A stylized map of Latin America and the Caribbean region, rendered in a light blue color, set against a dark blue background. The map is positioned on the left side of the cover. The background also features a pattern of faint, light blue numbers and a grid of small circles, suggesting a data-driven or analytical theme.

The Welfare Costs of Crime and Violence in Latin America and the Caribbean

Laura Jaitman
EDITOR



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Editor
Laura Jaitman

Institutional Capacity of the State Division
Institutions for Development Sector



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Preface

Latin America and the Caribbean is the most violent region in the world. The region is home to 9 percent of the world population but has 33 percent of world homicides. With a homicide rate above 20 per 100,000 population—and with a slightly upward trend—the region has a crime problem that is a major concern for citizens of the region.

The consequences of crime and violence are serious and long lasting. Crime and the fear of crime affect people's behavior, constrain the investment decisions of firms, erode trust in institutions responsible for ensuring public safety, and distort the allocation of public and private resources. Furthermore, crime affects relations at every level, from the relationship of citizens within their communities to external relations between nations, as it is very often the case that crime crosses national borders, especially when criminal gangs are involved. Crime depreciates a society's human, physical, and social capital and disproportionately affects the poor, eroding their already scant means of making a living.

As a consequence, crime and violence impose significant costs on an economy and constitute a severe threat to economic development. For the Inter-American Development Bank (IDB), citizen security and justice is an institutional priority. The IDB has more than 15 years of operational experience in this area in most countries of the region, having provided technical and financial support to prevent and control crime.

In this context, estimations of the costs of crime and violence can shed light on the size of the problem and thus help to quantify the investments, expenditures, and losses involved for households, firms, and the public sector. Estimating the cost of crime is useful to better inform crime prevention and crime control policies, as well as to improve the allocation of resources in an economy. It can also help to raise awareness about the problem and position the topic on the political agenda at the national and international levels.

How large are the welfare costs of crime and violence in Latin America and the Caribbean? How can they be measured? How can they be reduced? Although this is a very important topic, the costs of crime and violence have not been systematically studied in the region. Estimations of these costs do not aim to provide an exact figure, but rather an order of magnitude to understand the dimension of the problem in a country or a community. The reason for this is that there are different methodologies, and each of one needs a wide range of assumptions, so the results can vary across authors and methods even for the same place and time. Also, the necessary information to estimate the costs of crime is complex and difficult to obtain, which requires more assumptions and the use of indirect estimation methods.

In the last 20 years there has been a growing interest in this topic in the region, probably due to

the increase in the incidence of crime. In the first regional studies, conducted from 1998 to 2002, the estimates of the costs of crime were very heterogeneous, ranging from 2 to 14 percent of the gross regional product. There have also been national case studies covering such relevant issues as the costs of domestic violence in Nicaragua and Chile; the costs of violence in El Salvador and Guatemala; the costs of crime in Chile; the costs of crime in Argentina based on victimization surveys; and the costs of crime in Jamaica. All these works have contributed to developing methodologies and improving sources of information. However, there is still no consensus on how the cost of crime and violence should be measured and how the different methodologies can be compared.

This volume is the first step toward a systematic and rigorous analysis of the costs of crime and violence in Latin America and the Caribbean. It is the first volume of a series of studies by the IDB that will address different topics related to estimating the costs of crime and the efficiency of public spending on citizen security. These topics are a pillar of the Citizen Security and Justice Sector Research Agenda, within the Institutional Capacity of the State Division at the IDB.

The aim of the volume is to disseminate the knowledge recently generated on the topic through rigorous research promoted by the IDB, and present it in an accessible way for a wide and relevant audience, including academics and policymakers. The volume presents mainstream theoretical frameworks and econometric methodologies, standardized estimations, and lessons learned from public policy interventions. All of these will be useful for designing and implementing better policies in the future. We also hope that this volume serves as motivation to promote knowledge and incentivize further theoretical and empirical research on the costs of crime in the region.

Based on the work that the IDB has been promoting on this specific topic since 2012, this volume first explores the characteristics of crime and violence in Latin America and the Caribbean. The volume also provides an interpretation of how to measure and estimate the welfare costs of crime to a society. Many important concepts are clarified and related, such as willingness to pay, contingent valuation, the types of direct, indirect, and intangible costs, and estimation methodologies. The volume also establishes a theoretical framework to understand which variables the different methodologies estimate and how these methodologies can (or cannot) be compared, and provide examples of work that estimate these costs employing diverse methods.

Finally, I would like to thank the following authors and contributors to the chapters of this volume for their valuable inputs: Diego Aboal, Jorge Agüero, Nicolás Ajzenman, Nathalie Alvarado, Victoria Anauati, Ana Basco, Gustavo Beliz, Kaizo Beltrão, Gabriela Calderón, Jorge Campanella, Ana Corbacho, Sebastian Galiani, Rogelio Granguillhome Ochoa, Arlen Guarín, Roberto Guerrero Compeán, Ana María Ibáñez, Laura Jaitman, Phil Keefer, Martin Foureaux Koppensteiner, Bibiana Lanzilotta, Beatriz Magaloni, Rosa Massena, Marco Manacorda, Carlos Medina, José Antonio Mejía Guerra, Catalina Mertz, Nicolás Muñoz, Mauricio Olavarría, Gustavo Robles, Catherine Rodriguez, Ana María Rodríguez-Ortiz, Mauricio Ruiz Vega, Carlos Santiso, Carlos Scartascini, Enrique Seira, Rodrigo Soares, Carina Solmirano, Jorge Srur, Jorge Tamayo, Francisco Torres, Víctor Vázquez, David Vetter, and David Zarruck.

Santiago Levy

*Vice-President for Sectors and Knowledge
Inter-American Development Bank
Washington, D.C., September 2015*

Introduction: The Welfare Costs of Crime

Laura Jaitman, *Inter-American Development Bank*

The aim of this volume is to initiate a systematic and rigorous analysis of the costs of crime and violence in Latin America and the Caribbean. How large are these costs in the region? Before answering this question, we should first establish what we mean by costs of crime and violence. In his historic work *On Crimes and Punishment* published in 1764, the Italian criminologist Cesare Beccaria was the first to define fundamental concepts of crime economics, including the concept that crimes are only to be measured by the costs they exact from society. In economics we refer to such costs as the welfare costs of crime.

What exactly are the social costs of crime and how can we measure them? These costs certainly include the direct costs as a result of crime: injury, damage, and loss. There are also costs in anticipation of crime, such as public and private expenditure on security. And there are costs in response to crime, such as the cost of the criminal justice system. We should also take into account other indirect or intangible costs such as changes in behavior due to the fear of crime or the costs to families of victims. Indeed, there are probably

many other consequences of crime that are costly and should be considered, including the possibility that what people may want to pay to reduce crime may sometimes even be much higher than what the aggregate costs of crime to the society actually turn out to be. The incidence of crime as well as the fear of crime and violence thus induces many distortions in the economy.

In the literature on the costs of crime, there is a distinction between “external costs” and “social costs.” External costs are those imposed by one person on another, where the latter person does not voluntarily accept this negative consequence. For example, the external costs associated with a mugging include stolen property, medical costs, lost wages, and pain and suffering endured by the victim. The victim neither asked for, nor voluntarily accepted, compensation for enduring these losses. Moreover, society has deemed that imposing these external costs is morally wrong and against the law, so the aggressor will be charged with a crime and sentenced accordingly.

Social costs are those that reduce the aggregate well-being of society. In this case, medical costs and lost wages are clearly social costs

because they are resources that could have been spent elsewhere in the economy on a socially productive activity. Although pain and suffering costs are not actual commodities or services exchanged in the marketplace, individuals are willing to pay to avoid the pain, suffering, and lost quality of life associated with being a crime victim. Thus, to the extent that society cares about the well-being of crime victims, these costs should also be considered social costs of victimization.

Which social costs should be considered and how can these costs be measured and translated into monetary terms? These are very difficult questions both from a theoretical and empirical point of view. The first step when embarking on the exploration of the costs of crime is to make a list of all the costs that seem reasonable to include. This gives an idea of just how complex the exercise of estimating the costs of crime in a rigorous and systematic way can be. And it is an exercise in which readers of this volume can themselves participate by writing down all the costs of crime and violence that are important to them. We invite you to do so.

One can start with the most straightforward costs: crime and violence produce damage to property and injuries to people that are costly. To include these costs we would have to quantify and value all the material loss as well as value the injuries to the victims, for example by attaching a price to the foregone income of the rest of the productive life of those killed, the days of work missed, or the medical expenses and disabilities incurred as a result of a crime. But of course, measuring this is no small task and requires many assumptions.

The list would also probably include stolen goods: cars, bikes, mobile phones, etc. Theft and robberies are very common in cities throughout Latin America and the Caribbean. Should we take into account those goods in our costs of crime? Strictly speaking, these goods do not disappear completely from the economy; rather, they are simply transferred from the legal to the illegal

owner. There might be partial loss due to damage and for the utility loss if the utility of the good is not the same for the thief as it is for the owner. There is still debate in the literature on whether these costs should be included, as some authors argue that stolen property is an “external” but not technically a “social” cost because the offender can enjoy the use of the property. For example, Cook (1983) argues that the relevant concept should be the social cost, which would exclude transfers of money or property.

The distinction between social and external costs is most apparent for what are called “victimless crimes” such as drug abuse, prostitution, and gambling (Bergelson, 2013). Usually these crimes are thought to be voluntarily supplied and demanded, and thus the individuals incur both the direct cost and benefit of them. However, these are illegal activities that have clear negative consequences to society. Drug abuse, for example, imposes many external costs. Drug users might be less productive at work and might commit crimes to support their drug habits or when under the effects of drugs; dealers might forgo socially productive work activities; and society might be burdened with additional medical costs in treating drug addicts. To the extent that these external costs can be identified and measured, they should be included as the cost of victimless crimes.

In addition to these costs that are the direct consequence of crime, there are other costs in anticipation of crime that you may have written down on your list. We tend to protect ourselves with private security systems, alarms, and fences, and governments protect us by allocating a non-negligible portion of the budget to crime prevention and deterrence through police forces and specific interventions. Firms also spend on security to prevent being victimized. Private and public security is costly and produces a distortion in the economy. For instance, when we buy a car, we usually buy an alarm to avoid victimization. The alarm does not add any value to the services that

the car already provides, but we spend money on it anyway. Thus, crime distorts the behavior of consumers and takes resources away from the society that could be used more efficiently.

Finally, after a crime occurs, there are costs associated with the legal response to it, including the criminal justice system, lawyers, prisons, and even the foregone income of inmates who are unproductive while imprisoned. These costs are very high for society, and the more inefficient the justice system, the more costs the system generates. For example, high pre-trial detention rates contribute to high costs of crime. An inefficient justice system also increases the costs of crime if clearance rates are low, or if impunity reduces the expected punishment of committing crimes and thus increases the probability of crimes occurring.

Indirect Costs

All of the costs mentioned above are considered direct costs, but there are other costs that can be sizable and are more difficult to measure. These indirect costs might include, for example, the effects on families of crime victims who do not go to work or are left with traumas that prevent them from developing their entire productive potential. This can be the case of children living in a household where there are episodes of domestic violence. What is the extent of these indirect costs? How do we quantify them and determine their value? Estimating and translating them into monetary terms can become difficult and require additional assumptions.

There are yet other important aspects of crime and fear of crime that may be included in the list of costs. For instance, suffering, fear and the loss of quality of life of victims and their families are also costs of crime. Here we would include all the distortions that are produced due to crime or the fear of crime, such as changing our routine or postponing or redirecting investment decisions of firms to other safer countries, etc.

Willingness to Pay to Reduce Crime

If we managed to estimate all these various components of the costs of crime and aggregate them, it is very likely that the society would pay at least this amount to prevent crime – and probably much more as well, as both victims and nonvictims usually change their behaviors, habits, and routines due to the fear of crime. We take longer routes, prefer certain times of the day to be outside, reallocate consumption, or make other alterations to what would be the normal noncrime course of life. We pay more to live in safer neighborhoods to reduce the risk of victimization.

Therefore, to measure the welfare costs of crime to the society, taking into account all the possible distortions due to crime and fear of crime, the most indicative factor would be the willingness to pay for reduced crime. The usual estimation method for the willingness to pay is the contingent valuation methodology developed in the environmental economics literature. This methodology has been used extensively to place dollar values on nonmarket goods such as improving air quality, saving endangered species, and reducing the risk of early death –social benefits that do not have direct market analogs (Hanemann, 1994). However, this methodology has not yet been widely used for crime. Some exceptions are Cook and Ludwig (2000) and Ludwig and Cook (2001), who use the methodology to estimate the amount that the average household would be willing to pay to reduce gun violence. The studies estimate that the average household would be willing to pay about \$200 a year to reduce gun violence caused by criminals and juvenile delinquents by 30 percent, which translates into about \$1 million per injury. Similarly, Zarkin, Cates, and Bala (2000) report on a pilot study in which they use contingent valuation to value drug treatment programs.

Cohen et al. (2004) report on the results of a nationally representative survey of 1,300 U.S.

adults asked about their willingness to pay to reduce crime by 10 percent in their community. Typically, in surveys, the willingness to pay is higher than the actual value. They found that the average household was willing to pay between \$100 and \$150 a year for crime prevention programs that reduced specific crimes by 10 percent in their communities. In the aggregate, these amounts imply a willingness to pay to prevent crime of about \$25,000 per burglary, \$70,000 per serious assault, \$232,000 per armed robbery, \$237,000 per rape and sexual assault, and \$9.7 million per murder.

On average for the United States, more recent estimates of willingness to pay are from two to seven times the magnitude of the estimates of the costs of crime based solely on the cost of crime to victims and the criminal justice system (Cohen et al. 2004). In Latin America and the Caribbean, the only estimation of willingness to pay is a study by Ajzenman, Galiani and Seira (2015) for Mexico, which is discussed in Chapter 4 of this volume.

Crime and Violence in Latin America and the Caribbean: Is the Region an Outlier?

Before studying the costs of crime, it is fundamental to first explore the main trends and the outlook in terms of crime and violence in the region and thus establish the consequences of crime. Unfortunately, Latin America and the Caribbean (LAC) is the most violent region in the world. It is home to less than 9 percent of the world population, yet accounts for 33 percent of the world's homicides, making it the region with the most murders worldwide, with Africa trailing at 31 percent. Asia ranks third with 28 percent of homicides, distantly followed by Europe and North America, with only 5 and 3 percent of the total, respectively, and Oceania, which accounts for less than 0.3 percent. Indeed, with regional homicide rates of over 20 per 100,000 population—more than three times the world average—LAC is the most dangerous place on earth (Figure 1.1).

