy, which was previously segmented into different secretariats (Sapori 2007, Rocha 2010). The new Management Model for the Prison System (*Modelo Referencial de Gestão do Sistema Prisional*) placed the management of the prisons under SEDS, thereby allowing the Civil Police to start focusing on investigations, crime prevention and repression, and on the rehabilitation of criminals. Prior to this change, the Civil Police were in charge of the prisoners in custody. Between 2003 and 2009, 44 prisons that used to be managed by them became SEDS's responsibility. By the end of 2009, all prisons in Belo Horizonte and its metropolitan area had been either transferred to SEDS or deactivated (Ribeiro et. al 2004, Sapori 2007, Minas Gerais 2009). In addition, education, health, professionalization and legal centers were also implemented or augmented in most prisons as part of the reform. The social prevention approach of the crime pillar included the development of crime prevention programs carried out in partnerships with other public institutions (Civil and Military Police, judiciary, etc.), other government actors (state, municipal government) and civil society organizations (Beato 2007, Andrade 2006, Sapori 2007, Sapori and Andrade 2008, Batitucci 2010, Cruz 2005, Sousa 2009, Paula 2009).

**Most of these programs embraced a multidimensional approach to crime and violence reduction that placed a premium on partnerships** between law enforcement institutions such as the police and judiciary, and between government actors at the state and municipal levels while also including civil society organizations (Beato 2007; Sapori and Andrade 2008; Batitucci 2010).

**The decentralized nature of several of the results-oriented reforms implemented in Minas Gerais and São Paulo brings into sharp relief the importance of front-line workers during program implementation.** What perceptions do these frontline workers have about the drivers of crime reduction in their area, and about the relative efficacy of the programs being implemented there? How accurate are these perceptions, and how can these perceptions affect program implementation? A background paper was prepared for this report to address these questions using a positive deviant methodology (main results are summarized in Box 7).

**Box 7. Exploring the Perceptions of Frontline Workers about the Drivers of Crime Reduction – A Positive Deviant Analysis in Belo Horizonte**

The paper by Azevedo et al (2011) presents the findings of a positive deviant study designed to explore in a systematic manner the perceptions of those at the frontline about the factors correlated with the reduction of violent crimes in the city of Belo Horizonte. The study was based on a sample of 100 census tracts, which had similar trends of homicide between 2000-2003, but then observed opposite trajectories between 2004-2009. Almost 500 frontline workers from the local Police and NGOs working in those census tracts were interviewed face-to-face.

**Key findings include:**

- **The perceptions of the frontline actors seemed accurate**, as respondents from higher and increasing homicide areas were more likely to claim that the criminal activity in his/her census tracts seems worse when compared to either the AISP or the city of Belo Horizonte.
- **According to the systematic perception of respondents, crime reduction seemed to be correlated with the presence of selected programs in the past five years.** Some of these programs include Fica Vivo, GEPAR, community police, IGESP, Conflict Mediation, mobile courts, Open schools during the weekends, BH Ciudadania, Municipal Police (Guardia Municipal) and Bolsa Escola/Bolsa Familia.
- **In addition, the perception of improvement in the quality of implementation of these programs in the course of the last five years is also significantly different among groups** for the three main programs, namely, Praca de Esporte, GEPAR, IGESP. Areas in which the perception of the implementation programs had worsened, were more likely to have observed an increase in crime.

- **These results should not be interpreted as evidence regarding the effectiveness of such programs**, however one could see them as a possible argument to prioritize these interventions on a future agenda of more rigorous impact evaluations. Since not only the perception of their presence, but also the variation in the quality of their implementation seems to be correlated, according to this sample of decision makers, with the observed changes in crime reduction.

Source: Azevedo et al (2011)

## APPLICABILITY TO OTHER STATES?

**Pernambuco's recent response to criminality mirrors in several ways the strategies adopted several years earlier in São Paulo and Minas Gerais.** In an attempt to confront the rising rates of violence striking the state until the mid-2000s, in 2007 the government launched a cross-cutting, integrated public security strategy called Pact for Life (*Pacto Pela Vida*). The program used a multisectoral approach, consisting of 138 actions for crime control and prevention involving police and institutional reforms (e.g., the development of sophisticated information systems to map crime, increased police training and results-oriented policing, hotspot policing, the integration of police forces, community policing and enforcement of gun-control legislation) and prevention initiatives (e.g., social programs targeted to youth at risk, investment in education, health, cultural activities, etc.). The program also developed a system of permanent monitoring and oversight that includes representatives from civil society and different sectors. During the first four years of implementation of the program, homicide rates declined by 26,9 percent (from 53.1 in 2007 to 38.8 in 2010), while in almost all other eight states in the Northeast region rates increased significantly over the same period, with the exception of a small decline in Rio Grande do Norte. A study by the State's Social Defense Secretariat released in early 2011<sup>12</sup> claims that the program was responsible for the nearly 14 percent decline in the violent crime rate in 2010, which represented 523 lives saved in the state when compared to 2009. The study also showed that in four years, Recife had a 34.4 percent decrease in the same index per 100,000 inhabitants. The Center for Research on Criminality, Violence and Public Security Policies (NEPS) at the Federal University of Pernambuco is currently developing a qualitative and quantitative study to evaluate the program.

**The current administration in Brasília appears to be following the lessons from these states and cities.** The Secretary of Public Security Regina Miki was the architect of the Diadema experience, from her position as Municipal Secretary of Public Security for eight years.

---

12 "Pacto pela Vida Vira Exemplo", [http://www.diariodepernambuco.com.br/2011/01/27/urbana1\\_0.asp](http://www.diariodepernambuco.com.br/2011/01/27/urbana1_0.asp). The methodology followed by this study was not reviewed for this report, so its claims should be taken as tentative.

The Secretary launched a renovated National Citizen Security Program (*Programa Nacional de Segurança Pública com Cidadania*, PRONASCI) and the Federal Government is investing in information systems to better understand data on crime and public security and develop stronger impact assessments of potentially transformative programs such as the UPP and UPP Social in Rio de Janeiro and Pacto pela Vida in Pernambuco. PRONASCI has a dual focus on territories and populations at risk. It tries to transform these hotspots into “territories of peace” with two major PRONASCI initiatives: *Mulheres da Paz* (Women of Peace) and *Protejo* (Protect), which were specifically designed to identify and proactively assist young people living in the most dangerous neighborhoods. Their implementation has varied across states, but no thorough impact evaluation of these programs has been carried out for far.





# CHAPTER 4.

## REDUCING CRIME AMONG YOUTH: THE ROLE OF EDUCATION POLICY



**This chapter weighs the evidence for the role of education** as a protective factor against crime and violence, with particular focus on its causal impact on aggression, crime and violence among at-risk male youth. In Chapter 2 we showed that large male youth cohorts and elevated high school dropout rates are strongly correlated with observed homicide trends at the national and sub national levels in Brazil for the period 1998-2008. This chapter goes beyond what is suggested by the estimates in chapter 2, exploring the causal impact on homicides of reducing the high school dropout rate and of projects targeting at risk youth through conditional cash transfers for schooling.

**The focus of this chapter is youth and juvenile delinquency, motivated by the overrepresentation of youth in crime and violence.** Youth account for a large proportion of crimes: 15- to 19-year-olds account for 20 percent of arrests for violent offenses in the US (Levitt and Lochner 2004). In São Paulo, among those crimes for which the age of the suspected offender is known, between 20 and 25 percent of robberies, thefts and motor vehicle crimes are committed by individuals under the age of 18. Not only are late adolescence and early adulthood the peak ages of criminal offenses, but they also coincide with a sensitive period in the development and formation of academic, socio-emotional and behavioral skills (Blumstein and Cohen 1987; Cook and Laub 2002; Farrington 2007). Indeed, both cognitive and non-cognitive forms of human capital are strongly predictive of criminal behavior (see Lochner and Moretti 2004; Lochner 2010). Results shown in chapter 2 show the importance of the size of male cohorts and its correlation with the homicide rate at the municipal level, where larger cohorts of males 15-19 in particular, appear to be positively correlated with larger homicide rates.

**Causal evidence is generally limited for Brazil because of data access issues and lack of empirical identification.** This chapter presents novel results from a background paper (Chioda, De Mello and Soares 2010, hereafter CMS). In particular, CMS studied the **contemporaneous impacts** of schooling on crime and violence. The paper falls into a strand of the literature focused on measuring the impact of interventions that influence youth schooling, whether along the extensive or intensive margin. The extensive margin refers to investment in schooling and the impact on crime produced by changes in the number of youth enrolled in school. The intensive margin refers to how long a given student stays in school conditional on initial enrollment; here we seek to measure whether there is an effect on crime of changing the length in the school day.

**This section is organized as follows:** The channels through which education and education policy may have consequences for the incidence of crime and violence are first reviewed. The specific policy interventions and environments in São Paulo are then discussed, as are the details of the data. Finally, preliminary results of the analyses are provided, along with brief discussions of the probable mechanisms.

## CHANNELS

**CMS's paper investigates the impact of two education policies on crime and violence.** The first, Brazil's conditional cash transfer (CCT) program, operates on adolescents along the extensive margin of education (whether or not to enroll in school) while the second, a lengthening of the school day among younger São Paulo students, operates on the intensive margins (the hours spent in school conditional on enrollment). This study relates to two strands of the literature on crime. The first considers the ability of poverty reduction programs to influence criminal behavior; the second investigates the role of human capital investments in decreasing crime and violence.

Although strong correlations relating poverty and education to violent and illegal activities are well documented, studies identifying causal links are more limited and are mainly restricted to UK and US policy evaluations. To the best of our knowledge, this paper is the first to consider the relationship between conditional cash transfers and criminality.

**The types of interventions studied here operate through mechanisms that fall into two broad headings: income and human capital effects.** Resources made available by poverty reduction programs may mechanically lower the incentive or need to engage in economically motivated crimes. For instance, under a relaxed budget constraint, newly affordable goods decrease the incentive or necessity to obtain them illicitly. Indeed, there is considerable evidence that economic conditions affect crime rates. For instance, small but significant reductions in property crimes are found in response to declines in unemployment rates (Freeman 1995; Donohue and Levitt 2001; Raphael and Winter-Ember 2001), while Machin and Meghir (2004) and Gould, Weinberg and Mustard (2002) document a negative relationship between crime rates and the earnings of low-wage and low-skilled workers. In turn, DeFranzo (1996, 1997), Zhang (1997) and Hannon and DeFranzo (1998) study the link between welfare payments and crime directly, finding a negative relationship for serious crimes as well as property crime. However, the most compelling evidence on the income gradient of crime comes from a housing voucher program in Chicago, which in fact transferred the equivalent of 50 percent of household income to beneficiaries. Jacob and Ludwig (2010) report close to a 20 percent decline in both violent and overall arrests in response to voucher receipt, implying an income elasticity of -0.4. In sum, the economic motivation for crime does not appear to be merely theoretical.

In addition, supplemental income from poverty reduction programs may alter a household's routines in a manner that exposes it to less risk of victimization and/or opportunities for delinquency, such as by affording parents more time for supervision (Heller, Jacob and Ludwig 2010). On the other hand, greater resources are also associated with purchases of normal goods, including criminogenic goods such as alcohol or narcotics that can induce loss of inhibition or control and increase aggression. For instance, Dobkin and Puller (2007) document that consumption of illicit drugs increases among welfare recipients at the beginning of the

month, when their checks arrive. While holding other inputs constant, the theoretical effect of increasing income is therefore ambiguous. However, policies that supplement family income are also associated with changes in the composition of household inputs, including investments in human capital. In the context of the conditional cash transfers considered here, this link is required by their conditionalities.

<b>Income Channels</b>	<ul style="list-style-type: none"> <li>• More resources relax HH budget constraints and imply less incentive to engage in economically-motivated crimes (-)</li> <li>• HHs change routines in a manner that exposes them to less risk of victimization and/or opportunities for delinquency (-)</li> <li>• More resources imply more purchases of normal goods, including criminogenic goods: e.g., alcohol or narcotics (+)</li> <li>• Additional family income is associated with changes in the composition of HH consumption and investment, e.g., human capital. (-)</li> </ul>
<b>Other Channels</b>	<ul style="list-style-type: none"> <li>• <b>Human Capital:</b> education alters both risk aversion and patience, favoring forward-looking decisions and less risky behavior (-)</li> <li>• <b>Social networks</b> are formed in school, with the potential for pro-social peer effects, assuming that those youth who are enrolled are positively selected (-)</li> <li>• Attending school mechanically generates an <b>incapacitation effect:</b> criminal opportunities are more limited in school than on the streets (-)</li> <li>• Attendance implies <b>concentration</b> of youth in a common location and facilitates their interaction, which may lead to increased conflict and more group-based delinquency (+)</li> </ul>

**Both the CCT programs and the school-day shift change in São Paulo directly impact human capital investments.** Each is expected to affect the propensity to engage in criminal or violent enterprises by altering the relative rewards of work and crime through a number of channels (Becker 1968; Lochner 2010). First, education may affect the cost-benefit calculations of criminal participation by altering preferences and discount factors, inducing greater patience and placing more weight on future welfare, thereby favoring more forward-looking decisions (Becker and Mulligan 1997). Similarly, education is related to changes in psychic returns to crime (Lochner 2010) by rendering students more risk averse, which makes participation in crimes associated with substantial uncertainty in rewards or punishment more costly. An additional benefit of education lies in the social networks that are formed in school and the potential for pro-social peer effects (Glaeser, Sacerdote and Scheinkman 1996), assuming that those youth who are enrolled in school are positively selected, in the sense of having lesser inclination toward crime. With positive returns to education in the labor market, education also raises expected future wages and, by extension, the current opportunity cost of crime, thereby discouraging delinquency (Becker 1968). In the context of incompletely rational behavior, psychologists and neuroscientists have emphasized the link between human capital accumulation and higher levels of executive functioning. This relates to self-regulation skills such as inhibitory controls, problem-solving strategies, memory and self-monitoring. Previous research has shown that a range of social and behavioral skills related to aggression, self-control, moral reasoning and emotional coping are predictive of criminal and related behaviors, in some cases even in early childhood (Agnew 1992; Heckman, Stixrud and

Urzua 2006; Hill et al., forthcoming). Finally, enrollment in school affects criminal activity through two additional mechanisms. First, attending school is mechanically associated with an incapacitation effect, according to which criminal opportunities are more limited in school than on the streets. Incapacitation has been established as an important channel through which education affects contemporaneous criminality. For instance, Anderson (2010) documents declines in juvenile crime rates at the time of increases in the minimum dropout age across US states, while Berthelon and Kruger (forthcoming) report concomitant declines in the wake of Chile's length-of-school day reforms which, since 1997, have gradually extended the amount of time that students spend in school from 32 to 39 hours per week. However, a second, countervailing mechanism is associated with schooling: school attendance implies concentration of youth in a common location and facilitates their interactions, which may lead to increased friction among them and result in more conflict and more group-based delinquency. By exploiting exogenous variation in teacher in-service days, Jacob and Lefgren (2003) report that property crimes committed by juveniles decreases by 14 percent on days when school is in session (i.e., due to incapacitation), but that the level of violent crime contemporaneously increases by 28 percent (as a result of concentration). In turn, Luallen (2006) estimates the causal effect of school attendance on juvenile crime by exploiting teacher strikes as an exogenous source of school closings and likewise reveals declines in property crimes but increases in violent offenses. The net impact of education on contemporaneous criminality therefore depends on the relative importance of the above mechanisms, hence the need for an empirical evaluation.

## EVIDENCE FROM SÃO PAULO

**CMS's paper investigates the impact of two education policies on crime and violence.**

Making use of a unique dataset combining detailed school characteristics with time-stamped and geo-referenced crime information from the City of São Paulo, it measures the contemporaneous effects on crime of interventions that directly influence youth schooling, both along the extensive and intensive margins. In order to identify these causal effects, the authors use two different policies.

**They first consider the impact of increased school enrollment induced by the conditionality of the federal and municipal cash transfer programs, *Bolsa Família* and *Renda Mínima*.**

These programs disburse cash to low-income families provided that children in the household meet minimal levels of school attendance. They exploit this conditionality (and the 2008 expansion of *Bolsa Família*) to quantify the effect of a manipulation in education along the extensive margin on the incidence of an array of crimes. Although this poverty reduction program may affect criminality through peer, incapacitation and human capital effects, a fourth mechanism could also be at play in this case: the income effect of additional resources in recipient households.

**Box 8. Policy Details (1): Conditional Cash Transfers**

During the 2006-2009 period, two conditional cash transfer programs were operating in the city of São Paulo. These were the federal program Bolsa Família and the municipal program Renda Mínima.

Bolsa Família is a federal minimum family income program created in 2003 that has been the subject of numerous studies. The program has different benefits for families at different income levels and with various conditionalities. The Basic Benefit is a payment of R\$60 for families with monthly per capita income below R\$70. In addition, there is the Variable Benefit, according to which families with monthly per capita income below R\$140 receive R\$22 per child under age 15 (up to the maximum of three payments). Finally, starting in 2008, benefits were extended to adolescents, through the creation of the Variable Youth Benefit. This benefit paid R\$33 per family member between the ages of 16 and 17 (up to a maximum of two payments), for families with monthly per capita income below R\$140.