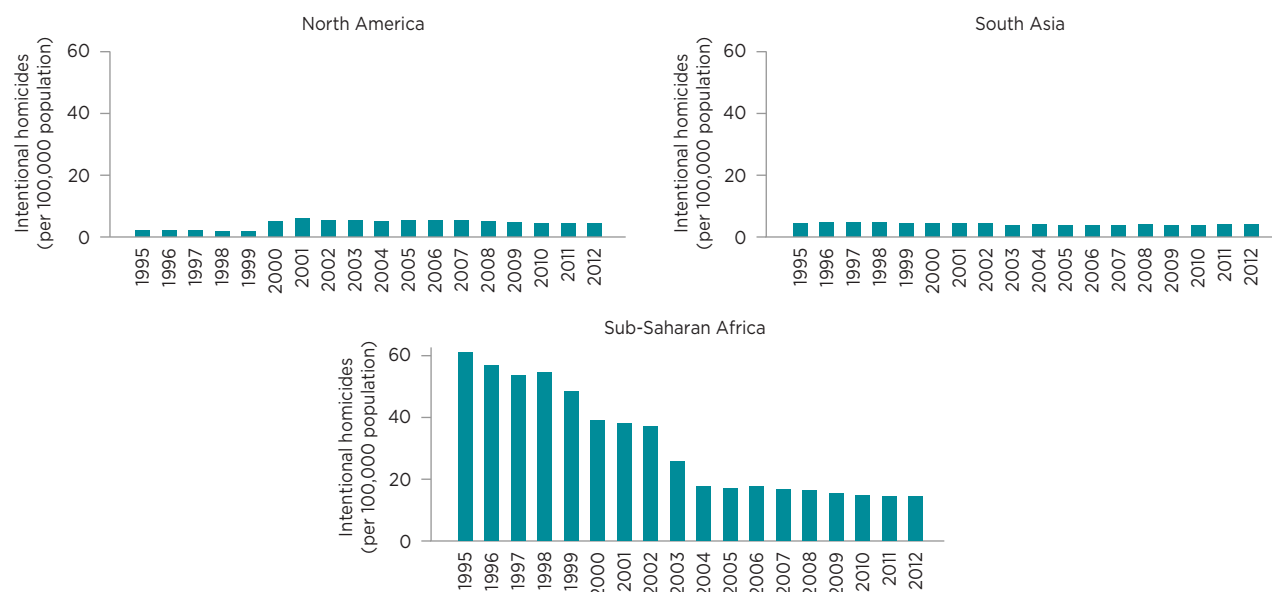
Not only are the region's murder levels high, but recent trends are also worrisome. While in many regions (such as sub-Saharan Africa) the

FIGURE 1.1. Intentional Homicide Rates per 100,000 population, 1995–2012



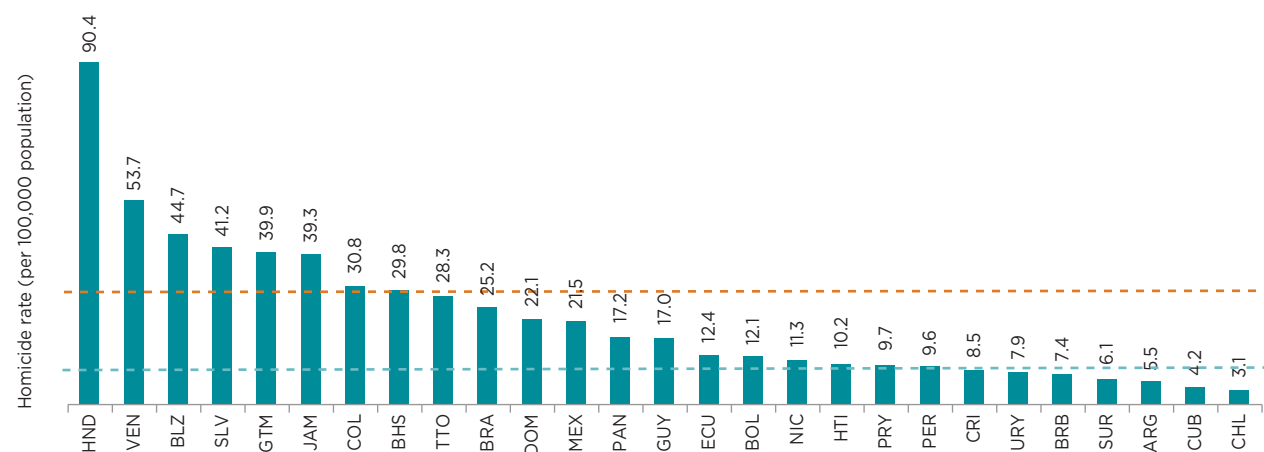
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FIGURE 1.1. Intentional Homicide Rates per 100,000 population, 1995–2012 (continued)



Source: Author's calculations based on data from the UNODC (2015).

FIGURE 1.2. Intentional Homicide Rates per 100,000 Population by Country, 2012 or Latest Year Available



Source: World Bank (2015).

Note: The blue line indicates an epidemic level of violence; the red line indicates a civil conflict level of violence.

Country codes: HND (Honduras), VEN (Venezuela), BLZ (Belize), SLV (El Salvador), GTM (Guatemala), JAM (Jamaica), COL (Colombia), BHS (Bahamas), TTO (Trinidad and Tobago), BRA (Brazil), DOM (Dominican Republic), MEX (Mexico), PAN (Panama), GUY (Guyana), ECU (Ecuador), BOL (Bolivia), NIC (Nicaragua), HTI (Haiti), PRY (Paraguay), PER (Peru), CRI (Costa Rica), URY (Uruguay), BRB (Barbados), SUR (Suriname), ARG (Argentina), CUB (Cuba), CHL (Chile).

homicide trend is decreasing, LAC is the only region where violence remains high and has continued to increase since 2005. In most LAC countries, in fact, violence levels are so high that the

spread of violence is equated with that of an epidemic by international standards (Figure 1.2).

The situation in terms of theft is an even more endemic problem. Although the data are less reliable

in terms of comparability and more dated than those of homicides, it is clear that theft is disproportionately common in Latin America. Data reveal that in less than one decade, the robbery rates in many LAC countries have dramatically increased. Equally worrisome is the fact that, on average, 6 out of 10 robberies in the region are violent (UNDP, 2013).

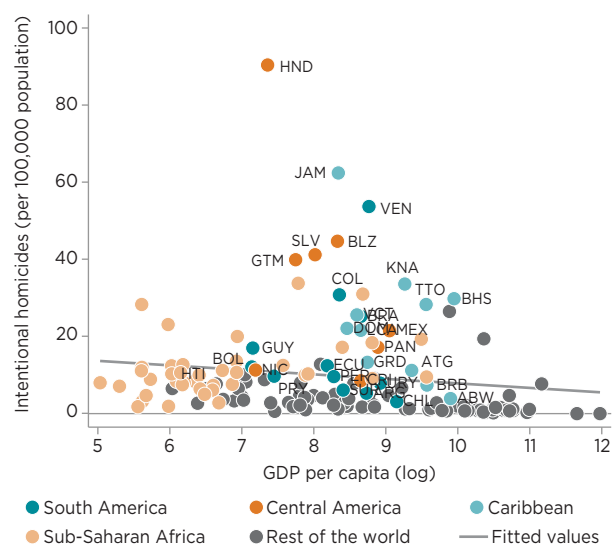
Now that we established that crime rates in the region are high, we can explore how the crime rates of LAC countries compare against other countries given their income, inequality, and poverty levels. Figure 1.3 relates the homicide rate to the wealth of the countries measured by the GDP per capita. It is usually accepted that the higher the income of a country, the lower the incidence of violence. The red line, which shows the partial correlation of the homicide rate and GDP per capita (controlling for inequality and poverty), confirms this negative relation. Looking at LAC countries, we find that most of them are far above the regression line (red line showing adjusted values). Thus, LAC is an outlier for crime given its income level, as its countries' homicide rates are

higher than they should be given their income levels (which is not explained by the fact that LAC countries might be poorer or more unequal). In this volume we illustrate the situation for homicides, but the anomalous position of the region is also observed in other dimensions of security, such as the relationship between police personnel, income and the homicide rate (see Jaitman and Guerrero Compeán, 2015).

Figure 1.4 shows a similar pattern when analyzing the relationship between homicide rates and poverty (partial correlation, controlling for GDP per capita and inequality). It is clear that although the proportion of poor people is relatively low in LAC, the incidence of violence is very high, and higher than for poorer countries in other regions. Finally, using the Gini coefficient, Figure 1.5 shows that LAC countries are very unequal. However, their homicide rates are much higher than those of countries with similar or higher levels of inequality. LAC is also an outlier in this dimension.

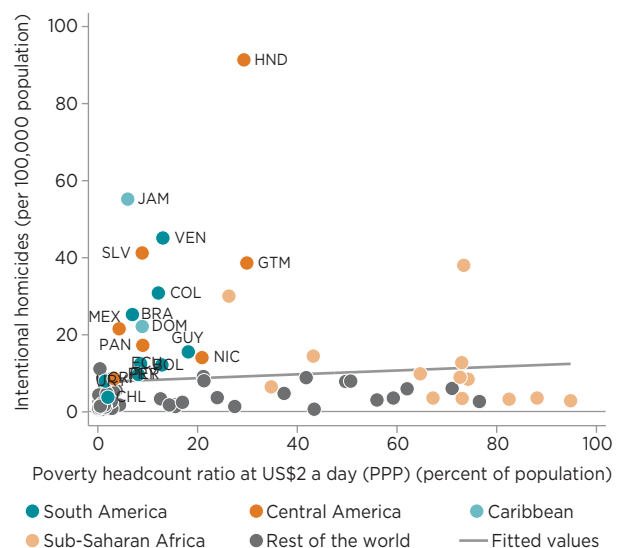
The positive partial correlation of inequality and crime can be due to the fact that there is a

FIGURE 1.3. Homicide Rate and Per Capita Gross Domestic Product, 2012 or Latest Year Available



Source: Author's calculations based on data from the UNODC (2015).

FIGURE 1.4. Homicide and Poverty Rates, 2012 or Latest Year Available



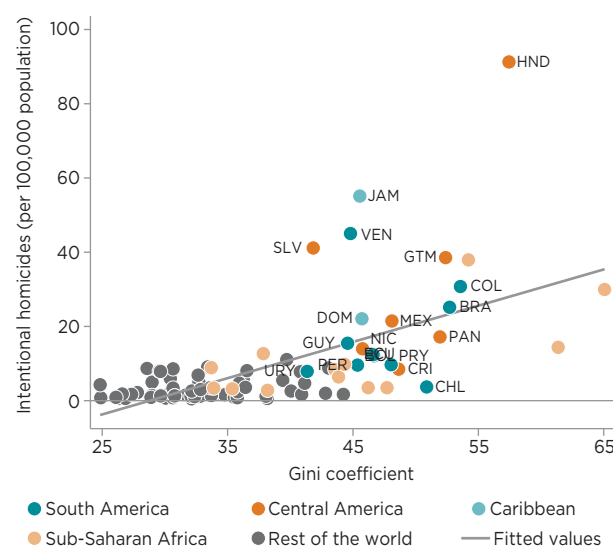
Source: Author's calculations based on data from the UNODC (2015).

higher concentration of potential victims (the rich) from whom valuables can be taken relative to the opportunity cost of the potential criminals (Chiu and Madden, 1998; Soares, 2004). Other theories, such as psychological strain theory, also suggest that inequality may be associated with high crime rates, as people who cannot access the same opportunities and goods as their neighbors may feel frustration that can lead to violence.

Given the statistics discussed above, it is not surprising that the main concern of the LAC population is crime, even above unemployment or their countries' economic situations. This can predict that the costs of crime in the region are sizable, as there might be many distortions to address this concern.

The introductory discussion on the costs of crime mentioned the costs as a consequence of crime, which include human losses and material damage. The high homicide rate in the region, as well as of other crimes against persons and property, makes this component of the costs of crime very important.

FIGURE 1.5. Homicide Rate and Inequality, 2012 or Latest Year Available



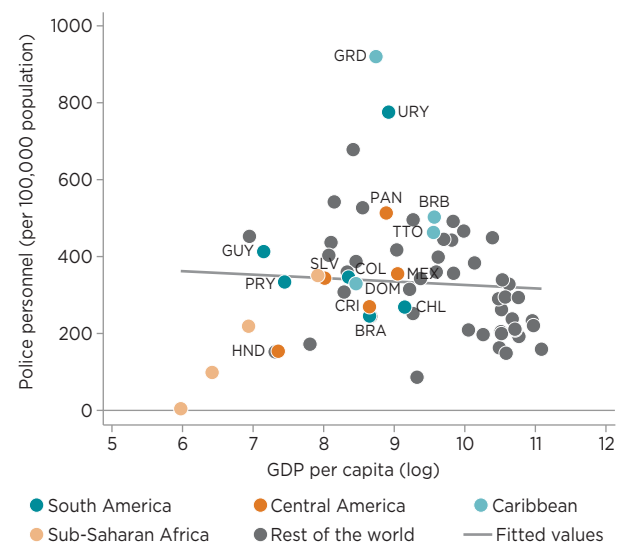
Source: Author's calculations based on data from the UNODC (2015).

The introduction also mentioned the costs for the police and the justice system. The few statistics available on these costs for the region shows that LAC is one of the regions with the largest number of police officers per 100,000 population. In fact, for its GDP per capita, LAC is also an outlier in this variable (Figure 1.6).

When comparing the size of police forces by region, on average LAC has 307 police officers per 100,000 population, a rate similar to the Middle East and North Africa (365) and Europe and Central Asia (378) and much higher than North America (222) and South Africa (125) (UNODC, 2015). However, the police do not seem to be very effective in the region, as the homicide rates are much higher in LAC countries. Figure 1.7 shows the correlation between the size of the police force and the homicide rate.

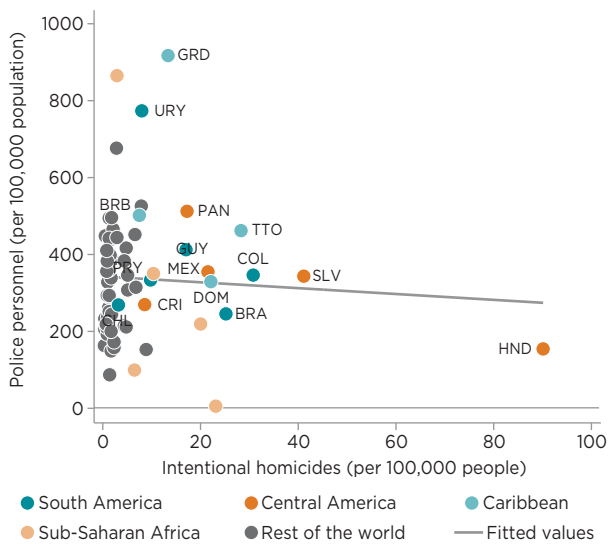
In terms of justice systems, which are an important part of the social costs of crime, there are scant comparable statistics. The prison population in LAC is 205 per 100,000 population (UNODC, 2015), less than a third of that in North

FIGURE 1.6. Police Personnel and Per Capita Gross Domestic Product, 2012 or Latest Year Available



Source: Author's calculations based on data from the UNODC (2015).

FIGURE 1.7. Police Personnel and the Intentional Homicide Rate, 2012 or Latest Year Available



Source: Author's calculations based on data from the UNODC (2015).

America (684), similar to Europe, and double that of other developing regions. However, what is distinctive in LAC is that it has the highest overcrowding rate, with a capacity for only 142 inmates per 100,000 population. Pretrial detention rates are also very high in the region, with the highest rate of 83 percent for the prison population in Bolivia.

About this Volume

The aim of this volume is to start a systematic and rigorous analysis of the costs of crime and violence in Latin America and the Caribbean. This is the first volume of a series of studies on this topic sponsored by the Inter-American Development Bank (IDB). This first volume focuses on methodological and conceptual issues that are key to an exhaustive understanding of crime and violence.

Chapter 2 presents an economic model of crime that conceptualizes the impact of violence on welfare. This model will serve as the theoretical foundation for subsequent chapters and provide

notional relationships through which testable hypotheses are formulated. It emphasizes that nonmonetary dimensions of the cost of crime and violence carry indirect social and economic consequences, both in the short and long terms, for criminals and victims alike.

The chapter articulates the challenges with regard to developing methodologies to evaluate the welfare impact of crime given the wide range of indirect and intangible costs, and also discusses the many analyses carried out in recent years to estimate the cost of crime and violence in LAC. The chapter highlights the limitations of these analyses and potential extensions for future research.

The economic model, based on the works of Becker (1968), Stigler (1970), and Ehrlich (1973), presents the direct welfare consequences of crime for potential victims as a function of the probability of victimization and the amount of goods lost, as well as expenditures on public or private security and the justice system. Similarly, the model captures the welfare loss for criminals in terms of physical and/or normative efforts to commit a criminal act and the likelihood and severity of potential punishment; the loss and opportunity costs incurred (monetary or otherwise) due to capture; and expenditures on police, criminals, and the justice system.

The social loss associated with crime is the difference in expected welfare of potential victims and criminals between the “no-crime” and “crime” scenarios. In this context, this chapter argues that the typical problem facing a government is how to allocate spending on crime prevention and punishment in a way that will minimize social loss. Having outlined a theoretical structure to guide the discussion, the chapter turns to the different methodologies used to estimate the costs of crime and violence.

Given that there is no unified framework that addresses all dimensions of the welfare costs of crime and violence, the chapter presents the

various methodologies that have been developed to deal with some aspects of the problem, including accounting of expenditures and other costs, contingent valuation surveys, and other marginal willingness-to-pay approaches (including hedonic models). The chapter then illustrates relevant empirical results from the literature based on these approaches in terms of costs of crime, potential welfare gains from crime reduction, and other consequences of crime, with particular emphasis on studies of LAC.

Chapter 3 applies the accounting method discussed in Chapter 2 to estimate the cost of crime in five Latin American countries. The offenses studied are crimes against persons and property, such as homicides, assaults, theft, and burglary. The chapter applies the crime classification proposed by Brand and Price (2000) to identify whether expenditures were done in anticipation of, as a consequence of, or in response to criminal acts. As such, the cost of crime is expressed as the total expenditures of households, enterprises, and the State to reduce violence.

The chapter uses homogenous crime definitions and cost methodologies in presenting comparable estimates of the cost of crime for the five countries (Chile, Costa Rica, Honduras, Paraguay, and Uruguay). It also offers stylized facts and up-to-date statistics for the region in terms of crime, violence, and citizen security outcomes, as well as their evolution over the past decade, both for vulnerable groups and national populations as a whole.

To estimate the cost of crime, the authors draw on a variety of sources of information, from administrative data from statistics agencies, hospitals, and victim care centers to private sector records and economic and victimization surveys by academic institutions and national and subnational authorities. A number of assumptions are made to operationalize several cost categories, account for opportunity costs, and make use of price data.

Overall, cost estimates are presented for 11 categories: private expenditures to prevent crime, public expenditures to prevent crime, homicides and aggressions, burglaries and larcenies, motor vehicle thefts, health-related crime expenses, the police, the justice system, prosecution, the penitentiary system, and public defenders. For some countries, additional data are also presented in terms of the cost of domestic violence (Chile), extortions and kidnappings (Honduras and Costa Rica), medical treatment resulting from physical aggression (Chile, Costa Rica, and Honduras), support for at-risk youth (Chile and Uruguay), sexual assault (Chile), opportunity costs for inmates (Chile and Uruguay), and credit card fraud (Costa Rica and Honduras).

This volume is the first of its kind to provide estimates of the direct costs of crime and violence with the accounting method in a homogenous manner for a set of countries in the region. This estimation gives us a lower bound for the costs of crime of an average of 3 percent of GDP, which is a very sizable figure. As a point of reference, it equals the amount of resources that the region spends annually on infrastructure and is roughly equivalent to the income share garnered by the poorest 20 percent of the population (3.6 percent) (World Bank, 2015).

Chapter 4 discusses seven studies carried out in the context of a call for papers by the IDB in 2013 on the indirect and intangible economic and social costs of crime and violence. These studies are original research and are published as part of the IDB's Working Paper Series.

The chapter starts by introducing the notion of indirect costs and how they compare against a variety of direct and observable costs of crime. It highlights that both indirect and intangible costs are absorbed by a number of agents, but emphasis is given to the welfare effects of crime on households and communities.

The empirical analysis for Chapter 4 is grounded in the theoretical framework introduced

in Chapter 2 to provide logical coherence to the discussion of the welfare impact of violence. Unlike most works on this topic, which tend to be observational in nature, a common feature of the studies presented in Chapter 4 is that they include an identification strategy to attribute the causal impact of criminal acts.

Although one analysis in the chapter is macroeconomic and centered on economic impacts, most of the analyses focus on the social effects on relevant dimensions and rely on micro data to estimate outcomes. The countries for which these analyses are conducted are Colombia, Mexico, Brazil, and Peru. The analyses incorporate theoretical elements from the economic model introduced in Chapter 2.

The topics of discussion are varied. In terms of indirect costs, Ibáñez, Rodríguez, and Zarruk (2013) focus on the effect of justice reform on crime rates and school attendance. Estimates are obtained through a duration model exploiting the fact that adoption of justice reforms was exogenous. Guarín, Medina, and Tamayo (2013) study the impact of severity of punishment on youth crime rates using a fuzzy regression discontinuity design. Robles, Calderón, and Magaloni (2013) analyze the impact of drug violence on municipal economic performance and employment using an instrumental variable regression model and synthetic controls, and show a significant negative impact.

In terms of intangible costs, Vetter, Beltrão, and Massena (2013) calibrate a hedonic model to study how much households are willing to pay to live in perceived safe areas. Similarly, using panel data, Ajzenman, Galiani, and Seira (2015) evaluate the impact of homicides on property values and test the theoretical model introduced in Chapter 2 to show that violence has a price-reducing effect. Agüero (2013) studies the effect of domestic violence on children's health by exploiting the phased-in expansion of a women's center in Peru as a source of exogenous variation and finds a

negative and significant effect. Finally, Foureaux Koppensteiner and Manacorda (2013) complement the previous analysis by examining the effect of violence on infant health in rural areas, employing a difference-in-differences methodological strategy and demonstrating that violence reduces welfare in a number of health outcomes.

Finally, Chapter 5 discusses the need to improve statistical systems in the region given that, as readers of this volume will soon learn, the lack of reliable and timely statistical information is a critical constraint to carrying out evidence-based citizen security analyses and obtaining accurate estimates of the welfare costs of crime. The chapter describes the main features of crime statistics systems in the region and assesses where they stand in relation to the ideal information system and to best practices in collecting and systematizing crime data. An efficient system for the collection, processing, and dissemination of this information is a prerequisite for crime analysis and effective crime prevention. However, this area is particularly underdeveloped in LAC.

In general terms, crime statistics systems in the region lag behind the ideal statistic system in a number of ways. First, they are not user-oriented—crime data are not publicly available and lack periodicity and detail. Second, crime statistics systems are not effectively planned or managed—to the contrary, data-collection offices usually correspond to different levels of government and agencies within each level, which are rarely connected. In most countries, the lack of resources and training are major obstacles to the collection and systematization of statistics. Third, the crime statistics systems do not maintain political neutrality or a high public profile. Finally, the scope and content of crime statistics systems are not clearly integrated because the systems do not use common classifications and there is still much to be done to compile statistics with methodological rigor. As a result, the main input for any rigorous empirical analysis is at best scarce, typically of

very bad quality, and, at worst, not publicly available or nonexistent.

It is thus essential to improve the availability and quality of reliable statistics in LAC, encompassing all aspects of crime. Efforts along those lines are a prerequisite to gain an understanding of a phenomenon as complex as crime, spur a constructive debate, and increase and improve knowledge about crime in the region.

The Way Forward

LAC has one of the highest crime rates in the world. Ominously, during the last two decades these crime rates have been increasing in several countries, imposing significant cost to societies and often making the problem of crime the primary concern of citizens in the region. However, this rising crime trend does not appear to have been accompanied by a significant investment to learn more about this problem and the effectiveness of the policies destined to tackle it (Di Tella, Galiani, and Schargrodsky 2010). A possible explanation for this is the lack of reliable data on crime in the region. This volume establishes that an efficient system for the collection, processing, and dissemination of information on crime and criminal justice is a prerequisite for crime analysis and effective crime prevention.

However, it is clear that many other challenges remain. For example, from a theoretical perspective, a relevant aspect is to harmonize the approach to establishing the costs of crime, particularly in terms of the economic effects of the transfer of goods from legal to illegal owners as well as the economic effects of victimless crimes. Even more complex, but no less important, is to develop a holistic theory that systematizes the distinct indirect and intangible costs of crime and violence.

Analytically, given that the costs presented in this volume are partial costs, it is necessary to conduct a robust analysis that measures the effect of criminality from the perspectives that are particularly relevant for the region, such as informality and its causal relation to violence, as well as the cost of crime for the private sector and its direct impact on the productivity of businesses. International comparison of the costs of crime shows the variety of components considered and methodologies employed in these types of exercises. That in turn makes it necessary to analyze the range of similar costs and verify that the estimation methods used in these studies allow for reasonable comparison for a large number of countries. Another step that follows from an analytical standpoint is to refine the spatial precision of the diverse typologies of criminal acts, identifying vulnerable groups and giving them high priority on government agendas. Finally, although the methodologies to derive the costs of crime approximate the marginal benefit of certain policy interventions, an ongoing area of opportunity is the generation of more and better evidence on the cost of specific crimes,—evidence which is validated through impact evaluations and rigorous cost-benefit analyses.

In institutional terms, the production, development, and improvement of official indicators to estimate the costs of crime highlight the importance of building the capacity of the State and civil society. This provides sustainability to, for example, crime observatories and other collective efforts, in terms of the transfer of knowledge as well as monitoring efforts, communications and cooperation mechanisms, and promotion and transformation of public policies at the local and regional levels. These efforts help to identify priority areas for intervention and, importantly, to accumulate lessons and experiences in how to reduce crime and its negative effects on the citizenry.

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A Conceptual Framework for Interpreting the Welfare Costs of Crime

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This chapter proposes a conceptual framework for analyzing and interpreting the estimates of the welfare costs of crime available from the literature. It draws heavily from the original analysis and discussion developed in Soares (2015) and provides a critical overview of the methodologies traditionally used in research and public policy discussions on the topic.

Crime and violence interfere with many dimensions of individual and social life and, therefore, have multifaceted implications for human welfare. These range from the direct individual costs – due to injuries or death, the value of goods stolen or destroyed, fear of victimization, and changes in behavior to avoid crime—to the aggregate losses associated with public expenditures on police forces, prisons, and the criminal justice system. Less obviously, and still somewhat controversial from the perspective of academic research, crime and violence may also hinder long-term growth and development. This diversity of manifestations has led, maybe not surprisingly, to the use of a wide spectrum of different strategies to

estimate the various dimensions of the welfare costs of crime. Though rarely recognized in the literature, these strategies sometimes have different conceptual perspectives and lead to numbers that are not directly comparable. A more structured view of the question is therefore necessary for the different estimates available to be put in perspective and interpreted correctly.

This chapter critically assesses the large and diverse literature that tries to estimate the various dimensions of the welfare costs of crime. Using a standard economic model of crime as a theoretical benchmark, the chapter discusses the conceptual content of the different methodologies used in the estimation of the welfare costs of crime. It also illustrates the use of each methodology by presenting results of some selected studies. The discussion pays particular attention to the limitations intrinsic in each approach and to the potential uses of these approaches as inputs for public policy design and evaluation.

The lack of communication across areas in the literature on the welfare costs of crime is easy

to explain. Measuring the magnitude of the costs of crime in a consistent and unified way is indeed a very difficult task. Material costs, for example, include direct expenditures on police, penitentiaries, the criminal justice system, and also partly on the public health system. These costs have been estimated to be substantial across regions, irrespective of the level of development. For the United States, for example these costs are thought to correspond to 2.1 percent of GDP, while for Latin America and the Caribbean the costs reach 3.6 percent (Bourguignon, 1999; Londoño and Guerrero, 1999; World Bank, 2003). In South Africa, the criminal justice system alone corresponds to expenditures of the order of 3.1 percent of GDP (Altbeker 2005). Accounting for monetary costs associated with property crime, the numbers for the United States, Latin America, and the Caribbean add up to roughly 2.6 percent and 5.1 percent of GDP, respectively (Bourguignon, 1999).

But direct material costs are only one of the many consequences of crime. Injuries and deaths, for example, represent direct welfare losses from the perspective of potential victims that may easily surpass the corresponding expenditures on the public health system. Current estimates suggest that reductions in mortality are a very significant component of recent improvements in welfare worldwide, immediately suggesting that homicides may represent a significant dimension of the costs of crime. Indeed, current evidence indicates that increased mortality due to violence corresponds to a welfare loss of the same order of magnitude of the direct material costs of crime: one year of life expectancy lost to violence is typically associated with subjective losses equivalent to a reduction in yearly income of the order of 3.8 percent of GDP (Soares, 2006). This estimate still does not incorporate subjective costs due to injuries and reduced health, among other areas.

Finally, there are various negative consequences of crime that are much harder to put in objective terms and even harder to quantify.

Sometimes referred to as intangible costs, these costs include the spillovers of crime into the labor market, business climate, and individual behavior. According to Londoño and Guerrero (1999), for example, deterioration of productivity, consumption, and the labor force constitute the most important components of the cost of crime in Latin American and the Caribbean, corresponding to 7.1 percent of the region's GDP. Changes in individual behavior may include reduced investments in physical and human capital due to reduced risk of expropriation and reduced planning horizons; changes in the hours and locations of work and leisure; and changes in patterns of consumption. In terms of investments and employment, Gaviria and Velez (2002) present evidence of the perverse effect of crime in poor Colombian communities. In Brazil, according to the World Bank's 2003 Investment Climate Survey, 52 percent of managers considered crime to be a major obstacle to business development. In Jamaica, violence is estimated to directly affect 19 percent of the firms, resulting in an average loss of three work days for each of these firms (World Bank, 2003). In general, since these dimensions are more difficult to quantify in a systematic and comparable way, the evidence available is limited. That does not mean, however, that these dimensions are any less important than other factors more commonly considered in the literature on the welfare costs of crime.

Given the various dimensions affected by crime, there is no unified methodology capable of incorporating all of them simultaneously. Typically, different methodologies have been applied to address different issues, often with different objectives in mind. What is, in fact, measured and what is considered to constitute the cost of crime, in reality ends up depending to a large extent on the specific methodology used and on the data available. For this same reason, broader studies that try to paint an encompassing picture of the phenomenon end up being, to a great extent,

guesswork and mostly impressionistic descriptions. At any rate, some of these analyses have suggested that total annual costs of crime in Latin America can easily surpass 10 percent of the region's GDP (Londoño and Guerrero, 1999).

This chapter focuses on common crimes and their indirect consequences, giving special attention to issues that have been discussed in the recent literature. Most of the discussion is associated with violent crimes and crimes against property (homicide, theft, assault, robbery, etc.). We do not discuss the more systemic dimensions of crime associated with the operation of illegal markets, or the associated corruption and violence that these engender.¹ These dimensions immediately raise the question of the costs and benefits associated with deeming certain types of voluntary exchanges as illegal. We concentrate our attention on crimes associated with illegal involuntary property transfers (thefts, robberies, burglaries, etc.) and physical violence. It is nevertheless true that our discussion will be contaminated by these dimensions because a large part of the criminal justice system handles the prevention and punishment of crimes related to illegal markets (e.g., drug consumption and trade) or because of the spillover effects that these activities have on the overall incidence of crime and violence. We also do not deal explicitly with some types of crimes that are usually outside of the main scope of the literature on costs of crime (such as corruption, white-collar crime, and domestic violence).²

The next section puts forth a very simple theoretical model that helps shed some light on the different dimensions of the costs of crime and their economic content. We then use this theoretical model as a guideline in the presentation and discussion of the various methodologies that have been applied to estimate particular aspects of the costs of crime. The chapter then presents, in a roughly comparable way, the main empirical results from some selected empirical studies,

before concluding with a discussion of directions for future research.

Theoretical Benchmark

This section develops a very simple economic model of crime in the tradition of Becker (1968), Stigler (1970), and Ehrlich (1973). The goals of the model are to guide our discussion and shed light on the conceptual content underlying the estimates of the costs of crime usually calculated in the empirical literature. In order to keep things as clear as possible, we introduce various simplifying assumptions and focus on the key aspects of the crime phenomenon.

Consider an agent with preferences defined over two goods, c and y , that can be represented by the following utility function:

$$V_n(c,y) = a \cdot \ln c + y, \quad (1)$$

where a is a constant. The subscript n denotes the "no-crime" scenario. The objective of the individual is to maximize utility function (1) subject to the budget constraint:

$$p \cdot c + y = m, \quad (2)$$

where p is the price of good c , m is income, and the price of y is normalized to 1. Given the quasi-linearity of the utility function, y can be interpreted as income spent on all other goods apart from c , or, alternatively, as the utility associated with the money that is not used in purchasing good c . In an interior solution within this formulation, there is no income effect in the demand for c . Therefore, any loss of income is reflected exclusively on a reduced demand for y .