The maximum benefit value in Bolsa Família is R\$200 per family, which applies to families with monthly per capita income below R\$70, three children under age 15, and two adolescents between the ages of 16 and 17. Schooling and health conditionalities are also attached to the payments, although it has recently been claimed that they have not been seriously enforced. In terms of schooling, program participation requires school enrollment and 85% attendance for children between 6 and 15, and 75% attendance for adolescents between the ages of 16 and 17.

São Paulo's Renda Mínima, in turn, is a municipal minimum family income program that was created in 2006. In order to be eligible for the program, families must have lived in the City of São Paulo for at least two years, have a monthly per capita income below R\$175, and have at least one child under age 16. The conditionalities are school enrollment and minimum attendance of 85% for children between the ages of 6 and 15, and fulfillment of a vaccination schedule for children under age 7. Renda Mínima's benefits typically complement those of Bolsa Família. The maximum benefits allowed by Renda Mínima are (total value = Bolsa Família + Renda Mínima): R\$140 for families with one child, R\$170 for families with two children, and R\$200 for families with three or more children.

**The second policy instrument considered involves a change in the length of the school day.** Starting in 2007, the Secretariat of Education of the city of São Paulo began reducing the number of schools operating three-shift school days, in favor of the longer two-shift system. The new shift structure is intended to benefit children through more time in school and also to make more rational use of school time (*Prefeitura de São Paulo* 2010). This reform enables the authors to estimate the impact of schooling on crime and violence along the intensive

margin of schooling, conditional on enrolling in school, in a manner that is not confounded by any income effects.

As mentioned, the aim is to measure the short-run impact of education investments on criminal behavior, in the form of the effect of schooling (and income) that is likely driven by day-to-day changes in the desire and opportunity to commit crime. While important, this study does not investigate the longer term impacts of educational attainment on criminal participation that operate through changes in the returns to legitimate work, in the financial or psychic rewards of crime, or in preferences, for which there is already considerable evidence (see Lochner 1999; Lochner and Moretti 2001).<sup>13</sup>

## Crime Data

**The paper uses data from several sources.** First, crime data are from INFOCRIM, a COMP-STAT crime-tracking system of the *Secretaria de Segurança Pública do Estado de São Paulo*, the state-level law enforcement authority. It includes georeferenced police report data for all crimes committed in the city of São Paulo from 2006 through 2009. INFOCRIM includes all information available in the police report. Besides the latitude and longitude where a crime was committed, it includes the type of crime, time (or estimated time) of occurrence, and some characteristics of the perpetrator such as age and gender, when available. The analysis concentrates on theft, robbery, vandalism, violent crimes (homicides, attempted homicides and assaults), crimes against minors, and drug-related offenses. Records related to these types of occurrences encompass a total of 1,473,939 crimes over the four-year sample.

## School and Student Data

**School and student data cover the period between 2006 and 2009 and come from two sources.** Data from the Secretariat of Education of the city of São Paulo on state and municipal schools identify the type of school, school location (longitude and latitude), and number of students covered by conditional cash transfer programs (Bolsa Família and/or Renda Mínima). For municipal schools, data are also available on the year in which the school switched from three to two shifts and average performance in standardized Mathematics and Portuguese exams from 2007 to 2009 (students enrolled in municipal schools of São Paulo—2<sup>nd</sup>,

---

13 School-based programs focused on improving social development among at-risk children have shown positive effects in terms of criminal behavior through early adulthood. Empirical evidence suggests that school-age programs specifically targeting at-risk children/youth and designed to improve social development can yield positive long-term effects on an array of outcomes ranging from educational attainment, conduct disorder, and criminal behavior. (See Evaluation of Fast Track, the Montreal Longitudinal Experimental Study, and the Seattle Social Development Project.)

4<sup>th</sup>, 6<sup>th</sup>, and 8<sup>th</sup> grades—take Mathematics and Portuguese exams every year, known as the Prova São Paulo). Most municipal schools cover elementary education up to 8<sup>th</sup> grade, while state schools typically cover 5<sup>th</sup> grade through high school.

From the Brazilian School Census, additional data are gathered on the number and demographic characteristics of teachers and students, and on school infrastructure. The characteristics are: gender, race and education of teachers; age, gender, race and current grade of students; and, for school infrastructure, number of classrooms, presence/absence of treated water, sanitation, a television, and number of computers available.

#### **Box 9. Policy Details (2): Change in School Shifts**

Historically, most municipal schools in the City of São Paulo operated on a three-shift school day. The first shift would run from 6:50 a.m. to 10:50 a.m., the second from 10:55 a.m. to 2:55 p.m., and the third from 3:00 p.m. to 7:00 p.m. Each group of children would therefore typically spend four hours at school, regardless of the shift to which they were assigned.

Starting in 2007, the Secretariat of Education of the City of São Paulo decided to reduce the number of schools operating under three shifts and switch the entire municipal system to the two-shifts-per-day system. Under the two-shift system, children spend five hours in school, either from 7:00 a.m. to 12:00 p.m. or from 1:00 p.m. to 6:00 p.m. This is supposed to benefit children through more time in school and also to make more rational use of school time, preparing the municipal system for a future transition to school shifts of six or seven hours, depending on the grade (Prefeitura de São Paulo 2010).

As a result of the change in policy, the percentage of municipal schools operating under the three-shift system declined from 67.1% in 2006 to 14.6% in 2009. This percentage is likely to continue to decline over the coming years.

**Empirical strategy:** Given the nature of the interventions and outcomes under consideration, the natural unit of analysis is the geographic area in the approximate vicinity of each school. Unfortunately, São Paulo does not have a strict geographic definition of school districts. Students in the city are assigned to the closest available school, so there is a high correlation between school location and place of residence. Artificial districts around each school are therefore constructed by assigning to a given school the area that is closer to it than to any other school.

This is an important step that associates crimes in a given location to a particular school. Obviously, children do not circulate only in these areas and do not necessarily live there, but they are likely to live close to the school and spend part of their day there. If there is a

high probability that children are near the school area for a significant amount of time, this approach should be adequate. US evidence supports this strategy, since it reveals a concentration of crimes committed by youth in periods immediately following school hours, when children/adolescents are likely to remain around the school (Snyder and Sickmund 1999; Jacob and Lefgren 2003; and Gottfredson and Soulé 2005). The system of assigning students to schools in São Paulo also supports this approach, since children are expected to study in the closest school available. Thus, the measure of crime per school is the number of crimes that happened closer to a given school than to any other school (these crimes are “assigned” to that particular school). Therefore, the construction of the dependent variable depends on the schools included in the sample.

To check the sensitivity of the results to the age group of children considered, municipal and state schools are considered separately. **Municipal schools** typically cover younger children, from elementary school up to eighth grade, while **State schools** cover older children, from fifth grade to the end of high school. Also, to account for the possibility of movement and social interactions across children from different schools, the presence of other schools (and students) in a certain neighborhood around a given school (a given kilometer radius) are explicitly controlled for.<sup>14</sup>

## SUMMARY OF RESULTS

The analysis concentrates on theft, robbery, vandalism, violent crimes (homicides, attempted homicides and assaults), crimes against minors, and drug-related offenses. Records related to these types of occurrences encompass a total of 1,473,939 crimes over the four years in the sample.

In the analysis of the relationship between CCT-related schooling and crime, the correlation between a school’s enrollment of students receiving the Bolsa Família and surrounding crime is found to be indistinguishable from zero. As discussed above, however, raw correlations are difficult to interpret in this context, because several mechanisms mediate the relationship. In addition, this relationship is confounded by unobserved socioeconomic conditions that prevail in the areas surrounding schools, such as poverty and unemployment rates, which are likely to be correlated with both CCT receipt and crime rates.

**However, when CCT receipt is instrumented using Bolsa Família’s 2008 expansion to adolescents aged 16 to 17, large declines in all categories of crimes are uncovered.** The effects based on the full sample are similar in magnitude to those based on restricting attention to crimes committed exclusively on school days, suggesting that incapacitation does not exclusively account for the results. Instead, this evidence is consistent with income and

---

14 In the report and in the paper, details are provided on the identification strategy and on the causal nature of the estimates. That discussion is omitted here for brevity.

human capital effects playing a role. In turn, the school shift change is found to have little impact on criminality, perhaps because the policy operates on youth who have already opted to enroll in school, and who are thus at a lower baseline risk of delinquency.

## The extensive margin (policy instrument: CCTs, conditionality):

Among state schools which, as previously mentioned, typically provide high school instruction, there is little relationship between the number of students receiving federal or state CCT and any of the various measures of crime. For instance, conditional on a number of school and neighborhood characteristics, a year-to-year increase of one student receiving a CCT in a given school is on average associated with a 0.006% increase in crime of any kind. However, this relationship is statistically indistinguishable from zero.