¹ For an overview of these issues, see Keefer, Loayza, and Soares (2010).

² Lederman, Loayza, and Soares (2005) show that corruption seems to be driven by factors very different from those driving common crime. In relation to domestic violence, Waters et al. (2005) review the available literature.

From the first order conditions for the optimal individual choice in this problem, it is easy to see that the Marshallian demands for these two goods in the no-crime scenario are given by:

$$c_n = a/\rho, \text{ and} \quad (3)$$

$$y_n = m - a. \quad (4)$$

There is always some degree of inefficiency in any equilibrium with positive incidence of crime due to changes in behavior, expenditures on the public justice system, and the value of goods destroyed, among many other potential costs. So, from a theoretical perspective, this no-crime scenario is the first-best solution against which any equilibrium with positive incidence of crime should be compared. This is, in fact, precisely what some of the methodologies applied in the literature try to do. Let us now consider the scenario with positive incidence of crime to understand what these strategies actually estimate.

Victims

Suppose that there is, potentially, some positive incidence of crime in this economy. To simplify our discussion, assume that good c can be stolen and y cannot. This may seem reasonably appealing if one thinks of c as corresponding to conspicuous goods that can be physically seized—such as jewelry, cars, money, cellphones, etc.—and of y as representing real estate, financial investments, and other fixed assets. In this spirit, suppose that c is the good that is targeted by criminals. We assume that the probability of being victimized, $\pi(c)$, is an increasing function of c . If victimized, the individual has an amount x of good c stolen and, in addition, experiences a subjective welfare loss of σ (measured in monetary units). Assuming that the individual takes x as given, the expected utility of a potential victim is given by

$$V_c(c, y) = \pi(c)[a \ln(c - x) + y - \sigma] + (1 - \pi(c))[a \ln c + y]. \quad (5)$$

First-order conditions for the individual's problem determine optimal consumption c_c in the crime scenario implicitly from:

$$\frac{\alpha}{c_c} - \rho + \pi(c_c) \frac{\alpha x}{c_c(c_c - x)} + \pi'(c_c) \left[\alpha \ln \left(\frac{c_c - x}{c_c} \right) - \sigma \right] = 0 \quad (6)$$

The first two terms in this expression are identical to the solution in the no-crime scenario discussed before. The last two terms represent the responses of the optimal choice of c to the possibility of victimization. The third term, which is positive since $c_c > x$, compensates for the expected reduction in the consumption of c due to the probability of c being stolen. The fourth term, which is negative because $\pi(c)$ increases with c , accounts for the fact that c also directly affects the probability of victimization, which is in turn associated with a reduction in consumption and with the utility loss σ .

The third and fourth terms in equation (6) represent the direct welfare losses of crime to a potential victim. Their relative importance is likely to vary across different types of crime. For crimes with a given probability of victimization—such as with inconspicuous consumption, when the probability of victimization is not associated with c —the last term disappears and we have $c_c > c_n$. In this case, the individual in fact ensures against the probability of losing x units of c by buying more of it. The quasi-linear utility function isolates the substitution effect on c , so all the income effect falls on y only. In other words, $\pi \cdot \alpha \cdot x / c_c (c_c - x)$ is exactly the increased demand for c in anticipation of the probability π of having an amount x stolen. For expositional purposes, consider, for example, the case where $\pi(c) = 1$. Under this circumstance, $c_c = (a/\rho) + x$, so the consumption of c remains the same and the loss from victimization is reflected entirely in reduced consumption of y (by exactly

p, x). Generally, this compensation will not be perfect due to the presence of uncertainty. In any case, it is still true that the third term from equation (6) represents a utility loss that can be measured directly as reduced consumption of y .

There are other costs of crime that would, in a model such as this, appear as well as reduced consumption of y . This would be the case, for example, of expenditures on public and private security, which would enter the budget constraint as taxes or additional personal expenditures. Given the quasi-linear preferences, these would again be reflected entirely in reduced demand for y .

The fourth term in equation (6), in turn, captures what is probably the most commonly considered effect of crime on individual behavior. It is associated with the increased probability of victimization due to the consumption of c . This particular connection between consumption of c and the probability of victimization may be broadly seen as related to behaviors such as wearing expensive jewelry, driving a fancy car, or walking in certain areas of a dangerous city at night. The increased probability of victimization from consumption of c is associated with higher likelihood of occurrence of the state where consumption is $(c_c - x)$ instead of c_c and where there is a subjective utility loss σ . The term σ captures other negative consequences of crime—apart from the material loss associated with the goods stolen—and is usually thought of as arising from the interaction between victim and perpetrator. Its most obvious manifestations are the fear and trauma associated with victimization itself and the possibility of injury or death. If the absolute value of $\pi'(c_c)\{a \ln[(c_c - x)/c_c] - \sigma\}$ is larger than $\pi(c_c) \cdot a \cdot x / c_c (c_c - x)$, then c_c is lower than c_n . This would be the case, for example, if $\pi(c)$ were strongly increasing in c or if σ were large enough. This possibility indeed seems to be intuitively appealing, since it is commonly thought that, in most cases, the direct utility loss represented by crime is far more relevant than the impact of crime on reduced consumption. In this situation,

individuals reduce their demand for certain goods or activities that are associated with higher probability of victimization, so crime implies changes in behavior and welfare losses that are similar to those observed in the presence of distorting taxes. We maintain this hypothesis through most of the following discussion.

Criminals

Consider now the problem of a criminal. Suppose that criminals choose the amount x to be stolen, but that x has to be “produced” with an effort e that reduces utility. The negative effect of effort on utility may derive from actual work or from moral or social norms that attach stigma to criminal activities. Suppose that a criminal’s preferences over x and e can be represented by the instantaneous utility function:

$$u(x, e) = \beta \cdot x - e, \quad (7)$$

where β is a constant. Suppose, in addition, that criminals can generate gain x according to the production function:

$$x = \ln e. \quad (8)$$

Assume now that criminals may be caught with probability $\theta(e, s)$, which is increasing on e and on s , the latter being defined as expenditures on some public safety technology (e.g., a police force). If criminals are caught, they lose whatever they may have stolen and face a punishment corresponding to a utility loss δ . Generally, δ would also be produced by some technology associated with the public justice system (and some corresponding expenditure j). It can be interpreted as summarizing all different dimensions of punishment once a criminal is convicted, including utility loss from incarceration and foregone earnings. In this setting, the expected utility of a criminal is given by:

$$P(x,e) = \theta(e,s)(-e - \delta) + (1 - \theta(e,s))(\beta x - e). \quad (9)$$

If criminals take s , j , and the individuals' choices of c as given, the first-order condition characterizing the optimal choice of e is:

$$(1 - \theta(e^*, s)) \frac{\beta}{e^*} - 1 - \frac{\partial \theta(e^*, s)}{\partial e} (\delta + \beta \cdot \text{In}e^*) = 0. \quad (10)$$

Costs of crime typically analyzed in the literature include expenditures on police and the criminal justice system (s and j), and sometimes the losses associated with the punishment of criminals (δ) and the value of goods stolen or lost (x).

We abstract from some nontrivial issues here. First, we do not allow for extensive margin choices, so the number of criminals and potential victims is fixed (with the former smaller than the latter). Second, we ignore the issue of matching between victims and criminals. Implicitly, we assume that criminals choose x but that they cannot target particular victims. In order to make this compatible with the assumption that π is increasing on c , one may assume that there is a unit interval of potential victims who are randomly drawn by criminals with probability proportional to c . Finally, we assume that s affects the probability that the criminal gets caught but not the probability of victimization. This comes immediately from the fact that we do not allow for extensive margin adjustments. So s affects x , but not the number of crimes committed. This is certainly the most limiting of the simplifying hypotheses. Still, our framework is able to highlight the main issues in the discussion of the content of estimates of the welfare costs of crime.

Welfare Costs of Crime

Taking the public expenditures on security s and j as given and incorporating them in the victim's budget constraint, an equilibrium in this economy can be defined as a vector (c_c, y_c, e^*) , such that:

- i. (c_c, y_c) maximize $V_c(c, y)$, given e^* , subject to $p \cdot c + y + s + j = m$; and
- ii. (e^*, x^*) maximize $P(x, e)$, given c_c , subject to the production function $x = \text{In}e$.

The discussion on the adequate metric of social welfare in this context can be somewhat tricky. A straightforward economic analysis would incorporate the utility of all agents in discussions of efficiency and in the design of welfare-improving policies. But, usually, analyses of the optimal design of criminal justice policies do not place positive value on criminals' welfare. From this perspective, the optimal social choice of s and j would maximize the utility of victims subject to the reaction function of criminals. This would be equivalent to the solution if s and j were private goods chosen by victims and if victims incorporated the decisions of criminals when making their own optimal choice.

As mentioned before, crime in this setting is intrinsically inefficient, so there can never be a first-best allocation with positive incidence of crime. Without constraints on the instruments available to the government, optimal allocations would always imply zero crime, even if governments attach a positive value to criminals' welfare. If this were the case, governments could, for example, transfer an amount x^* to criminals and set e , s , and j to zero, therefore increasing the utility of both criminals and victims (notice that this would also save the potential utility loss σ for victims). Positive values of e , s , and j represent inevitably a social waste because they reduce, respectively, the welfare of criminals and the income of victims, and do not generate any net output. Similar views are prevalent, even if only implicitly, in most of the discussions on the welfare costs of crime.

One of the most commonly used measures of the welfare costs of crime can be interpreted as trying to assess the difference in the welfare of potential victims across the no-crime and crime scenarios. In terms of our model, this concept,

which is equivalent to the aggregate social loss due to crime, can be expressed as:

$$L_v = s + j + \pi(c_c) \cdot (\sigma + p \cdot x) + p \cdot (c_n - c_c). \quad (11)$$

The components of this aggregate cost are (1) expenditures on the criminal justice system associated with prevention and punishment of crimes, represented by the variables s and j ; (2) direct utility losses from victimization, including psychological costs due to trauma and fear, and physical costs due to injury and death, captured by σ (which occur with probability $\pi(c_c)$); (3) the value of goods lost or destroyed, represented by $p \cdot x$ (which also occur with probability $\pi(c_c)$); and (4) the change in behavior to try to reduce the risk of victimization, corresponding to a reduction in the consumption of c from c_n to c_c and representing a welfare loss of $p \cdot (c_n - c_c)$. Most estimates available in the literature try to get at the first three terms in this expression.

Whether x should be counted as a social loss or a transfer of resources within the economy depends on the weight attributed to the welfare of criminals. As argued by Glaeser (1999), part of x certainly represents a net social loss, since consumers—who purchase the good in the market—typically value it more than criminals. We follow the most common approach and do not consider the benefit that criminals derive from the stolen property. So we consider x entirely as a social loss.

More generally, the discussion related to criminals in the applied literature does not follow what theory would suggest. From a conceptual perspective, social costs of crime should include the effort allocated to crime e and the punishment δ imposed on criminals. Some estimates try to assess certain dimensions of δ , such as the opportunity cost of individuals incarcerated or incapacitated as a consequence of involvement with crime. But, in addition, δ also captures direct utility losses from incarceration and other types of punishment. As for e , it is best understood as reflecting the goods

that could have been produced with the time and effort that criminals allocate to the planning and execution of crime had they allocated this time and effort to production, generating value added. The theoretical counterpart of the welfare loss associated with criminals is:

$$L_c = e + \theta(s, e) \delta. \quad (12)$$

The vast majority of estimates of the costs of crime in the literature can be mapped in some of the concepts discussed above and rely basically on the comparison between a no-crime and a crime scenario. This is indeed an intuitively appealing comparison that highlights the aggregate social cost associated with the existence of crime. It gives an assessment of the overall magnitude and relevance of the phenomenon in a given economy. Still, it is not clear how useful such numbers can be from the perspective of the design and evaluation of public policies.

The problem facing a government in relation to any dimension of public policy is how to allocate resources in order to maximize social welfare. Optimal allocation of resources can usually be characterized by the equality between marginal benefits from expanding a certain policy and marginal costs associated with this expansion. As it relates to the model outlined above, this logic would imply that governments should choose s and j by weighting their marginal benefits (from reduced criminal activity) against their marginal costs (from reduced consumption due to increased taxes). This would be equivalent to choosing s and j in order to minimize the aggregate social loss as represented by $L_v + L_c$.

To account for the benefits from increased expenditures on s and j , governments would need to know the public policy technology linking changes in s and j to crime effort e , the costs and probability of victimization, the consumption decisions of potential victims, and the cost of punishment to criminals. These are relationships that are

very difficult to estimate and that involve knowledge of causal channels that are not immediately observable, such as the response of criminals to increased punishment, the changes in behavior of victims due to reductions in crime, and so on. These elusive causal relationships are certainly much harder to assess than the aggregate costs of crime typically calculated in the literature. Still, some methodologies come closer to what governments would want in order to decide on the optimal allocation of resources to public safety. The next section presents the various methodologies used in the estimation of the welfare costs of crime and interprets them in light of the theoretical framework developed here.

Methodologies

This section discusses some of the main strategies applied to estimate the welfare costs of crime. These can be broadly classified as accounting, contingent valuation, and other willingness-to-pay methods. Some studies have also analyzed particular dimensions of the welfare implications of crime, without necessarily trying to quantify them in monetary units or incorporate them into broader calculations of the overall costs of crime. We discuss a selected sample of these studies as well at the end of this section.

Accounting

Accounting is the most commonly used strategy to estimate the welfare costs of crime. It is, in short, a straightforward application of the logic of comparison between the “no-crime” and “crime” scenarios discussed in the previous section. Its basic justification can be summarized in two points: (1) there are costs incurred by and losses experienced in economies that would not be observed in the absence of crime; and (2) these represent direct welfare losses that should not occur and resources that potentially could be used for other

purposes. The specific dimensions considered in each study using the accounting methodology vary widely, but typically include a subset of the following: value of property stolen or destroyed; expenditures on security (public and private); medical expenditures on injuries; wages lost by people incarcerated, incapacitated, or killed; and subjective costs related to pain and suffering.

The main constraints to the set of dimensions included in the analysis are usually related to data availability for each location and time period. Almost always, calculations make use of secondary data such as public budgets, household expenditures surveys, medical records, demographic information on individuals incarcerated and victims, jury awards, and insurance data, as well as estimates from other studies (e.g., focused on pain, suffering, and quality of life).

Direct utility losses (σ) are not observable in the data, so accounting studies usually estimate these aspects of the costs of crime from certain expenditures that hint at them. Expenditures on medical care, for example, reflect at least a lower bound of the costs of injuries, since the pain associated with the conditions under treatment should be larger or equal to the cost of treatment. Compensations from jury awards are sometimes used to capture the damages that society deems as being associated with certain types of crime. Some studies also try to assess costs associated with pain and suffering from surveys of subjective perceptions.

The very diversity of numbers sometimes incorporated into accounting studies reveals their major drawback, which is the absence of a guiding theoretical framework. These studies typically add up all numbers related to the welfare costs available in a certain context, without a clear understanding of their conceptual content. This leads to some concrete limitations. First, there is the possibility of double counting. For example, medical costs are incurred to minimize the cost of suffering, and at least part of jury awards has this same goal. Subjective surveys of perceptions also try to

get at this same concept. It is not clear to what extent the incorporation of overlapping dimensions such as these constitute double counting.

It is also important to mention that some of these sources do not provide unbiased estimates of the relevant theoretical concepts. Jury awards, for example, provide estimates of the welfare loss associated with certain types of injuries, while the relevant metric should be the subjective welfare loss experienced by victims. Second, certain numbers commonly estimated in the accounting methodology do not correspond to relevant theoretical concepts. Take the incarceration of criminals, for example. The relevant welfare loss from incarceration should be the utility loss incurred by convicted criminals. This certainly includes their foregone wages, as incorporated in some studies, but various other costs as well, such as direct utility losses from lack of freedom, reduced contact with the family, and violence experienced while incarcerated, to name a few.

The accounting methodology is probably the most widely used strategy in the estimation of the welfare costs of crime. So it must have its merits, and it does. It is simple, encompassing, and intuitively appealing. But, in addition to the issues discussed above, the use of the theoretical framework proposed in the last section reveals yet another limitation. The strategy of the accounting methodology tries, in the end, to calculate the aggregate costs associated with the overall incidence of crime in a given society. So it is equivalent to trying to compare a no-crime to a crime scenario. As mentioned before, this number may be appealing from an intuitive perspective, since it reveals the total burden of crime in society, but it has very little concrete use. One may think of it as a relevant tool in a campaign to raise awareness about the severity of the crime problem in a certain context, but it would be difficult to see any utility in it beyond this. Public policy design and evaluation requires the comparison of marginal costs and marginal benefits of certain policies.

The accounting methodology provides virtually nothing in this direction.

Contingent Valuation

The contingent valuation methodology uses subjective surveys of perceptions to try to uncover the value that individuals place on a public good. It was originally developed by the environmental economics literature as a way to elicit preferences for such public goods as clean air and preservation of protected areas and endangered species (Mitchell and Carson, 1989). More recently, this methodology was applied in the criminology literature to deal with contexts involving crime, violence, and public security policies (Cook and Ludwig, 2000; Cohen et al., 2004).

The basic approach of the contingent valuation method is very simple and straightforward: in order to uncover the value of a good not traded in the market, one should simply ask how much people would be willing to pay for it. Contingent valuation studies in fact do just that, through surveys that typically offer policy alternatives to individuals or, using a price schedule, ask the maximum that individuals would be willing to pay for a certain policy outcome. Examples regarding crime policy, for example, can be found in Cohen et al. (2004, 93), where “respondents were asked if they would be willing to vote for a proposal requiring each household in their community to pay a certain amount to be used to prevent one in ten crimes in their community.” Similarly, Atkinson, Healey, and Mourato (2005, 568), after describing the characteristics of a specific type of crime, try to elicit individuals’ willingness to pay for reducing the “chance of being a victim of this offence by 50 percent over the next 12 months. The payment vehicle for this change was a one-off increase in local charges for law enforcement...with amounts varying from £0 to £5,000.”

Contingent valuation surveys offer individuals a certain outcome and ask how much they would

be willing to pay for it. Under ideal conditions, this would indeed reveal the precise value of a hypothetical policy capable of affecting the outcome in the way stated in the question. Taken on face value, this is really a key concept, corresponding roughly to the ideal number that would be needed to calculate the benefit side in a cost-benefit analysis, essential for any public policy design or evaluation. From the perspective of our theoretical model, it tells us how the welfare loss of victims—given by L_v , from equation (11)—responds to changes in crime rates. Since it supposedly reveals the value that individuals attach to a certain public policy outcome, the contingent valuation method does not require aggregation of different dimensions of the welfare costs of crime. It summarizes in a single number all dimensions that are relevant from the individuals' perspective, be they related to ex-ante fear of victimization and change in behavior, or to ex-post losses due to injury or trauma. In very simple terms, investment in a certain public safety technology would be efficient if it were able to achieve such an outcome at a cost (law enforcement, punishment of criminals, etc.) lower than the willingness of potential victims to pay, as revealed by contingent valuation studies.

The convenience of this method should be obvious. For example, it does not require knowledge of the specificities of a particular context, such as knowledge of the social stigma associated with a certain type of crime, in order to provide estimates. Individuals who are answering the surveys should already take into account everything that they deem relevant. So similar methodologies could be applied, for example, in different regions and they would still provide the overall benefits of certain policy changes from the perspective of potential victims themselves.

However, despite the obvious appeal of the simplicity of the contingent valuation method and the potential relevance of the numbers it generates, it also has its drawbacks. Within economics, there is a long empirical tradition that regards

stated preferences—as opposed to revealed preferences—with suspicion. Hypothetical questions about how individuals would react under certain conditions, or how much they would value certain interventions, are not real decision-making situations. There are no real individual-level costs or benefits incurred from the responses to such questions, so it is difficult to understand exactly what individuals are answering when faced with these hypothetical situations. They may not put enough thought into the issue, they may say what is deemed to be the “socially desirable” answer, or they may find it difficult to process the hypothetical counterfactual scenarios usually proposed. The latter is associated with the more pervasive issue of framing, usually identified as a potential problem in these types of studies. Individuals may be unable to dissociate the hypothetical questions they are faced with from their specific context. So when asked about how much more in terms of taxes they would be willing to pay for a given reduction in crime, individuals may bring implicitly into this answer their perceptions regarding, for example, the quality of local law enforcement agencies. In some sense, answers may not really be addressing the hypothetical question proposed, but a combination of what individuals consider to be realistic given the institutions they know. For all of these reasons, it is not uncommon for economists to regard willingness-to-pay estimates based on subjective statements of perceptions with much more suspicion than their counterparts based on actual behavior (Carson, Flores, and Meade; 2001).

Other Willingness-to-Pay Methods

In addition to contingent valuation studies, other willingness-to-pay methods based on revealed preferences have also been applied to the estimation of the welfare costs of crime. These typically rely, one way or another, on estimates obtained from hedonic price models. Hedonic models are

used to decompose the price of a good into its attributes, so that a value can be attached to each specific attribute (Rosen, 1974). From this perspective, the price of a house reflects its characteristics, such as living space, number of bedrooms, and amenities, as well as certain features associated with its specific location, from which the “consumption” of the flow of services from the house cannot be dissociated. The frequency of crime in the neighborhood of a house may therefore be seen as one of the hedonic attributes associated with it. Individuals will usually be willing to pay higher values for houses that are located in safer neighborhoods.

Hedonic price models allow researchers to estimate how much individuals are willing to pay to avoid a neighborhood with a certain level of crime. If individuals are willing to pay a certain value to avoid the level of crime associated with a specific area, it means that the welfare gain they experience from such a reduction in crime is at least as large as the additional value they are paying. So hedonic price models provide an indirect estimate of the willingness to pay for reductions in crime rates or, in other words, the welfare loss associated with a certain level of crime. A simple back-of-the-envelope calculation based on estimates from hedonic price models applied to real estate prices (or rental rates) thus provides a straightforward way of assessing the costs of location of specific crime and violence. This logic was first applied by Thaler (1978), who used data from property crimes and real estate prices in Rochester, New York.

Contributions from health economics, based similarly on willingness-to-pay methods and hedonic models, have also been applied to the analysis of specific dimensions of the welfare cost of crime and violence. Researchers in health economics usually make use of hedonic estimates of compensating wage differentials for mortality risk to estimate the willingness to pay of a certain population for reductions in mortality rates due to

specific health conditions. Procedures similar to these have been used to estimate the welfare cost of homicides (Soares, 2006).

Estimates obtained from hedonic models have a theoretical interpretation analogous to those from contingent valuation methods. Under ideal conditions, they reveal how much individuals are willing to pay for certain changes in crime rates, which is indeed what is needed for cost-benefit analysis. From the perspective of our theory, it tells us how the welfare loss of victims (L_v) varies with changes in crime rates. Again, since the numbers supposedly refer to individuals’ own willingness to pay, there is no need to aggregate other dimensions of benefits associated with reductions in crime—they provide the overall valuation of the gains in welfare under consideration. The advantage of strategies based on hedonic prices compared with contingent valuation is that they rely on actual market behavior, not on hypothetical answers or subjective statements of preferences. People are indeed incurring real costs and benefits when they choose to pay a higher price for a house in order to be able to live in a safer area. As before, the hedonic approach is also applicable to various different contexts, irrespective of institutions or cultures, as long as the crime under consideration is implicitly priced in some good transacted in the market (as happens with crimes that are geographically delimited, in the case of real estate prices). From this perspective, the contingent valuation presents a clear advantage: it is much more flexible, since the hypothetical questions can be applied to any policy change that is regarded as potentially relevant.

Difficult-to-Measure Costs of Crime

Several consequences of crime go beyond the direct welfare losses experienced by potential victims and are therefore difficult to incorporate into the standardized methodologies discussed above. Some of these involve general equilibrium effects

and externalities that would hardly be captured by marginal willingness-to-pay methods, which typically are akin to partial equilibrium analysis (they consider a certain change in crime rates, taking everything else as given). Such consequences include the effect of crime and violence on the business environment, human capital accumulation, and urban development, among other factors.

Investments involve the transfer of resources across time through present costs that generate future benefits. So the theoretical connection between crime and investments is clear. Weakened property rights, reduced planning horizons (or expected lifetime, in the case of individuals), and increased uncertainty tend to discourage any activity that implies current costs and future benefits. In the case of human capital, crime is likely also to affect the technology of investment, since psychological trauma and fear are likely to reduce the learning ability of children. Available evidence suggests that crime affects the level and effectiveness of investments in schooling. Children growing up in high crime areas or exposed to episodes of violence tend to accumulate fewer years of schooling and perform worse on standardized exams (Grogger, 1997; Monteiro and Rocha, 2012). Similarly, recent literature has also indicated that the impact of crime on business may be quite significant. Evidence from Brazil, Colombia, Jamaica, and a sample of transition economies in Europe and Southeast Asia suggests that crime and violence represent real burdens to businesses, reducing investment, hindering job creation, increasing costs through private security expenditures, and reducing hours of operation (Gaviria and Velez, 2002; World Bank 2003; Krkoska and Robeck, 2006; and the World Bank's 2003 Investment Climate Survey). Interestingly, this effect seems to be driven by the incidence of street crime, rather than organized crime.

Hammermesh (1999) and Cullen and Levitt (1999), in turn, present evidence that these forces

may indeed end up affecting the functioning of cities and even the pattern of urban growth. Hammermesh (1999) shows that crime shifts hours of work in cities away from nighttime and toward daytime. Cullen and Levitt (1999) show that crime affects the pattern of urban growth, with cities that go through sustained increases in crime rates typically experiencing substantial population losses as a result. Thus, crime does seem to have a first-order effect on the way cities function and on their long-run dynamism.

Not surprisingly, the combination of these negative impacts of crime seems indeed to end up reflected in aggregate growth rates. Though it is a major challenge to identify causality in the relationship between crime and economic growth, the evidence currently available—based on cross-country data and dynamic panel techniques—seems to indicate that increases in crime rates (measured by homicide rates) tend to reduce the growth rate of income per capita (World Bank, 2006).

Distributional considerations represent an additional dimension often neglected by studies on the welfare costs of crime. Aggregate numbers usually presented miss the unequal burden that crime represents to different groups in society. The distribution of crime across the population is far from homogenous across types of crime and contexts. Levitt (1999), for example, finds that the poor in the United States are more likely to be victims of violent crimes than the rich, but finds no clear pattern for property crimes. Di Tella, Galiani, and Schargrodsky (2010) present evidence that most of the burden of increases in burglaries in Argentina during the 1990s was concentrated on the poor, while for street robberies increases were roughly homogenous across socioeconomic groups. On the other hand, Gaviria and Pagés (2002) present evidence for 17 Latin American countries showing property crime victimization concentrated among the rich and the middle class. For Colombia, in particular, they also

show that violent crimes behave quite differently, with kidnappings concentrated on the rich and homicides on the poor. For Brazil, Soares (2006) also presents evidence that homicides are concentrated among the lower socioeconomic strata. The equilibrium distribution of crime in society probably reflects a combination of costs and benefits to criminals and of protective technologies available to victims. This is an important area that deserves further research but that falls outside of the main scope of this chapter.

Many other indirect costs of crime could also be included in this discussion. Most of these are analyzed qualitatively and not incorporated into broader strategies aimed at calculating the overall costs of crime, sometimes because they can be difficult to monetize and sometimes because their evaluation depends on the availability of data. Still, they provide important insights into dimensions of the social costs of crime that are not immediately obvious and that, ultimately, should also be incorporated into public policy analysis.

Results from the Literature

Table 2.1 reviews some selected studies that illustrate the use of the methodologies discussed in the previous section. The table presents the methodologies used, the focus of the analyses in terms of geographic area and year, the types of crimes and welfare costs considered, and the main results. Since the papers included are very diverse in nature and objectives, main results may be estimates of costs of crime or of potential welfare gains from crime reduction, and are sometimes presented in monetary units (2007 U.S. dollars) and sometimes as fractions of local production.

Examples of the use of the accounting methodology abound in the literature. This long list includes Miller, Cohen, and Rossman (1993) for the United States; Londoño and Guerrero (1999) for Latin America (selected countries and cities, such as Caracas, urban Colombia, El Salvador, Lima,

Mexico City, and Rio de Janeiro); Brand and Price (2000) for England and Wales; Mayhew (2003) for Australia; ISER (1998) and Rondon and Andrade (2003) for Brazilian cities (Rio de Janeiro and Belo Horizonte); World Bank (2003) for Jamaica; Altbeker (2005) for South Africa; and Bundhamcharoen et al. (2008) for Thailand.

To give an idea of the many dimensions typically considered in accounting studies, take the case of Mayhew (2003). The author estimates the costs of homicides, assaults, sexual assaults, robberies, burglaries, thefts, vandalism, arson, fraud, and drug offenses, and also includes expenditures on the criminal justice system, victim assistance, the security industry, and insurance administration, as well as production lost by the incapacitation of prisoners and victims. He makes use of budgetary figures, industry data, medical information on costs of hospitalization, estimates obtained from other studies using willingness-to-pay methods, jury awards, and statements of desired compensation by victims.

Despite the many potential differences across accounting studies, Table 2.1 shows that the studies usually provide estimates that, as fractions of local production, tend to be of similar orders of magnitude. For the Brazilian cities of Belo Horizonte and Rio de Janeiro, for example, the estimates add up to roughly 5 percent of annual production. In the average for Latin America, once various other dimensions are incorporated, Londoño and Guerrero (1999) extrapolate some country estimates and suggest that it may be close to 14 percent of GDP if some dimensions of “intangible costs” are incorporated into the analysis. Without such intangible costs, their estimates also hover around 5 percent of GDP. Relative numbers are not too different in the case of developed countries such as Australia, England and Wales, and the United States. For Australia, Mayhew (2003) estimates a cost of 10 percent of GDP, while Brand and Price (2000) arrive at 7 percent for England and Wales. For the United States, Miller, Cohen, and Rossman

TABLE 2.1. Summary of Selected Studies on Welfare Costs of Common Crime and Violence

Method	Study	Area of analysis	Year	Type of crime or expenditure	Main result (costs of crime or potential welfare gain from crime reduction) (in 2007 U.S. dollars or percent of production, unless otherwise noted)
Accounting	Miller, Cohen, and Rossman (1993)	United States	1987	Rape, robbery, assault, arson, murder	Rape \$16.72 billion Robbery \$38.46 billion Assault \$160.56 billion Arson \$1.42 billion Murder \$80.28 billion Total \$297.47 billion
	ISER (1998)	Rio de Janeiro Brazil	1995	Medical assistance, years to death or incapacity, material losses, expenditures on safety, justice system, insurance	Medical \$43 million Injuries and premature deaths \$1 billion Material loss and security expenditures \$1.7 billion Total \$2.8 billion (5 percent of GDP)
	Londoño and Guerrero (1999)	Latin America	1990s	Medical costs, loss output, intangible costs	Human capital 1.9 percent Capital 4.8 percent Transfers between victims and criminals 2.1 percent Total cost 14.2 percent
	Brand and Price (2000)	England and Wales	1999-2000	Medical costs, loss output, intangible costs	Crime against individuals: average cost = \$3,100; total cost = \$50.4 billion Commercial and public sector cost: total cost = \$14.2 billion Fraud and forgery: total cost = \$21.6 billion Traffic and motoring/other non-notifiable offenses: total cost = \$7.5 billion Total cost of crime = \$93.7 billion
	Mayhew (2003)	Australia	2001-02	Medical costs, loss output, intangible costs	Direct costs from crime \$24 billion Criminal justice system \$8 billion Costs of provision for victims \$1 billion Private security \$4 billion Total cost \$37 billion

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TABLE 2.1. Summary of Selected Studies on Welfare Costs of Common Crime and Violence *(continued)*