A concern regarding estimating simple associations between the number of students receiving either the Bolsa Família or Renda Mínima and crime is that these are plausibly positively correlated with unobserved neighborhood characteristics, which are themselves correlated with criminality and violence, including poverty rates or unemployment. To overcome this possibility, the 2008 expansion of Bolsa Família eligibility, which extended benefits to adolescents up to age 17, is exploited by constructing an instrument that is the interaction of the number of students ages 16 to 17 in 2006 and an indicator for years 2008 and 2009.

	All Crimes	Robberies	Thefts	Violent Crimes	Drug-Related	Against Minors
# of <i>Bolsa Família</i> Students	-0.391%***	-0.464%***	-0.118%	-0.252%*	-1.50%***	-0.782%**

Note: Dependent variable is the # of crimes in each category that occurred in the neighborhood of a high-school. Reported estimates represent the percent decline in crime of each type resulting from an increase of one student receiving *Bolsa Família*.

Instrumenting for the number of youth receiving a CCT in this manner reveals the importance of unobserved characteristics, since the IV estimates differ considerably from their OLS and count data counterparts. **In particular, they suggest that an additional student receiving a CCT at a given state school is causally related to (statistically significant) 0.39, 0.46, 0.25, 1.50, and 0.78 percent declines in all crimes, robberies, violent crimes, drug-related offenses, and crimes against minors, respectively.** Although the latter two categories experience the largest declines as measured by their semi-elasticities to the receipt of *Bolsa Família*, such offenses are relatively rare events (only between 3 and 5 incidents per year per school neighborhood) particularly compared to robberies, which occur at an average rate of 433 per year per school district, such that the largest decline in number of incidents are among robberies.

## The intensive margin (policy instrument: lengthening of the school day):

**The results suggest little relationship between school shift length and crime.** To the extent that the incapacitation and concentration effects are non-zero, this evidence suggests that they roughly offset one another, such that any gains resulting from keeping youth in school longer are unraveled by greater conflict or crime in school. However, the null results on nonviolent crimes such as thefts, which are unlikely to occur in schools and are therefore not a margin along which one would expect to observe a concentration effect, suggest that even the incapacitation effect is weak (at least along this margin).

	All Crimes	Robberies	Thefts	Violent Crimes	Drug-Related
Shift Change	39.38	6.95	25.65	4.61	0.95
Indicator	[22.96]*	[5.41]	[15.38]*	[3.67]	[0.91]

Notes: For ease of interpretation, OLS estimates are reported. However, estimating negative binomial count data models reveals no statistically significant impacts.

An alternative explanation for the finding that there is no relationship between the length of the school day and crime is that this manipulation along the intensive margin of education does not capture those youth who are at higher risk of criminality. In particular, the intervention affects only youth who are already positively selected, i.e., those who have previously opted to enroll in school and who are at lesser risk of delinquency. In addition, the reform affects only municipal schools, which typically serve younger children (only three percent of students were age 16 to 17 in 2007)



# CONCLUSIONS AND WAY FORWARD



**The landscape of violent crime in Brazil** has undergone a profound transformation over the last ten years. As this report shows, for the first time in decades Brazil's homicide rate is lower than the average for Latin America. Cities that were synonymous with insecurity and crime, such as São Paulo and Rio de Janeiro, have been the main drivers of this decline, placing them, especially São Paulo, at the same level of change as the much-heralded cases of New York City and Bogotá. Unfortunately, most states in the Northeast and many in the North have experienced a significant deterioration of their levels of public safety.

We built a unique dataset to analyze the drivers of the national level decline as well as the heterogeneity across regions. At the national level, the reduction of the male cohort of 15- to 19-year olds, the reduction in concentration of income, and the reduction in high school dropout rates appear to be highly correlated with the decline in homicide rates observed following 2003. Why did the Southeastern states do so much better than the North and Northeast? What explains variation across regions? Our results suggest that a higher reduction in income inequality, school dropout rates and better labor market conditions in the Southeast are consistent with the observed reduction in homicides. In the Northeast, however, we observe a smaller reduction in inequality compared to all other regions, and an increase in high school dropout rates. In addition, the Northeast's increase in urbanization is also associated with increases in crime. For the Northeast and Southeast regions, we find that changes in coefficients of these variables largely account for most of the observed change in homicides since 2003. This means that the marginal propensity to commit crime is very sensitive to changes in these variables. Crime prevention policies should therefore pay special attention to inequality, high school dropout rates, and urbanization as strong risk factors to be tackled. However, we should remember that these are simple correlations, which do not capture causation. The policy recommendations stemming from these results should thus be cautious, since these variables could be simply markers of underlying causal mechanisms.

Our analysis of the residuals suggests that the variation across regions could potentially be related to differences in policies. What are the policies that have distinguished the Southeast from the rest? The most important appear to be: results oriented policing, gun and alcohol control, programs targeting youth at risk and hot-spots of crime and violence, all guided by integrated and multi-stakeholder citizen security subnational strategies. These policies are not offered as prescriptions of what governments should do since the evidence basis for their effectiveness is not strong enough to establish causal relationships; even when they are, their external validity or transferability is not established. Instead they are offered as examples of policies meriting careful further study through more robust analytical work, impact evaluations, and controlled policy learning. In particular, this learning agenda should include five themes that appear to have been important in the policy experience of the southeastern states:

- 1. Reduce youth fragility.** Although there is little that policy can do to influence the type of demographic shift that contributed to the recent national crime decrease, policies

can be put in place to reduce the fragility of youth. This report has summarized the experience of programs which can offer useful insights on how to adopt a multi-sectoral, territorially based strategy focused on youth at risk. In addition, compelling evidence from the CCT evaluation shows the power of education as a key protective factor, and the value that instruments such as CCTs could have in reducing the fragility of youth at risk. The study found that an additional student receiving a CCT at a given state school is causally related to 0.39, 0.46, 0.25, 1.50, and 0.78 percent declines in all crimes, robberies, violent crimes, drug-related offenses, and crimes against minors, respectively.

- 2. *Develop comprehensive crime-prevention strategies that combine territorially based interventions targeting crime and violence hotspots with generalized policies that reduce risks across the board.*** Reviewing the determinants of violent crime identified in this study gives a sense of the multiple factors and dimensions influencing it: rapid urbanization, increased circulation of firearms, and reduced inequality are all complex phenomena that call for comprehensive strategies dealing with different risks and determinants through different instruments. There is no single magic bullet to reduce violent crime. Some risk factors are of an eminently territorial nature, as confirmed by the victimization survey of São Paulo, and as further underscored by the effect of rapid urbanization as a determinant of national crime. Slum upgrading and urban renewal policies that transform decaying and risky environments into places where communities can thrive should be combined with broader social and economic policies that enable economic opportunities to emerge in these territories.
- 3. *Sequence and integrate crime-control and crime-prevention activities.*** It is very difficult to provide opportunities in contexts where local governance is in the hands of gangs or organized crime. As the recent example of UPP and UPP Social reveals, in contexts such as the slums of Rio de Janeiro, peace is a precondition for social development, and social development is a precondition for the sustainability of the peace process. The apparent synergies among UPP, UPP Social and social programs in Rio de Janeiro are an example of the gains to be made through sequenced and integrated approaches. The pacification effort can allow social programs to reach out to beneficiaries previously excluded from the program. The UPP Social is actively seeking to facilitate access to high schools so that the newly enrolled children can meet the program's conditionality. The synergies from a sequenced approach are evident in many of the experiences reviewed in this report. GEPAR and *Fica Vivo* in Minas Gerais and the experience of Jardim Ângela in São Paulo are other examples of this approach.
- 4. *Introduce a results orientation that rewards innovation and performance accountability.*** Both Minas Gerais and São Paulo were at the forefront of efforts to reform the police through the adoption of results- and information-based management, through better integration of the civilian and military police, and through improved training

and professionalization of the police force. Minas Gerais created a *Secretaria de Defesa Social* to provide strategic leadership and coordination for this agenda and hold the different actors accountable for agreed targets. The success of policies such as IGESP is an example of the results achieved through this approach. Usually, these innovations were founded on strong partnerships with universities and/or with the private sector and civil society, which lead to the next point on the knowledge and information platform that should underpin these efforts.

- 5. Build monitoring and evaluation systems that enable shared diagnostics, policy learning and experimentation among the key actors involved in the public safety agenda.** Several of the innovations presented in this report were the result of carefully designed pilots, accompanied by impact assessments that guided decisions regarding their rollout. *Fica Vivo* in Minas, UPP and UPP Social in Rio, *Disque Denúncia* in São Paulo are examples of this. Assisting government teams in developing the skill set required to perform this controlled “learning-by-doing” approach, and tools such as the positive deviant analysis piloted in Belo Horizonte as part of this study, can be part of the repertoire of tools to identify areas that require more rigorous impact assessment.