Method	Study	Area of analysis	Year	Type of crime or expenditure	Main result (costs of crime or potential welfare gain from crime reduction) (in 2007 U.S. dollars or percent of production, unless otherwise noted)
	Rondon and Andrade (2003)	Belo Horizonte, Brazil	1999	Public and private security expenditures, value of goods stolen, potential income lost by fatal victims, medical expenses	Expenditures on crime prevention 2.26 percent Costs from existing crime 1.6 percent Total 3.9 percent
	World Bank (2003)	Jamaica	2001	Medical costs, loss of output, public expenditure on security	Medical costs 0.40 percent Lost production (in 2001 only) 0.20 percent Public expenditure on security 3.1 percent Total 3.7 percent
	Altbeker (2005)	South Africa	2004	Public expenditure on criminal justice	3.1 percent
	Bundhamcharoen et al. (2008)	Thailand	2005	Direct medical costs, loss of productivity	Direct medical costs \$35 million Loss of productivity \$379 million Total \$415 million (0.23 percent of GDP)

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TABLE 2.1. Summary of Selected Studies on Welfare Costs of Common Crime and Violence (continued)

Method	Study	Area of analysis	Year	Type of crime or expenditure	Main result (costs of crime or potential welfare gain from crime reduction) (in 2007 U.S. dollars or percent of production, unless otherwise noted)
Contingent valuation	Ludwig and Cook (2001)	United States	1998	Gun violence, fatal and nonfatal	<p>Exercise: 30 percent reduction in crime</p> <p>Total: \$31.2 billion</p> <p>Per injury: \$1.52 million</p> <p>Value of statistical life: \$6.9 million to \$8.6 million</p>
	Cohen et al. (2004)	United States	2000	Burglary, serious assault, armed robbery, rape and sexual assault, and murder	<p>Exercise: 10 percent reduction in crime</p> <p>Per crime - burglary: \$30,102</p> <p>Per crime - serious assault: \$84,286</p> <p>Per crime - armed robbery: \$279,347</p> <p>Per crime - rape, sexual assault: \$285,367 million</p>
	Atkinson, Healey, and Mourato (2005)	England and Wales	2001	Common assault, other wounding, and serious wounding	<p>Exercise: 50 percent reduction in crime</p> <p>Total - burglary: \$12.9 billion</p> <p>Total - serious assault: \$14.9 billion</p> <p>Total - armed robbery: \$13.6 billion</p> <p>Total - rape, sexual assault: \$15.7 billion</p> <p>Total - murder: \$18.18 billion</p>
	Thaler (1978)	Rochester, New York	1971	Property crime	<p>Hedonic model: cost of an "average" property crime roughly \$2,560.</p> <p>Common assault - per crime: \$8,903</p> <p>Wounding - per crime: \$52,099</p> <p>Serious wounding - per crime: \$60,419</p>
	Lynch and Rasmussen (2001)	Jacksonville, Florida	1994-95	Rape, robbery, assault, motor vehicle theft, burglary, larceny	<p>Reduction of 39 percent of price of a home in the two deciles with the highest cost of crime (from \$129,670 to \$78,630).</p>
	Soares (2006)	Cross-country	1990s	Homicide rates	<p>Calibration. Exercise: 100 percent reduction in mortality due to violence</p> <p>Total - present value: 29 percent</p> <p>Annual flow: 1 percent</p>

Source: Soares (2015).

Note: Values deflated to 2007 U.S. dollars using the Consumer Price Index.



(1993) estimate the welfare cost of rape, robbery, assault, arson, and murder at a slightly lower number of the order of 3 percent of GDP. For Jamaica, the World Bank (2003) estimates the losses corresponding to medical costs, lost productivity, and public security expenditures at 3.7 percent of annual production. In South Africa, Altbeker (2005) estimates that public expenditures on the criminal justice system alone correspond to 3.7 percent of GDP.

For purposes of comparison, it is useful to consider the welfare costs of crime in a low-crime environment. In the case of Thailand, for example, Bundhamcharoen et al. (2008) estimate the costs of crime associated with direct medical expenditures and loss of productivity to represent only 0.23 percent of GDP. It is important to note, though, that these specific estimates for Thailand do not include expenditures on the criminal justice system.

Contingent valuation studies, in turn, typically focus on one type of crime or on a relatively small set of crimes. Ludwig and Cook (2001), for example, focus on injury from gun violence in the United States, while Cohen et al. (2004) analyze burglary, serious assault, armed robbery, rape, sexual assault, and murder, also in the United States, and Atkinson, Healey, and Mourato (2005) look at common assault, wounding, and serious wounding in England and Wales. They do not provide estimates of the overall loss associated with crime that are as encompassing as those provided by the accounting methodology. On the other hand, they do provide numbers that are closer to being useful in terms of public policy analysis. Given the typical questions asked, as discussed earlier in this chapter, the answers can be interpreted as revealing the benefits associated with reductions in the types of crime under consideration. These studies show, not surprisingly, that the subjective cost of victimization—and, therefore, the welfare gains from crime reduction—may vary considerably from crime to crime.

Cohen et al. (2004), for example, estimate the willingness to pay to avoid one burglary and one assault to be, respectively, \$30,102 and \$84,286. The similar numbers for armed robbery and sexual incident are around \$300,000, and for murder around \$11 million. Ludwig and Cook (2001) estimate a willingness to pay to avoid a gunshot injury of \$1.5 million and a value of a statistical life (corresponding to the social willingness to pay to avoid one death) between \$7 million and \$8.5 million. Atkinson, Healey, and Mourato (2005) estimate willingness-to-pay values for England and Wales that are smaller than the numbers for the United States, but still of the same order of magnitude. Overall, the use of the contingent valuation method to estimate the welfare costs of crime is still quite limited, particularly for developing countries.

In terms of other willingness-to-pay methods, Thaler (1978) represents the first effort to use market behavior to try to estimate the welfare cost of crime. He applied the hedonic price strategy to estimate the impact of property crimes on real estate values in Rochester, New York. From that, the average cost of property crime was estimated to be around \$2,560. Various other papers have since applied adapted versions of this methodology to estimate costs of specific types of crime or violence. Lynch and Rasmussen (2001), for example, apply this methodology to the case of Jacksonville, Florida, and estimate that high-crime areas had real estate prices discounted up to 40 percent (or \$50,000).

Developments of Thaler's (1978) original strategy continue to be applied today, sometimes to issues that fall somewhat outside of the scope of common crime and violence. An example is Besley and Mueller (2012), who use it to estimate the social gains generated by the reduction in political violence in Northern Ireland. Finally, Soares (2006) uses hedonic estimates to calculate the welfare costs of violence, but coming from a different perspective. Following the value-of-life literature

from health economics, he uses estimates of compensating wage differentials for mortality risks to calibrate a theoretical lifecycle model, and then uses this model to calculate the welfare losses from increased mortality due to homicides. The results suggest that each additional year of life expectancy lost due to homicides is associated, on average, with a social welfare loss of the order of 3.8 percent of GDP.

Concluding Remarks

Current estimates of the welfare costs of common crime and violence offer a broad picture of the social losses related to crime. Yet, different methodologies deliver different types of estimates, and a clear theoretical perspective is important to put these estimates in perspective and interpret them. This chapter has developed a simple economic model of crime to try to provide one step in this direction and help make sense of the variety of numbers currently available in the literature.

The optimal design of public policies requires a comparison between the marginal costs and

marginal benefits associated with a given intervention. This chapter has argued that some of the methodologies applied in the literature provide estimates that come closer to the marginal benefits that would be useful for public policy design and evaluation. Still, it is worth remembering that this is just one side of the equation. In the end, potential benefits have to be compared with the costs of achieving such outcomes, given the public security technologies available.

This other side of the cost-benefit equation will typically be provided by evidence from impact evaluation studies. These studies face the nontrivial challenge of estimating the public safety production function. Ideally, this production function should map expenditures along various margins on relevant outcome variables, providing numbers that could then be compared with the potential welfare gains obtained from studies on the costs of crime. Having this perfect framework for policy analysis fully developed may seem an elusive and virtually impossible objective. Nevertheless, it should remain as the paradigm to guide future research on the costs and benefits of policies to fight crime.

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3

Costs of Crime as Calculated Using the Accounting Methodology: A Comparative Study of Chile, Costa Rica, Honduras, Paraguay, and Uruguay³

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What was the cost generated by crime⁴ in Chile, Costa Rica, Honduras, Paraguay, and Uruguay in 2010? The answer to this question, based on victimization surveys and police records, provides the background information to assess the size of the problem and, through that process, establish the corresponding priorities for government agendas, the public policy debate in each country, and international fora. On this point, Graham and Chaparro (2010) indicate that the results of studies on the economic costs of crime represent a powerful argument to generate public support for citizen security policies proposed by governments.

In addition, studies on the costs of crimes allow for more clearly measuring the benefits that could result from public interventions—one of which would be the costs avoided by reducing incidents of crime and violence—as well as

from the efficiency of those interventions. McColister, French, and Fang (2010) and Roper and

³ This chapter was developed with assistance from Diego Aboal and Bibiana Lanzlotta. It integrates three studies: one on Chile, Costa Rica, and Honduras, another on Paraguay, and a third on Uruguay. The editing of the studies was done by the author listed under the title of this chapter. The research teams for each of the respective studies were comprised of the following: Chile, Costa Rica, and Honduras—Mauricio Olavarría Gambi (Universidad de Santiago de Chile), Catalina Mertz Kaiser (Fundación Paz Ciudadana, Chile), Nicolás Muñoz Correa (Fundación Paz Ciudadana, Chile), Francisco Torres Avilés (Universidad de Santiago de Chile), and Consultora Demoscopia (Costa Rica); Paraguay—Diego Aboal (CINVE, Uruguay), Bibiana Lanzlotta (CINVE, Uruguay), and Víctor Vázquez (Instituto Desarrollo, Paraguay); and Uruguay—Diego Aboal, Jorge Campanella, and Bibiana Lanzlotta (CINVE, Uruguay). Additional contributors to the development of the studies were as follows: Chile—Catalina Araya Oporto and Rodrigo Leyton Cornejo; Costa Rica and Honduras—José Rodríguez and Adriana Moya; Paraguay—Alejandra Bazzano; Uruguay—Magdalena Domínguez and Maren Vairo.

⁴ According to WHO (2002: 7), violence consists of “the intentional use of physical force or power, threatened or actual,

Thompson (2006) add that studies of costs provide useful information for estimating the value of social programs that address crime and violence. Similarly, a study by the World Bank (2011: 4) argues that “even when these calculations only approximate the real costs, the exercise can be useful to summarize the direct costs of violence, calculate the cost-effectiveness of interventions to combat violence, and measure the effectiveness of a given intervention.” In this way, this type of study contributes to attaining an overview of the problem, its scope, and the social effectiveness of State interventions in this area.

This chapter uses the accounting method (of losses and expenditures) to estimate the costs of crime and violence.⁵ The crimes analyzed are those committed against persons and property, with a particular focus on homicides, assaults, and the wide variety of robberies and thefts.⁶ The study uses the cost accounting classification of Brand and Price (2000), which allows for identifying expenditures in anticipation of, as a consequence of, and in response to crimes.

The focus of the study is on the costs, valued monetarily, that crime and violence impose on society. More specifically, this analytical perspective encompasses the costs, expenditures, losses, and investments incurred by households, firms, and the State in relation to the phenomenon of crime. The cost studies do not aim to establish exact amounts, but rather to identify orders of magnitude of crime and violence in a given country or community. The reason for this is because, on the one hand, crime in practice is an evolving and dynamic phenomenon, which makes the task of identifying monetary measures and their consequences more difficult. On the other hand, it is important to note that the information necessary to estimate the cost of crime is complex and difficult to obtain, often leading to significant data cleaning efforts and the use of indirect estimation methods.

In the present study, one of the difficulties has been the characteristics of the information

with which we have had to work. This difficulty is common to this type of analysis, and it comes from the fact that the data upon which the estimations are based normally come from official entities or nongovernmental organizations. They are thus used for study purposes as provided, even though they have rarely been prepared for the purpose of estimating costs of crime. An additional challenge typically faced by these types of studies—and the present study is no exception—involves the availability of and access to relevant information. One manifestation of this problem is that a significant portion of the information needed to make estimations does not exist, or there are no records of it. Furthermore, even when the information does exist, much of the data required are the property of public agencies, which are often protective of access to it, even when it comes to providing it to accredited academic institutions.

Thus, as was discussed in the introductory chapter to this volume, it is important to reiterate that estimations about the same case can vary across different studies. The origin of this variability in the estimates lies in the types of crimes analyzed, the assumptions made, the type and quality of information and what information was accessible, and the estimation techniques used. This makes it necessary for the studies to sufficiently take into account the methodologies applied and the operationalization of the statistical information used to make the estimates.

The aforementioned difficulties make comparisons in terms of the costs of crime a difficult undertaking. Thus, an analysis that estimates and

against oneself, another person, or against a group that either results in (or has a high likelihood of resulting in) injury, death, physiological harm, maldevelopment, or deprivation.”

⁵ As discussed earlier, alternative methods used to estimate the costs of crime and violence are hedonic price models and contingent valuation.

⁶ Although these crimes do not represent all of the crimes against property and persons, they are the most frequent and those for which the most information is available for analysis.

compares the costs of crime in several countries is both a major challenge and a major novelty. The present study collects comparable information from the five countries analyzed using the same search pattern and applying a comparable methodology for most of the crimes for which costs are estimated. Even then, there was not information available in all of the countries for certain components of the analysis. Thus it was decided to conduct a comparative analysis only for those components for which there was information for the five countries, then conduct an additional analysis for those cases for which information could only be collected for certain countries.

This chapter first presents an overview of crime and violence based on national surveys in each of the countries analyzed. It continues with an estimation and discussion of the costs derived from the application of the methodology indicated, then concludes with a discussion of the implications for public policy that emerge from the analysis.

Overview of Victimization

The Latinobarometer survey (Lagos and Dammert, 2012) found that in 2011, 32 percent of the Latin American population considered violence and gangs as their country's principal problem, and that in 11 of the 18 countries analyzed, crime

and citizen insecurity were the most critical challenges. Although the data from national surveys on citizen security sometimes differ from estimates in Latinobarometer, all of the sources tend to show that violence and crime are considered as one of the problems that generates most concern among citizens.

Latinobarometer data (Table 3.1) show that violence—as measured by the homicide rate—is comparatively low in Chile and Uruguay and very high in Honduras. The trend is the same when employing the overall victimization rate as the indicator.

The study of specific crimes is complex, given that not all countries have victimization surveys. In the case of Uruguay, for example, there is a survey on victimization, perceptions of insecurity, and confidence in institutions carried out by Consultora Mori that allows for estimating the socioeconomic distribution of three crimes in the city of Montevideo, so estimates of the incidence of victimization have likely been based on complaints filed. In Paraguay, although there are victimization surveys, it has not been possible to access the micro data. In the cases of Chile, Costa Rica and Honduras, given that the terminology used for crimes varies, the terminology was harmonized using the international classification of crimes developed by the United Nations (UNDOC, 2013). Table 3.2 presents the harmonized terminology.

TABLE 3.1. Victimization and Violence Rates in Selected Countries

Country	Overall victimization (percent of households)	Violent victimization (percent of households)	Homicide rate (per 100,000 population)
Chile	29	14	3.7
Costa Rica	38	22	11.3
Honduras	36	15	82.1
Paraguay	30	14	11.1
Uruguay	30	16	6.1
Latin America (18 countries)	33	18	24.6

Source: Lagos and Dammert (2012).