**The future research agenda should also focus on understanding the dynamics of violent crime in the states that have suffered rapid increases in violent crime, particularly in the Northeast and North regions.** As annex V shows, this includes states like Bahia, Alagoas, Maranhão, Para, Rio Grande do Norte, Paraíba, and Amazonas. This study has hinted at some of the factors that might explain the worsening of security in these states and capital cities: rapid urbanization, the effect of dropout rates, and increases in inequality. Further studies should try to unpack these factors and assess more carefully their relative contribution to insecurity.

**Looking ahead from a policy perspective, Brazil needs to consolidate and deepen the gains made in the Southeast and tackle head-on the challenge of the Northeast.** Fortunately, there is good news coming from the Northeast as well. Pernambuco and its capital city, Recife, which for much of the past decade had the dubious distinction of being by far the country’s most violent major metropolitan area, have seen homicide rates decline since 2008. Perhaps not coincidentally, Pernambuco is the only state in the Northeast to have implemented substantial public security reforms based on experiences from the Southeast. Other Northeastern states, including Bahia, have pledged to follow suit. The Federal Government is investing in information systems to better understand data on crime and public security and develop stronger impact assessments of potentially transformative programs.

**Brazilians are well known in the world for their life-loving attitude,** their warmth and capacity to enjoy human fellowship. It is only fitting, then, that the country has started to put the blemish of crime and violence behind it and to build a future in which the right to live, and to live in peace, becomes one more thing about which Brazilians can feel proud.





# REFERENCES



- Agnew, Robert (1992). Foundation for a general strain theory of crime and delinquency. *Criminology*, 30(1): 47–87.
- Alda, Erik (2011). Social Cohesion, Neighborhood Disorder and Criminal Victimization: Evidence from São Paulo. Mimeo.
- Amnesty International (2005). "Eles Entram Atirando: Policiamento de comunidades socialmente excluídas no Brasil. London: Amnesty International Press.
- Anderson, D. Mark (2010). In School and Out of Trouble? The Minimum Dropout Age and Juvenile Crime. Mimeo.
- Andrade, S. C. P. de. (2006). Polícia Bipartida: uma reflexão sobre o Sistema Policial Mineiro. Dissertação de mestrado. Belo Horizonte, EG/FJP.
- Andrade, M. V.; Peixoto, B. (2008). "Avaliação Econômica de Programas de Prevenção e Controle da Criminalidade no Brasil". In: Beato Filho, C. C. (Org.). *Compreendendo e Avaliando: Projetos De Segurança Pública*. Belo Horizonte, UFMG.
- Alzir das Chaves, Roberto and Cesário de Sá, Antonio. Public Security in Rio de Janeiro. Presentation at the Wilson Center for Scholar on March 16, 2011.
- Batitucci, E. C. *A Emergência do Profissionalismo na Polícia Militar de Minas Gerais (1969-2009)*. Tese. Doutorado Sociologia, UFMG. Belo Horizonte: FAFICH/UFMG, 2010.
- Beato Filho, Cláudio (2005). Crime and Violence Diagnostics and Information for Urban Safety Audits. Washington D.C.: World Bank.
- Becker, G.S., (1968). "Crime and Punishment: An Economic Approach", *Journal of Political Economy*, 76 (2), pp. 169-217.
- Becker, Gary and Casey B. Mulligan (1997). The Endogenous Determination of Time Preference. *Quarterly Journal of Economics*, 112(3), 729–58.
- Biderman, C., Mello, J.M.P., and Schneider, A. (2010). Dry Law and Homicides: Evidence from the São Paulo Metropolitan Area. *Economic Journal*, v.120, 157–182.
- Braga, Antonio, Kennedy, David; Piehl, Anne; and Elin Waring (2000). "The Boston Gun Project: impact evaluation findings". Cambridge: Harvard University.
- \_\_\_\_\_ (2008). "Pulling Levers Focused Deterrence Strategies and the Prevention of Gun Homicide". *Journal of Criminal Justice* 36(4): 332-43.
- Brandon C. Welsh and David P. Farrington. (2007) Save Children From A Life Of Crime. *Criminology & Public Policy*. Volume 6, Issue 4.
- Bratton, William J. and Smith, Dennis C. (2001) "Performance Management in New York City: Compstat an revolution in police management.", in Dall. W. Forsythe, ed., *Quicker Better Cheaper? Managing Performance in American Government*. Albany, NY: Rockefeller Institute Press.

- Briceño-León and Zubillaga (2002). Violence and Globalization in Latin America. *Current Sociology* January 2002 vol. 50 no. 1 19-37.
- Buonanno, Paolo, 2003. The Socioeconomic Determinants of Crime. A Review of the Literature. Working Papers 63, University of Milano-Bicocca, Department of Economics.
- Buonanno, Paolo and Leone Leonida, 2005. Non-linearity between Crime and Education: Evidence from Italian Regions, University of Milano-Bicocca, Department of Economics.
- Bushway, Shawn D. , Cook, Philip J. and Phillips, Matthew, The Net Effect of the Business Cycle on Crime and Violence (July 13, 2010). Duke Department of Economics Research Paper. Available at SSRN: <http://ssrn.com/abstract=1655741>
- Calderón, Valentina and Laura Chioda (2011, unpublished draft). Trends, elasticity and hysteresis of crime in violence in Brazil (2003-2008).
- Cerqueira, D., Mello J.M.P. Menos armas, menos crimes: o emblemático caso de São Paulo (2009). Available at: [www.ence.ibge.gov.br/pos\\_graduacao/mestrado/seminarios/res30.ppt](http://www.ence.ibge.gov.br/pos_graduacao/mestrado/seminarios/res30.ppt). Accessed on March 9, 2011.
- Chioda, Laura, João Manoel De Mello and Rodrigo Soares (2010). Does Education Reduce Crime & Violence? Evidence from Bolsa Família and Extending the School Day in São Paulo. World Bank.
- Chiu, H. and P. Madden (1998), "Burglary and income inequality", *Journal of Public Economics* 69, 123-41.
- Cook, Philip J. and Jens Ludwig (2002). *Gun Violence: The Real Costs*. NY: Oxford University Press.
- \_\_\_\_\_ and John H. Laub (2002). After the epidemic: Recent trends in youth violence in the United States. In Michael Tonry, (ed.), *Crime and Justice: A Review of Research*, Vol. 29. Chicago: University of Chicago Press.
- Corman, H. y Mocan N. (2002) "Carrots, Sticks and Broken Windows", National Bureau of Economic Research, Working Paper No. 9061.
- CRUZ, M. V. G.; BATITUCCI, E. C. (2006). "Novos Meios de Articulação Institucional na Segurança Pública: estudo de caso em Belo Horizonte, Minas Gerais". In: SLAKMON, C; MACHADO, M. R. e BOTTINI, P. C. (orgs.). *Novas Direções na Governança da Justiça e da Segurança*. Brasília/DF, Ministério da Justiça.
- Cunningham, Wendy, Linda McGinnis, Rodrigo Garcia Verdu, Cornelia Tesliuc, and Dorte Verner. (2008). *Youth at Risk in Latin America and the Caribbean: Understanding the Causes, Realizing the Potential*. Washington, DC: World Bank.
- de Mello, Joao M. (2009). Does Crime Affect Economic Decisions? An Empirical Investigation of Savings in a High-Crime Environment (with Eduardo Zilberman), *The B.E. Journal of Economic Analysis & Policy*.

- de Mello, Joao M. and Alexandre Schneider (2007). Mudança Demográfica e a Dinâmica dos Homicídios em São Paulo (with), *Revista São Paulo em Perspectiva*.
- DeFranzo, James (1996). Welfare and Burglary. *Crime and Delinquency*, 42, 223–229.
- DeFranzo, James (1997). Welfare and Homicide. *Journal of Research in Crime and Delinquency*, 34, 395–406.
- Dobkin, Carlos and Stephen Puller (2007). The Effects of Government Transfers on Monthly Cycles in Drug Abuse, Hospitalization, and Mortality. *Journal of Public Economics*, 91(11–12), 2137–57.
- Donohue, John, and Steven Levitt (2001). The Impact of Legalized Abortion on Crime. *Quarterly Journal of Economics*, 116(2), 379–420.
- Dreyfus Pablo and Júlio César Purcena (2009). *Pegando o touro pelos chifres. Os efeitos de medidas de controle na indústria brasileira de armas pequenas*. Flacso Brasil junho
- Eklom, Paul, Ho Law and Mike Sutton, with assistance from Paul Crisp and Richard Wiggins. (1996). *Safer Cities and Domestic Burglary*. Home Office Research Study 164, London, England: Home Office.
- Ehrlich, I., (1996). "Crime, Punishment, and the Market for Offenses", *Journal of Economic Perspectives*, 10 (1), pp. 43-67.
- Fajnzylber, P., Lederman, D. and N. Loayza (2002). "What Causes Violent Crime?", *European Economic Review*, 46 (2), pp.1323-1357.
- Freeman, R.B., (1999). "The Economics of Crime", *Handbook of Labor Economics*, ch. 52, 3, pp. 3529-3571.
- \_\_\_\_\_ (1996). "Why Do So Many Young American Men Commit Crimes and What Might We Do About It?", *Journal of Economic Perspectives*, 10 (1), pp. 25-42.
- \_\_\_\_\_ (1995). The Labor Market, in *Crime*, James Q. Wilson and Joan Petersilia, eds., San Francisco: ICS Press, pp. 171–192.
- \_\_\_\_\_ (1994). "Crime and the Job Market", in Wilson, J. Q. and J. Petersilia (Eds.), *Crime*. San Francisco: ICS Press.
- \_\_\_\_\_ (1991). "Crime and the Employment of Disadvantaged Youth", NBER Working Paper no. 3875.
- Glaeser, E.L. and B. Sacerdote (1999). "Why is there more crime in cities?", *Journal of Political Economy*, 107 (6), pp. S225-S228.
- \_\_\_\_\_ and J.A. Scheinkman (1996). "Crime and Social Interactions", *Quarterly Journal of Economics*, 111, pp. 507-548.