TABLE 3.2. Categorization of Crimes: Costa Rica, Honduras, Chile, Paraguay, and Uruguay

Demoscopia survey (Costa Rica and Honduras)	Chile	Paraguay	Uruguay
Robbery or assault and theft	Robbery with violence	Robbery with violence against persons	Robbery
Physical assault	Battery	Battery	Battery
Vandalism in the home	Domestic burglary with the use of force	Home burglary	Robbery
Breaking of bars, gates, locks	Robbery with forced entry to the home	Home burglary	Robbery
Home invasion and robbery in the absence of family members	Robbery with forced entry into the home	Home burglary	Robbery
Home invasion and robbery in the presence of family members	Robbery with forced entry to the home	Home burglary	Robbery
Cellphone robbery	Robbery without violence	Robbery with violence against persons	Robbery
Vandalism of an automobile	Robbery from motor vehicle	Vandalism of a motor vehicle	Robbery
Robbery of object in motor vehicle	Robbery from motor vehicle	Robbery of object in motor vehicle	Robbery
Motor vehicle robbery	Motor vehicle robbery	Motor vehicle and motorcycle robbery	Robbery
Motorcycle robbery	Motor vehicle robbery	Motorcycle robbery	Robbery
Bicycle robbery	Burglary with force	Motorcycle robbery	Robbery
Robbery of license plates	Robbery from motor vehicle	Robbery of object in motor vehicle	Robbery

Sources: UNDOC (2013); ENUSC (2010); Demoscopia (2010); authors' calculation based on ENV (2011); complaints filed, in the case of Uruguay.

Note: Although the crime of theft can be understood as equivalent to robbery, it was not established as an individual category in the Demoscopia survey, so it is not included in the table. Nevertheless, the cost estimates have taken into account the aggregate of all of the crime categories presented in the table, including the crime categorized as theft in Chile.

Victimization by Economic Strata

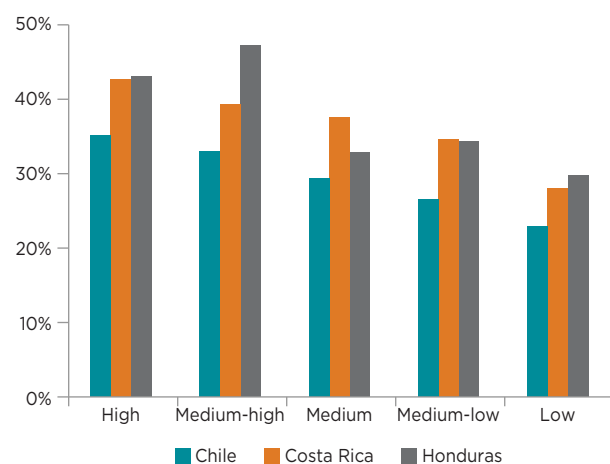
Victimization surveys⁷ show that, as suggested by the theoretical model in Chapter 2 in this volume, the income strata most victimized are the higher-income strata (Figure 3.1 and Table 3.3), suggesting that there is a search for yield in the targeting by criminals of their victims, and thus a certain economic logic behind the criminal act. In the case of Honduras, there is a slight variation of this phenomenon in that the most victimized strata is the medium-high income strata, followed by the high-income strata.

Data from a survey in the city of Montevideo by a Consultora Mori team conducted for the Inter-American Development Bank in 2010 shows that citizens with high socioeconomic status are

the principal victims of thefts, while robberies occur among those whose socioeconomic condition is classified as “bad” as well as those whose economic level is defined as “very good.”

⁷ Data on Chile are from the National Urban Survey of Citizen Security (*Encuesta Nacional Urbana de Seguridad Ciudadana - ENUSC*), with a probabilistic sample design, by three-stage conglomerate, administered by the National Statistics Institute (*Instituto Nacional de Estadísticas - INE*) as mandated by the Ministry of the Interior. The survey is conducted face to face, generally between the months of September and December, among persons 15 years of age or older, and it has progressively added to the number of communities represented, from 77 in 2003 to 101 in 2008 up to 2012. In 2010, the ENUSC surveyed 25,933 persons, which represents a sample of more than 11 million inhabitants. The ENUSC provides data on overall victimization in households in terms of home robbery with violence, robbery of persons without violence, robbery of persons with violence, theft, assaults, motor vehicle robbery, and robbery of object in motor vehicle.

FIGURE 3.1. Victimization by Socioeconomic Strata: Chile, Costa Rica, and Honduras, 2010



Source: Prepared by the authors based on data from ENUSC (2010) and Demoscopia (2010).

Note: In the case of Chile, the ENUSC survey classifies economic strata as ABC1, C2, C3, D, and E. In the Costa Rican and Honduran cases, Demoscopia used the classification of high, medium-high, medium, medium-low, and low. To facilitate understanding of the classification used in Chile, the following format is used: ABC1 is high, C2 is medium-high, C3 is medium, D is medium-low, and E is low.

TABLE 3.3. Victimization in Montevideo by Socioeconomic Level, 2010 (in percent)

Socioeconomic level	Victimization		
	Injuries	Robberies	Thefts
Very good (high)	0.0	19.6	5.9
Good (medium-high)	0.5	18.5	1.7
Regular (medium)	0.5	13.5	1.3
Bad (medium-low)	0.0	20.3	0.9
Very bad (low)	0.0	0.0	0.0
Total	0.4	15.8	1.6

Source: Consultora Mori Survey 2010.

Note: The original classification used by the Mori Survey is seen in the left column of the table. The text in parentheses indicates the equivalent in the delineation of strata in the other countries included in the study.

The ENUSC sample in Chile shows that 28 percent of households were victims of some type of crime against persons, robbery, or theft. In 2003 and 2013, there was an overall tendency toward a

reduction in victimization, and the most frequent crimes were robbery from a motor vehicle and burglary with forced entry. The crime of robbery without violence, which was one of the most frequent, showed a significant decline as of 2007. This evidence suggests that the main characteristic of victimization among households and persons in Chile involves crimes involving small amounts of money.

Data from the Demoscopia survey indicate that the victimization rate in both Costa Rica and Honduras is approximately 38 percent,⁸ which coincides with the Latinobarometer estimates shown in the introductory section. Figure 3.2 shows overall victimization and Table 3.4 presents the relative importance of crime victimization in Paraguay in 2010, estimated based on data from the National Victimization Survey (*Encuesta Nacional de Victimizaci3n - ENV*).⁹

Data on Costa Rica are from the victimization survey conducted by Demoscopia in 2010. The survey is considered a stratified random sample, with selection in stages, distributed in a format proportional to the population size of the country's regions, with a margin of error of 3 percent and a confidence level of 95 percent. The sample includes 1,200 households representative of about 1.3 million households and 2.3 million Costa Ricans. Two hundred businesses representing small and medium-size enterprises in the industry, commerce, and services sectors were also surveyed.

The estimates on victimization in Honduras are also based on the 2010 Demoscopia survey, with a stratified random sample, selection in stages, and distributed proportionally in the country's 16 departments and their respective municipalities. The size of the sample for Honduras is 1,111 households. The margin of error is 3 percent and the confidence level is 95 percent. The survey also included 216 small and medium-sized enterprises from the industrial, commercial, and services sectors, mainly in the cities of San Pedro Sula.

The data used to describe the crime victimization scenario in Paraguay is from ENV (2011), which collected information corresponding to 2010.

⁸ The wording of the question for the Demoscopia study for Costa Rica and Honduras is: Have you or a member of your family been the victim of a crime(s) in the past 24 months? Those who conducted the survey indicate that 75 percent of the crimes reported in the study are concentrated in the same year.

⁹ Given that the factors for the expansion of the survey were not available, it is assumed that the expansion parameter is the total number of existing households in the country in 2010 (1,575,975).

FIGURE 3.2. Victimized Population and Geographic Distribution of Victims: Paraguay, 2010



Source: Prepared by the authors based on data from ENV (2011).

TABLE 3.4. Relative Importance of Victimization: Paraguay, 2010

Crime	Estimated quantity (thousands)	Percentage of total
Corruption	333.3	30.9
Robbery of animals	226.1	21.0
Tolls	114.2	10.6
Assaults/Mild threats	90.3	8.4
Residential burglary	57.3	5.3
Personal theft	46.6	4.3
Attempted residential burglary	41.5	3.8
Robbery with violence against persons	37.8	3.5
Robbery without violence against persons	37.8	3.5
Motor vehicle vandalism	22.4	2.1
Sexual offenses	22.0	2.0
Robbery of objects from a motor vehicle	21.9	2.0
Motorcycle robbery	11.2	1.0
Rape (including attempts)	5.5	0.5
Battery/Serious threats	3.8	0.4
Robbery of motor vehicles	3.7	0.3
Trafficking of persons	1.8	0.2
Homicides	0.7	0.1

Source: Prepared by the authors based on data from ENV (2011).

The data in Table 3.4 do not break down the percentage of victimization by crime in Paraguay in 2010, but rather their relative importance, that is, the share that each crime represents with respect to the total estimate.

The analysis of the survey data shows that overall victimization is 23 percent and occurs

primarily in urban areas. Corruption and robbery are the most reported crimes in the survey (31 and 21 percent, respectively).¹⁰ In third place is a crime

¹⁰ The high number of robberies of animals is due to the fact that the survey includes both large livestock (primarily cattle) as well as smaller livestock (pigs and chickens).

committed by what are known as “toll collectors.” This crime, which is particular to Paraguay, involves forcing people to pay for the right to drive on a public road in marginal neighborhoods, especially at night. This crime occurs almost exclusively in urban areas and is generally committed by youth of very young ages. Victimization surveys show that 11.5 percent of persons older than 18 have been victims of robbery.

In Uruguay, official records of complaints classify crimes as crimes against property (76 percent of complaints in 2010), crimes against persons (14 percent), sexual crimes (1 percent), contraband (0.1 percent), and other crimes (9 percent). Crimes against property include thefts and stealing (85 percent of the total in the category), invasions, damages, cattle rustling, and a residual category. Crimes against persons include homicides, assaults, disputes, domestic violence, and also a residual category. In 2010, domestic violence represented 59 percent of these crimes, while assaults accounted for 29 percent.

Given the high proportion of crimes against property in the total number of criminal complaints, it is interesting to note trends within this category. If one takes the 2005–2010 period as a reference, in the case of thefts one observes highs and lows throughout the series. However, for the period total, there is a 9 percent decline in the total number of thefts. The residual category—which groups together invasions, cattle rustling, damage, and other types of crimes against property—also shows a decline, in this case by 14 percent. The case of theft is distinct, as this category shows an increase of 65 percent during the five-year period.

Underreporting or the “Dark Figure” of Crime

The analysis of the “dark figure” of crime—that is, crimes committed but not reported—shows a certain stability to the trend during the period. Table 3.5 presents the estimates.

The crime most reported in the three countries, as shown in Table 3.5, is robbery of a motor

TABLE 3.5. Percentage of Crimes Reported in Relation to Crimes Committed: Chile, Paraguay, and Uruguay, 2010

Crimes	Chile	Paraguay	Uruguay
Robbery of a motor vehicle	93	100	95
Robbery from a vehicle	28	43	95
Motorcycle robbery	na	100	86
Bicycle robbery	na	na	53
Residential burglary	54	45	60
Attempted residential burglary	na	23	35
Robbery with violence	45	52	47
Robbery without violence	30	na	43
Theft	25	26	na
Battery and threats	43	41	38
Robbery of animals	na	18	na
Trafficking of persons (abuse)	na	50	na
Vandalism to vehicle	na	16	na

Source: Prepared by the authors based on data from ENUSC (2010) for Chile; ENV (2011) for Paraguay; and the Ministry of the Interior for Uruguay.

vehicle. This is explained by the fact that insurance companies require that the crime be reported in order to process coverage. On the other hand, the least reported crimes are theft, robbery from a motor vehicle, and robbery without violence in Chile; vandalism of a motor vehicle, robbery of animals, and attempted burglary of a home in Paraguay; and attempted burglary of a home and assault in Uruguay.

The low level of reporting of these crimes suggests, on the one hand, that the amounts stolen are low and, in parallel, that the transaction costs of reporting are high, given that the process is slow, complex, and has little probability of success. It also indicates a low level of confidence in institutions and in the effectiveness of either the police or the court system. In Chile, data from the 2010 National Urban Citizen Security Survey (ENUSC) show that reasons for not reporting included that “the loss was not sufficiently serious,” “the police could not have done anything,” “there were no witnesses,” “the process takes too much time,” “the justice system (courts) would not have done anything,” and “the police would

not have done anything.” Taken together, these responses represent 83 percent of the total number of responses (MISP, 2011).

Similarly, in the specific case of sexual crimes, Table 3.6 also shows a lack of confidence among the citizenry in the courts and the police in Paraguay. Most victims did not report a crime because they perceived the authorities as being powerless or uninterested, or because they feared reprisals, which was the most cited among the reasons for not reporting rapes and attempted rapes. There was also a nontrivial percentage of victims who did not consider what happened sufficiently serious.

In Uruguay, the use of violence in a robbery did not seem to be a factor in terms of reporting the crime, given that the difference in the rates of reporting between robberies with and without violence is low. On the other hand, it should be noted that there is a particularly low propensity to report when the violent victimization is not linked to robbery (38 percent). However, it should be taken into account that the category of “battery and threats” covers a wide range of manifestations of violence, meaning that, in many cases,

TABLE 3.6. Motives for Underreporting of Sexual Offenses and Rapes (in percent)

Why did you not report what happened to the police, the prosecutor, or a judicial entity?

	Sexual offenses	Rape and attempted rape
I didn't dare (for fear of reprisals)	25	75
The police could not have done anything/Lack of proof	45	50
The police would not have done anything	45	25
It was not serious enough	20	25
Shame/Fear of the police/Did not want to get involved with the police	10	25
I resolved it myself/Knew the perpetrator	10	25
It was not sufficient for the police/The police were not needed	15	0
My family resolved it	10	0
Other reasons	10	0
No insurance	0	0
Made the complaint to other public or private entities	0	0

Source: ENV (2011).

the matter in question might not be considered a crime by the person victimized.

Methodological Issues

Method

This study uses the accounting methodology of losses and expenditures to estimate the cost of crime and violence in Chile, Costa Rica, and Honduras. The study uses the classification of Brand and Price (2000), which allows for identifying the expenditure based on the moment when it is made—that is, whether the expenditure occurs in anticipation of, as a consequence of, or in response to crimes.

As shown in Table 3.7, *costs in anticipation of crime* refers to investments or expenditures by persons, households, or public and private entities to avoid being the victim of a criminal act. *Costs as a consequence of crime* expresses the monetary value of the effects generated by the criminal action against a person, household, or organization. *Costs in response to crime* expresses the amount of money that the State directs toward the design of public policies to address crime, identify those who have perpetrated crimes, establish their responsibility, and apply sentences through the judicial system.

As suggested by the theoretical model presented at the start of this volume, these types of actions have a preventive consequence at three levels. First, the detention and incarceration of a criminal has the effect of incapacitating that person, which means that person will not commit crimes for the incarceration period and thus potential victims will not suffer from such acts of crime by that person. Second, detention, judgment, and incarceration can also have the effect of dissuading those considering getting involved in criminal activities from doing so. Finally, incarceration can have the effect of rehabilitation, through which persons imprisoned—particularly

those with long sentences—abandon criminal activity due to the personal costs and the costs imposed on their families (Glaeser, 1999; Needels, 1996) and/or because they have managed to reinsert themselves into the labor market through re-adaptation programs.

Table 3.7 presents a matrix based on Brand and Price (2000) to facilitate the analysis of the final results. The table organizes the information in a logical relationship with the stages in which the actions related to crime and violence are carried out, and infers the implications for public policy.

Data Collection Process

A sensitive aspect of these types of studies is the information that is required to make the estimates. Normally, the studies collect the information produced by public entities and, to a lesser extent, by nongovernmental organizations and private entities. Two recurring difficulties come up: access to the information, and the quality of that information. On the one hand, the institutions—including government entities—are typically reluctant to facilitate access to the information they produce and put together, which limits and sometimes makes it impossible altogether to calculate estimates. On the other hand, the information produced by the diverse organizations is of course produced for purposes other than generating estimates of the costs of crime and violence, and it is often incomplete, segmented, dispersed, or incompatible, and needs to be digitized

To address these difficulties, a strategy was developed to collect information based on three pillars. The first refers to gathering information from public entities regarding their activities (measured in numbers of procedures, judicial or similar causes, as appropriate) in terms of the costs involved or other types of data that are not produced on a regular basis. This pillar also includes information from health entities regarding the corporal consequences of a crime against persons.