- Grogger, J., (1998), "Market Wages and Youth Crime", *Journal of Labor Economics* 16, 756-791.
- \_\_\_\_\_ (1995). "The Effect of Arrest on the Employment and Earnings of Young Men", *Quarterly Journal of Economics*, 110 (1), pp. 51-72.
- \_\_\_\_\_ (1991), "Certainty vs. Severity of Punishment", *Economic Inquiry*, 29, pp. 297-309.
- Gottfredson, Denise C. and David A. Soulé (2005). The Timing of Property Crime, Violent Crime, and Substance Use among Juveniles. *Journal of Research in Crime and Delinquency*, 42(110), 110-120.
- Gould, Eric D., Bruce A. Weinberg, and David B. Mustard (2002). Crime Rates and Local Labor Market Opportunities in the United States: 1979-1997. *Review of Economics and Statistics*, 84(1), 45-61.
- Hannon, Lance, and James DeFranzo (1998). Welfare and Property Crime. *Justice Quarterly*, 15, 273-287.
- Hartung, Gabriel (2009). *Ensaio em Demografia e Criminalidade*. Rio de Janeiro: Fundação Getúlio Vargas.
- Heckman, James J., Jora Stixrud, and Sergio Urzua (2006). The effects of cognitive and non-cognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, 24(3): 411-482.
- Heller, Sara B., Brian A. Jacob and Jens Ludwig (Forthcoming). Family Income, Neighborhood Poverty, and Crime. In P. Cook, J. Ludwig and J. McCrary (eds.), *Controlling Crime: Strategies and Tradeoffs*, Chapter 11, Chicago: University of Chicago Press.
- Imrohoroglu, A., Merlo, A. and P. Rupert (2001). "What Accounts for the Decline in Crime?", Federal Reserve Bank of Cleveland, wp 0008.
- Imrohoroglu, A., Merlo, A. and P. Rupert (2000). "On the political economy of income redistribution and crime", *International Economic Review*, 41 (1) pp. 1-25.
- Instituto Brasileiro de Geografia e Estatísticas (IBGE). (2010). *Pesquisa Nacional por Amostra de Domicílios. Características da Vitimização e Acesso à Justiça no Brasil*. Rio de Janeiro: IBGE.
- Instituto de Estudos Socioeconômicos (INESC). (2010). *Segurança Pública e Cidadania: Uma Análise Orçamentária do PRONASCI*. Brasília: INESC.
- Jacob, Brian A. and Lars Lefgren (2003). Are Idle Hands the Devil's Workshop? Incapacitation, Concentration, and Juvenile Crime. *American Economic Review*, 93(5), 1560-1577.
- \_\_\_\_\_ and Jens Ludwig (2010). *The Effects of Family Resources on Children's Outcomes*. Working Paper, University of Michigan.

- Keizer, K., Lindenberg, S; Steg, L (2008) "The Spreading of Disorder". *Science* 322 (5908): 1681-5.
- Kelling, George L. and Sousa Jr., William H. (2001). *Do Police Matter? An Analysis of the Impact of New York City's Police Reforms*. NY: Manhattan Institute for Police Research.
- Khan, Tulio, and Rizzi, Renata (2010). On the relationship between crime and economic performance in Brazil after 1994 using time series econometric techniques. *Unpublished paper*.
- \_\_\_\_\_ and Zanetic, André (2005). *O Papel dos Municípios na Segurança Pública*. São Paulo: Secretaria Nacional de Segurança Pública.
- Kovandzic, Tomislav, Vieraitis, Lynne M. and Boots, Denise. Does the Death Penalty Save Lives? New Evidence from State Panel Data 1977-2006. (2006). Forthcoming in *Criminology & Public Policy*.
- Kvalseth, Jarald O. (1997). A Note on the Effects of Population Density and Unemployment on Urban Crime. *Criminology Journal, Criminology*, Volume 15, Issue 1, pages 105–110, May 1977.
- Levitt, S.D. and L. Lochner (2001). "The Determinants of Juvenile Crime", in Gruber, J. (Ed.), *Risky Behavior Among Youth: An Economic Analysis*. Chicago: The University of Chicago Press.
- Lima, R.S. (2010). Diagnóstico de la violencia y la criminalidad en las ciudades de São Paulo y Río de Janeiro. Serie Documentos Electrónicos N. 5, agosto 2010. Santiago de Chile: FLACSO-Chile
- Lochner, L., (1999). "Education, Work and Crime: Theory and Evidence", Working Paper No. 465, Center for Economic Research (RCER) - University of Rochester.
- Lochner, L. and E. Moretti (2001). "The effect of education on crime: evidence from prison inmates, arrests, and self-reports", NBER Working Paper no. 8605.
- Lochner, Lance and Enrico Moretti (2004). The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports. *American Economic Review*, 94(1), 155–189.
- Lochner, Lance (2010). "Education Policy and Crime." NBER Working Paper 15894.
- Lott, J.R. (2004). *More Guns, Less Crime: Understanding Crime and Gun-Control Laws*. Chicago: University of Chicago Press.
- Luallen, Jeremy (2006). School's out... forever: A study of juvenile crime, at-risk youth and teacher strikes. *Journal of Urban Economics*, 59(1), 75–103.
- Machin, Stephen, and Costas Meghir (2004). Crime and Economic Incentives. *The Journal of Human Resources*, 39(4), 958–979.

- Miki, Regina. A experiência de Diadema em políticas públicas e a segurança cidadã (2008) In: VELOSO, Fernando e FERREIRA, Sérgio Guimarães (Orgs). *É possível: gestão da segurança pública e redução da violência*. Rio de Janeiro: Casa das Garças.
- Pan American Health Organization (PAHO). [www.paho.org](http://www.paho.org). Accessed on March 12, 2011.
- Prefeitura Municipal de São Paulo (2010). "Balanço da Educação aponta avanços na rede de ensino público." ([http://www.prefeitura.sp.gov.br/portal/a\\_cidade/noticias/index.php?p=34456](http://www.prefeitura.sp.gov.br/portal/a_cidade/noticias/index.php?p=34456), posted on January 5, 2010).
- Raphael, Steven, and Rudolf Winter-Ember (2001). Identifying the Effect of Unemployment on Crime. *Journal of Law and Economics*, 44(1), 259–283.
- Secretaria de Estado de Desenvolvimento Social (SEDS) de Minas Gerais, accessed in March 2011, <https://www.seds.mg.gov.br/>.
- Snyder, Howard N. and Melissa Sickmund (1999). *Juvenile Offenders and Victims: 1999 National Report*. US Department of Justice Programs, Office of Juvenile Justice and Delinquency Prevention, Washington DC.
- Soares, Sergei and Natália Sátyro (2009). "O Programa Bolsa Família: Desenho Institucional, Impactos e Possibilidades Futuras." IPEA Working Paper n1424.
- Souza, M.F.M, Macinko, J., Pereira, A., et al. (2007). Reductions in Firearm-Related Mortality and Hospitalizations in Brazil After Gun Control. *Health Affairs*. 26 (2).
- Soares, Rodrigo R. & Viveiros, Igor (2010). "Organization and Information in the Fight against Crime: An Evaluation of the Integration of Police Forces in the State of Minas Gerais, Brazil," IZA Discussion Papers 5270, Institute for the Study of Labor (IZA).
- Veloso, Fernando and Sérgio Guimarães Ferreira (Orgs) (2008). *É possível: gestão de segurança pública e redução da violência*. Rio de Janeiro: Contra Capa.
- Waiselfisz, Julio Jacabo. (2011). *Mapa da Violência 2011 – Os Jovens do Brasil*. São Paulo: Instituto Sangari.
- \_\_\_\_\_ (2010). *Mapa da Violência 2010*. São Paulo: Instituto Sangari.
- \_\_\_\_\_ and Athias, Gabriela (2005). *Mapa da Violência de São Paulo*. Brasília: UNESCO.
- Wilson, J.Q. & Herrnstein, R. (1985). *Crime and Human Nature*. New York: Simon and Schuster.
- Washington Office on Latin America - WOLA (2011). *Tackling Urban Violence in Latin America: Reversing Exclusion through smart policing and social investment*. Washington, DC.
- World Bank (2006). *Crime, Violence, and Economic Development in Brazil: Elements for Effective Public Policy*. Poverty Reduction and Economic Management Sector Unit: Latin America and the Caribbean Region. Washington, DC: World Bank.

- \_\_\_\_\_ (2005). Case Study: Reduction of Crime in Bogota: A Decade of Citizen's Security Policies." Washington, DC: World Bank Working Paper Series 35128.
- Zhang, Junsen (1997). The Effect of Welfare Programs on Criminal Behavior: A Theoretical and Empirical Analysis. *Economic Inquiry*, XXXV(1),120–137.
- Zimring, Franklin E. (2007). *The Great American Crime Decline*. Oxford: Oxford University Press.
- \_\_\_\_\_ (2011 – forthcoming). *The City that Became Safe: New York and the Future of Crime Control*. February 3, 2001. Oxford University Press.





# ANNEX



## ANNEX I. DATA SOURCES

In Brazil there are three main sources of information that capture various forms of violence: Health and Victimization Surveys (HVS), Health Ministry's Mortality Records and Statistics (DATASUS), and Police Administrative Records (RPM). This report used DATASUS information for the national level analysis on trends and determinants (chapters 1 and 2), and police data for the analysis of Sao Paulo, Minas Gerais, Rio de Janeiro (chapters 3-6). Victimization surveys were only used for the case of Sao Paulo. Overall DATASUS is more reliable than police records. However, in the case of the southeast, the state governments have developed accurate information systems that show very similar trends to the ones from DATASUS.

There have been studies that estimate the discrepancies in homicide data in Brazil. For instance, Monteiro et. al. (2003) compare homicide data from DATASUS and RPM in Minas Gerais. There may be discrepancies in the homicide rates that increasingly vary as more disaggregated is the data. DATASUS and RPM have most consistency over time and across aggregation levels. Most studies, including this one, conclude that the records on both systems are accurate across states and among cities with more than 100,000 inhabitants. However, for cities below this population threshold, inconsistencies emerge mostly on the RPM data because under-reporting rises due to hospital deaths that are not followed up by police, but were caused by violence.

**National level analysis.** Our focus of interest, dynamics and determinants of violence at the national level as well as at state and municipal levels, imposes a restriction on the type of data available. Only Health Ministry's Mortality Records and Statistics (DATASUS), and Police Administrative Records (RPM) data allows having yearly data by municipality and state in Brazil. This report opted to use DATASUS as primary source of data to be complemented whenever needed by RPM. DATASUS data is more accurate than police data due to the systematic training of health providers in identifying homicide cases. The procedures to capture all external causes of death, including homicides, in the DATASUS data are more robust than the police data (Cano and Santos, 2001; Monteiro de Castro et. al., 2003). In addition, many injuries that result in deaths and can be typified as homicides are not reported in official police records but they are indeed reported in the DATASUS system. Although it is certain that both systems have undercounting of homicides, the DATASUS system has a broader range of categories to classify homicides. Because DATASUS is an integrated system that can disaggregate data at various levels there is better consistency in the definition and number of homicides across states and municipalities, in particular for more recent data. Since 1997 DATASUS reports appear to more closely follow police reports on crime, even though the DATASUS data appears to be consistently higher.

**Choice of homicide rate as leading indicator of violent crime.** While aware of the fact that violence is a complex phenomenon which manifests in various forms which may not be captured by the data: homicides rates represent the most extreme form of violence and by many is thought as “barometer” of all violent crime in society, with a relatively high level of comparability across time and by different levels of aggregation (Fajnzylber, Lederman and Loayza, 1999; Kovandzic and Vieraitis, 2006). In general, homicide data tends to be measured with relatively accuracy compared to other crime statistics, as it is difficult to underreport it. In addition, only homicides rates were available for the 1997-2008 for the 5,564 municipalities in Brazil.

The data at the municipality level was collected from SIM/DATASUS with comparable homicide rates using the International Classification of Disease (CID-10) from 1997 to 2008. Additional municipal level data was collected from IBGE and RAIS/CAGED.

## ANNEX II. KERNEL DENSITY DISTRIBUTIONS TESTS FOR EQUALITY

### Kolmogorov Smirnov tests for homicide rates 2008 v. 2003

Two-sample Kolmogorov-Smirnov test for equality of distribution functions

Smaller group	D	P-value	Corrected
<b>0:00</b>	0.0391	0.008	
<b>1:00</b>	-0.3057	0	
<b>Combined K-S:</b>	0.3057	0	0

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 367 unique values out of 6296 observations.

### Kolmogorov Smirnov tests for homicide rates 2008 v. 2003 in the Southeast region

Smaller group	D	P-value	Corrected
<b>0:00</b>	0.0103	0.91	
<b>1:00</b>	-0.3253	0	
<b>Combined K-S:</b>	0.3253	0	0

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 232 unique values out of 1795 observations.

### Kolmogorov Smirnov tests for homicide rates 2008 v. 2003 in the Northeast region

Smaller group	D	P-value	Corrected
<b>0:00</b>	0.1	0	
<b>1:00</b>	-0.3067	0	
<b>Combined K-S:</b>	0.3067	0	0

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 95 unique values out of 422 observations.

**Kolmogorov Smirnov tests for homicide rates 2008 v. 2003 in the North region**

Smaller group	D	P-value	Corrected
0:00	0.1095	0.08	
1:00	-0.1689	0.002	
<b>Combined K-S:</b>	0.1689	0.005	0.003

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 95 unique values out of 422 observations.

**Kolmogorov Smirnov tests for homicide rates 2008 v. 2003 in the South region**

Smaller group	D	P-value	Corrected
0:00	0.0322	0.525	
1:00	-0.3762	0	
<b>Combined K-S:</b>	0.3762	0	0

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 123 unique values out of 1244 observations.

**Kolmogorov Smirnov tests for homicide rates 2008 v. 2003 in the Central West region**

Smaller group	D	P-value	Corrected
0:00	0.0323	0.728	
1:00	-0.2824	0	
<b>Combined K-S:</b>	0.2824	0	0

We reject the null hypothesis of equality of distributions for the log homicide rate in 2008 v. 2003.

Note: ties exist in combined dataset; there are 92 unique values out of 607 observations.

## ANNEX III. FIXED EFFECTS REGRESSIONS OF THE LOG HOMICIDE RATE PER 100,000 FOR BRAZIL AND ITS REGIONS

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Brazil	Southeast	Northeast	North	South	Central West
Log Males 15-19	0.397*** (0.0583)	0.485*** (0.102)	-0.440*** (0.120)	-0.696** (0.311)	0.960*** (0.115)	0.311** (0.144)
Log Males 20-29	0.251*** (0.0583)	0.423*** (0.109)	0.385*** (0.119)	1.092*** (0.285)	-0.298** (0.116)	0.100 (0.159)
Log Population	0.160** (0.0634)	0.0437 (0.123)	0.835*** (0.127)	0.224 (0.277)	0.224* (0.124)	0.382** (0.151)
Urban Population Share	10.52*** (1.254)	22.75** (4.012)	1.180 (2.516)	-18.20** (8.419)	23.33** (11.81)	6.862*** (2.422)
Population Density	0.000572*** (1.82e-05)	0.000517*** (2.35e-05)	0.000527*** (5.66e-05)	0.000455 (0.000409)	0.000862*** (8.64e-05)	0.00197*** (0.000356)
Population Density Squared	-4.1e-08*** (1.87e-09)	-3.71e-08*** (2.25e-09)	-6.75e-08*** (9.80e-09)	-6.44e-08 (1.82e-07)	-1.49e-07*** (2.96e-08)	-8.90e-07*** (2.08e-07)
Log GDP	0.0808*** (0.0118)	0.0806*** (0.0192)	0.185*** (0.0242)	0.238*** (0.0636)	0.0314 (0.0254)	-0.0102 (0.0324)
Public High school dropout rate	0.344*** (0.0751)	0.159 (0.147)	0.373*** (0.131)	0.388 (0.375)	0.0983 (0.159)	0.125 (0.182)
Gin Coefficient	1.001** (0.459)	2.625 (1.702)	0.870 (0.660)	3.692 (4.371)	0.387 (1.414)	-0.156 (1.460)
Formal Jobs Created	2.19e-07 (3.04e-07)	-2.10e-07 (3.21e-07)	8.24e-06*** (2.24e-06)	1.41e-05*** (5.37e-06)	3.92e-06*** (1.34e-06)	7.77e-06*** (2.18e-06)
Formal Jobs Destroyed	5.40e-07* (3.04e-07)	4.57e-07 (3.19e-07)	7.74e-06*** (2.13e-06)	-2.59e-06 (4.57e-06)	4.24e-06*** (1.50e-06)	-1.79e-07 (2.10e-06)
Formal Jobs Created males 15-29	-0.0491*** (0.0131)	-0.104*** (0.0364)	-0.0193 (0.0162)	0.0204 (0.0599)	-0.128*** (0.0396)	-0.0615 (0.0445)
Formal Jobs Destroyed males 15-29	0.0628*** (0.0124)	0.0240 (0.0345)	0.0690*** (0.0153)	0.153*** (0.0573)	0.0352 (0.0375)	0.0465 (0.0424)
Constant	-16.54*** (0.461)	-20.05*** (1.646)	-17.21*** (0.942)	-10.12*** (3.123)	-15.69*** (1.498)	-14.74*** (1.392)
Observations	19,121	6,802	5,318	874	4,304	1,823
R-squared	0.714	0.778	0.665	0.612	0.710	0.691

Source: Calderón and Chioda, 2011.

Clustered standard errors by municipality in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$   
Source: DATASUS, IBGE and RAIS, CAGED from 1997 to 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions. Year, region and state fixed effects are included in the regressions.

## ANNEX IV. OAXACA BLINDER DECOMPOSITION 2008 V. 2003

Variables	Brazil				Southeast				Northeast			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	overall	endowments	coefficients	interaction	overall	endowments	coefficients	interaction	overall	endowments	coefficients	interaction
Males 15-19		0.179*** (0.0374)	-5.865*** (1.643)	-0.163*** (0.0475)		0.108 (0.0687)	0.223 (3.308)	0.00550 (0.0817)		-0.0198 (0.104)	-4.430 (3.875)	-0.184 (0.162)
Males 20-29		0.0323** (0.0155)	11.70*** (1.985)	-0.0615** (0.0268)		-0.0185 (0.0228)	6.255 (3.897)	-0.0350 (0.0327)		-0.00861 (0.0149)	0.878 (4.185)	-0.00341 (0.0165)
Urban Population Share		0.00182* (0.000998)	0.0623** (0.0293)	0.000984 (0.000674)		0.00840** (0.00345)	0.193** (0.0861)	0.00879* (0.00506)		-0.00142 (0.00159)	0.397** (0.158)	-0.00288 (0.00300)
GDP		-0.0341*** (0.0124)	0.783** (0.313)	-0.0367** (0.0147)		-0.0479** (0.0215)	-0.583 (0.502)	0.0281 (0.0242)		-0.0848*** (0.0285)	0.247 (0.645)	-0.0140 (0.0366)
Public School Dropout rate		0.0351*** (0.00553)	-0.0735* (0.0378)	-0.0123* (0.00640)		0.0588*** (0.0182)	-0.0806 (0.0628)	-0.0289 (0.0226)		-0.00214 (0.00266)	-0.163** (0.0778)	0.00272 (0.00338)
Gini Coefficient		0.0776*** (0.0214)	-0.734 (0.546)	-0.0463 (0.0345)		0.0271 (0.102)	-21.71** (10.77)	-1.584** (0.786)		0.115*** (0.0335)	1.924 (1.351)	0.0924 (0.0650)
Formal Jobs Added		-0.00224* (0.00118)	0.0106** (0.00526)	-0.00365** (0.00184)		-0.00319* (0.00179)	0.00117 (0.00412)	-0.000446 (0.00157)		-0.00140 (0.00163)	0.0435*** (0.0139)	-0.0141** (0.00714)
Formal Jobs Destroyed		-0.000438 (0.00153)	0.00536** (0.00210)	-0.00204** (0.000809)		4395e-05 (0.00238)	0.0124*** (0.00413)	-0.00488*** (0.00170)		-0.00314 (0.00268)	-0.0131 (0.0157)	0.00600 (0.00739)
Formal Jobs Added Males 15-29		0.000639 (0.00750)	0.0315 (0.264)	-0.00125 (0.0104)		0.0306 (0.0405)	0.353 (0.955)	-0.0196 (0.0531)		-0.00876 (0.00424)	-0.175 (0.224)	0.00454 (0.00652)
Formal Jobs Destroyed Males 15-29		-0.0175** (0.00866)	-0.321 (0.244)	0.0151 (0.0117)		0.0125 (0.0459)	-0.140 (0.899)	0.00923 (0.0591)		-0.00644 (0.00631)	-0.0861 (0.203)	0.00188 (0.00473)
2008		-6.203*** (0.0274)				-6.081*** (0.0525)				-6.383*** (0.0474)		
2003		-6.228*** (0.0242)				-6.210*** (0.0467)				-6.287*** (0.0409)		
Difference		0.0248 (0.0227)				0.128*** (0.0413)				-0.0957** (0.0406)		
Endowments		0.309*** (0.0480)				0.176* (0.104)				0.0770 (0.111)		
Coefficients		0.0581 (0.0402)				1.581** (0.768)				-0.127 (0.118)		
Interaction		-0.342*** (0.0536)				-1.628** (0.765)				-0.0455 (0.148)		
Constant			0.711 (1.025)				24.75** (12.01)				-3.605 (2.585)	
Observations	5,407	5,407	5,407	5,407	1,772	1,772	1,772	1,772	1,510	1,510	1,510	1,510

Clustered standard errors by municipality in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: DATASUS, IBGE and RAIS, CAGED for 2003 and 2008 for all 5,564 municipalities. Information on school dropout rates is not available for 2006, and thus this year is dropped from the saturated model regressions.

## ANNEX V. CHANGES IN HOMICIDE RATES PER 100,000 INHABITANTS FROM 2003 TO 2008 BY STATE AND STATE CAPITAL

Variables	Homicide Rate			Capital	Homicide Rate		
	2003	2008	Change		2003	2008	Change
Bahia	15.81	32.60	1.06	Salvador	27.74	59.10	1.13
Alagoas	34.92	59.79	0.71	Maceió	58.80	105.73	0.80
Parana	25.03	32.48	0.30	Curitiba	35.49	55.80	0.57
Maranhao	13.13	20.25	0.54	São Luís	29.61	43.20	0.45
Para	20.39	38.77	0.90	Belém	33.61	46.54	0.38
Rio Grande do Norte	13.92	23.08	0.66	Natal	22.32	30.76	0.38
Paraíba	17.62	27.42	0.56	João Pessoa	43.27	59.24	0.37
Amazonas	17.87	24.37	0.36	Manaus	28.13	37.73	0.34
Rio Grande do Sul	18.06	22.17	0.23	Porto Alegre	36.08	46.86	0.30
Ceara	19.56	23.78	0.22	Fortaleza	28.55	35.84	0.24
Goiás	22.98	29.69	0.29	Goiânia	36.48	43.68	0.20
Espirito Santo	48.93	55.89	0.14	Vitória	71.40	73.40	0.03
Piauí	11.23	13.13	0.17	Teresina	27.60	27.04	(0.02)
Rondonia	35.79	31.92	(0.11)	Porto Velho	47.52	46.50	(0.02)
Amapá	34.71	33.67	(0.03)	Macapá	42.88	41.20	(0.04)
Pernambuco	54.30	50.33	(0.07)	Recife	90.26	84.65	(0.06)
Distrito Federal	37.55	33.64	(0.10)	Brasília	37.55	33.64	(0.10)
Tocantins	18.43	18.47	0.00	Palmas	20.25	18.02	(0.11)
Mato Grosso	33.81	31.43	(0.07)	Cuiabá	48.22	42.50	(0.12)
Santa Catarina	11.47	13.14	0.15	Florianópolis	26.10	22.79	(0.13)
Sergipe	24.58	28.57	0.16	Aracaju	49.40	40.25	(0.19)
Roraima	27.76	24.91	(0.10)	Boa Vista	30.89	24.35	(0.21)
Acre	21.68	19.55	(0.10)	Rio Branco	36.35	28.44	(0.22)
Mato Grosso do Sul	31.83	29.49	(0.07)	Campo Grande	33.92	25.43	(0.25)
Minas Gerais	20.54	16.68	(0.04)	Belo Horizonte	56.67	41.55	(0.27)
Rio de Janeiro	51.59	33.73	(0.35)	Rio de Janeiro	55.36	30.95	(0.44)
Sao Paulo	35.13	14.90	(0.58)	São Paulo	51.64	14.89	(0.71)

Source: DATASUS, IBGE and RAIS, CAGED for 2003 and 2008 for all 5,564 municipalities.