TABLE 3.7. Matrix to Present the Results of the Costs of Crime and Violence

Type of expenditure by opportunity	Amount
In anticipation of crime:	
Alarms, security monitoring, and technology	
Security guards and protection services	
Transport of valuables and related services	
Security consulting and training	
Public expenditure on crime and violence prevention	
As a consequence of crime:^a	
Robbery and theft	
Extortion	
Kidnapping	
Battery, rape, and other assaults	
Foregone income	
Expenditure on medical treatment	
Homicides (foregone income)	
In response to crime:	
Government agencies that design public policies	
Police	
Courts	
Prisons	
Public Prosecutor	
Public Defender	
Other government entities	
Subnational government expenditures	
Total	

Source: Brand and Price (2000).

^a Robbery is defined as the taking of property, without the consent of its owner, during an act that uses or threatens to employ the illegitimate use of force. Theft is defined as the taking of property without the consent of the owner. Assault makes reference to a physical attack against a person that results in corporal injury of the person assaulted. Kidnapping is defined by the Organization of American States as the act of “detaining a person as a means to obtain money, goods, titles or documents in exchange for his or her freedom, which provide benefits to the kidnapper or to other person involved in the crime” (OAS, 2015). Extortion is defined by the Guatemalan Penal Code in the following terms: “Someone who, to procure an unjust benefit, to defraud or demand money by way of violence or direct or indirect threat of it, or through a third party and some medium of communication, obliges someone else to give money or goods; also, when violence is used to oblige someone to sign, subscribe, destroy, or send a document, undertake a contractual obligation or condone or renounce a certain right” (United Nations, 2015). Rape is defined as a “sexual encounter without valid consent.” Homicide is defined as “the deliberate murder of someone.”

The second pillar refers to the public budget, which in each country is available in budget laws and budget execution reports. Both pillars allow for estimating the proportion of the total activity that public agencies devote to combatting crime and

violence. The third pillar is information from private entities and surveys, which includes information on victimization of households and persons, the value of the goods stolen, and the expenditure or investment made to avoid victimization.

Estimations

The procedures that have been followed to estimate the costs generated by crime and violence in each of the periods identified are detailed in the following sections.

Costs in Anticipation of Crime

This type of cost refers to expenditures made by households and firms (private costs) and public entities (public costs) to reduce the risk of being the target of an act of crime or violence. Private costs include expenditures on security guards and watchmen, alarms and security monitoring, security technologies, transport of valuables, and security consulting and training. Public expenditures consist of crime prevention programs developed by the State.

An important source of information to estimate this type of cost has been the billing by security companies that provide such goods and services as security guards, watchmen, and protection, closed perimeters with or without electrification, monitoring systems, short-circuit surveillance cameras, house alarms and security installations, armored cars, safe deposit boxes, payroll systems, collection in payments centers and toll booths, processing of budget values and related services, and security consulting and training. The estimation of expenditures on security services is a complex calculation because organizations representing neighborhoods, condominiums, and other residential groupings often act directly as employers of the persons who provide this service, and a portion of this information is not visible in the formal records of these types of activities.

To address this difficulty, it is possible to use the records of formal enterprises that provide these services along with business organizations with which these enterprises are associated. They typically have estimates of the market shares of formal businesses for each of the goods and services, as well as the numbers of security guards directly

contracted by neighborhood organizations. This information allows for estimating the size of the market for private security, and as a consequence, calculating the expenditures in this area. In the case of Chile, records were used from various business groups;¹¹ in the case of Uruguay, data on sales by security firms were provided by the General Tax Bureau (*Dirección General Impositiva*) and corroborated by the Economic Activity Survey (*Encuesta de Actividad Económica*); and for Paraguay, information on sales by security enterprises was from the 2010 National Economic Census (*Censo Económico Nacional*) conducted by the country's Bureau for Statistical Surveys and Censuses (*Dirección General de Estadísticas Encuestas y Censos*).

Another source of information has been victimization and social surveys. In the case of Costa Rica and Honduras, the data to estimate private costs in anticipation of crimes came from Demoscopia's 2010 survey of households and businesses.^{12,13}

¹¹ In the case of Chile, the data for private expenditure come from the study entitled *V Estudio de Oferta de la Industria de Seguridad Privada en Chile* (Leemira Consultores 2011), sponsored by the Chilean Chamber of Commerce (*Cámara de Comercio de Chile*), and from an interview with the president of the Asociación de Empresas y Transporte de Valores de Chile A.G. (ASEVA). The estimates included the number of security guards and watchmen in force, the cost of this service to users, the number of armored vehicles that transport valuables and the cost to clients, the size of the market for security training and consulting, and the billing of businesses for alarms and security technology and monitoring.

¹² The survey includes questions on contracting of security firms, bodyguards, security personnel and the purchase of weapons, vehicle satellite locators, electronic security equipment, encrypted software, online security data, metal detectors, closed-circuit video, perimeter security systems, vehicle recovery systems, plant security procedures and investments, the design of systems for restricted access to business facilities, private neighborhood watch programs, guns, private investigators, neighborhood guardhouses and citizen patrols, home and automobile alarms, security cameras, purchases of pepper spray and electronic fences, specialized locks, automobile devices, vehicle locator systems, and the installation of additional protection mechanisms in the home.

¹³ The survey in Honduras includes the same questions as those used in Costa Rica.

Apart from the expenditures or investments by households or firms to avoid being victims of crime, the costs in anticipation of a crime also include the costs of prevention for the State. Including this type of cost is a complex question from the conceptual point of view, since it implies establishing limits between the effects of control and prevention of the interventions. For example, an intervention directed toward the greatest effectiveness in terms of the police can also have a preventive effect in the sense that it takes wanted criminals out of circulation who, were they free, could commit other illicit acts. Such an intervention would thus prevent the occurrence of other crimes and avoid the victimization of persons, households, and entities that, had the intervention not occurred, would have been subject to a criminal act.

In this case, the strategy to estimate the cost of these types of interventions consists of identifying those actions that have been directly classified as prevention, such as campaigns to prevent crime, violence, and intra-family violence. As a consequence, components within the budget of public entities that include these types of expenditures are investigated.

In the case of Chile's public expenditure, the amounts directed toward public programs and exclusively aimed at prevention are used. This category includes programs of the National Service for Women (*Servicio Nacional de la Mujer* - SERNAM) such as the Center for the Prevention of Intrafamily Violence (*Centro de Atención para la Prevención de la Violencia Intrafamiliar* - VIF) and the shelter program (*Casas de Acogida*); the New Life Program (*Programa Vida Nueva*), which in 2010 was funded by the National Service for Minors (*Servicio Nacional de Menores* - SENAME); the Citizen Security Division of the Ministry of the Interior; and funds allocated for projects associated with prevention in terms of citizen security through the National Regional Development Fund (*Fondo Nacional de Desarrollo Regional*) administered by the Subsecretariat for Regional Development (*Subsecretaría*

de Desarrollo Regional - SUBDERE) of the Ministry of the Interior.

For the estimate of public expenditures in Costa Rica, information comes from the national accounts (CGRCR, 2013), particularly the budget of the Ministry of Public Security, which has as its objectives to "intensely promote the prevention of crime in order to reduce the incidence of criminality, transform the institutional culture with the goal of achieving greater efficiency, and increase the perception of security among the population in order to contribute to development of the country" (MSP, 2013).

Data on State expenditures on crime prevention in Honduras were obtained through the Police Prevention Unit of the Secretariat of Security, supported by the Transparency Unit of the Secretariat of Finance. In the case of Paraguay, the estimates are based on information on execution of the 2010 public budget and on consultations with the Ministry of the Interior and the National Police Command. Finally, the estimations for Uruguay are based on data on execution of the 2010 public budget and consultations with the Ministry of the Interior, Ministry of National Defense, Ministry of Social Development, and the Institute for Children and Adolescents of Uruguay (*Instituto del Niño and el Adolescente del Uruguay* - INAU).

Costs as a Consequence of Crime

This type of cost expresses the monetary valuation of material losses, direct and indirect and tangible and intangible, as well as the effects on the health of victims as a result of criminal activity. It also includes the foregone income resulting from homicides and assaults, the value of those costs for robberies and thefts,¹⁴ the loss due to the robbery of automobiles, the costs of treating victims

¹⁴ There has been discussion in studies on the costs of crime as to whether robbery and theft should be considered a loss. The discussion could also be extended to amounts stolen through crimes committed through acts of kidnapping, extortion, or what are called economic crimes. The argument that these would not be a social loss is based on the notion

of sexual assaults, losses resulting from intrafamily violence, and the losses suffered by businesses as a consequence of robberies, vandalism, and corruption.¹⁵

Unfortunately, some of these components can only be estimated in certain countries due to the lack of information necessary to undertake these types of calculation. Therefore, following the presentation of the estimations of costs for components for which complete information is available for the five countries considered in this chapter, we will present additional estimates for those items for which information was available for one or some of the five countries analyzed. In that subsequent section we will examine, for example, estimates of the cost of intrafamily violence, kidnappings and extortion, recovery from health problems caused by assaults, and treatment of victims of sexual assaults. The costs that are determined with this information represent the income foregone as a result of victimization—for homicides and assaults—and the expenditures on treatment as a result of assaults, battery, and sexual assaults, and for programs to support victims.

The estimation of income foregone as a result of victimization uses the human capital methodology and health burden studies. By way of the information provided by these studies, it is possible to identify the years of healthy life lost (DALYs) due to premature death (YLLs) or to becoming disabled (YLDs) from the set of causes that affect health and that have been identified by the World Health Organization (World Bank, 1993).¹⁶ The estimates of DALYs already include a social discount rate—which is necessary in order to calculate the present value of future losses—which is useful to calculate the foregone incomes of crime victims. For purposes of analysis, the causes that affect health considered in this study will be violence, battery, and sexual assaults. In this way the estimation of foregone incomes from homicides will use the YLL for violence, while estimations for battery will be based on the YLD for violence and assaults.

The next step in the estimation of income foregone for the reasons described above will be to assign the average salary paid to the estimations of the DALYs. The reasons to use the average salary are, on the one hand, to obtain clarity in the estimate and, on the other, to avoid bias in the design and implementation of public policies that could come about as a result of the findings of those studies that use alternative income measures. For example, given that income is associated with accumulated education, assigning foregone income to those persons from certain socioeconomic segments who died prematurely would suggest that—to avoid higher costs—would

that they simply represent a transfer of property between the legitimate owner and the person who appropriated it through a criminal act, so the good continues to exist in society and has not disappeared. There are variations in the contrary argument. On the one hand, Tullock (1970) argues that in this type of action, which is called “resisted transfers,” both the legitimate owner and the thief have invested a variety of resources to keep or obtain ownership of the good in dispute (time, tools, and other resources for the criminal; alarms, security guards, and similar measures for the legitimate owner). From the point of view of economic rationality, the limit of the investment made by both parties will be equivalent to the value of the good in dispute. In this way the loss can become the equivalent of double the value of the good. On the other hand, it can be expected that the goods robbed will have a much lower value on resale markets, that there is a social opportunity cost in terms of the time that the criminal invested to rob the good (instead of undertaking a legal activity), that there is a welfare loss for the legitimate owner, and—perhaps most importantly from the perspective of the accounting methodology—that the victims tend to replace the stolen item, which implies that they use part of their incomes to make that purchase instead of acquiring another good or service to increase their well-being. In the same sense, based on a comparison of the “no-crime” and “crime” scenarios, Soares (2009: 34, 7) considers “the total value of the stolen goods as a social loss.

¹⁵ Funeral and burial expenses are not included because these are separate if the person died as a consequence of a violent death or natural causes. The effect of violence in this way moves up the occurrence of death.

¹⁶ Years of healthy life lost (DALYs) are expressed as the sum of the years of years of healthy life lost due to premature death (YLL) and the years of healthy life lost due to becoming incapacitated (YLD). Algebraically, this is expressed in the following manner: $DALY = YLL$ (years of life lost) + YLD (years lived with disability) (World Bank, 1993).

require prioritizing the protection of the more educated and the wealthy, which is contrary to many unstated notions of equality.

This general method is the one that is applied in the cases of Chile, Costa Rica, and Honduras, with the caveat that in Costa Rica and Honduras the data had already been estimated by the World Bank (2011), from which they were obtained. In the case of Chile, the data on DALYs was taken from projections by the Ministry of Health for 2010. Given the lack of studies that value DALYs for Paraguay and Uruguay, the estimation of the cost of homicides used information from the Mortality Database of the World Health Organization, which allowed for determining information on the cause of death, age, and gender of the deceased, extrapolating the number of homicides recorded by the respective Ministries of the Interior. The estimates also identify the cost based on the profile of the deceased using income derived from productive activity. In this way, the estimation of the cost by profile of the deceased multiplied by the number of persons murdered allowed for identifying income foregone as a result of the murder.

Similarly, the estimation of the costs of assaults for these countries used the estimates by Dolan et al. (2005), which identified the proportion of homicides that generated injuries and rapes (including attempted). As a consequence, the cost generated by assaults is estimated as a proportion of the cost of homicide.

Information on expenditure on medical treatment for injuries was obtained from victimization surveys—which provide data on the number of events and the extent of the treatment—and from information from the Ministries of Health or equivalent organizations, which allows for identifying the unit cost of care in the public system, such as programs to treat injuries from assaults and sexual assaults, and to provide victim support. It is important to note that this calculation method could imply an underestimation in this cost category, since a segment of the victims are cared

for by the private sector, where the costs tend to be higher than in public hospitals. Given that it was not possible to identify the proportion of victims treated at private hospitals or clinics, it was decided to use the public sector cost for medical treatment for identified victims of these crimes.

For Chile, the expenditures for recovery of health were obtained through the procedure as described here. First, cases that involved emergency treatment of patients for assaults in 2010 at the Hospital del Salvador in Santiago in 2010 were identified. The facility specializes in high-complexity cases. Those treatments were immediately valued according to the cost to the hospital for private ambulatory care and hospitalization, identifying the average cost of the interventions considered. Finally, the number of assaults committed in 2010 was estimated based on data from the ENUSC. In addition, the cost of treating victims of sexual assaults in Chile was obtained from the budget of the Center for Treatment of Victims of Sexual Assaults (*Centro de Atención a Víctimas de Atentados Sexuales* - CAVAS) of the Police Investigation Unit (*Policía de Investigaciones* - PDI), taking into account information from the National Service for Minors (*Servicio Nacional de Menores* - SENAME) and the National Service for Women (*Servicio Nacional de la Mujer* - SERNAM).

The cost of medical care for victims of assaults in Costa Rica was estimated using data published by the Costa Rican Social Security Fund (*Caja Costarricense de Seguridad Social*) on expenditure by hospital, and from Demoscopia surveys of directors, emergency room supervisors, and administrative supervisors of the main public hospitals regarding the proportion of expenditure for emergency services directed toward treating victims of assaults.¹⁷

¹⁷ The surveyed hospitals were San Juan de Dios, Calderón Guardia, México, San Rafael, Fernando Escalante Padilla, William Allen, Max Peralta, Enrique Baltodano, Tony Facio, Guápiles, San Carlos, Monseñor Sanabria, Anexión, and San Vicente de Paul.

The calculation of expenditure in Honduras on treatment as a consequence of assaults took into account the number of assaults, derived from the Demoscopia survey, and the current value of expenditure on injuries from external causes provided by the Health Secretariat of the Hospital Escuela. The study estimates the cost of injuries from external causes for 2007, which was updated in accordance with the variation in the Consumer Price Index between 2007 and 2010 and converted into U.S. dollars at the average 2010 exchange rate.

To assign values to the material losses, the incidence of different types of robberies and thefts was estimated in accordance with the corresponding victimization surveys. The total cost of robbery and theft in 2009 in Chile was estimated by using the total number of crimes reported by the ENUSC. Lacking data that identified the value that victims assigned to the goods taken from them, the amount paid by insurance companies to robbery victims was used as a proxy (SVS, 2015). The estimation of the cost of robbery of automobiles used the difference between automobiles robbed and recovered as reported by the ENUSC. Each automobile robbed and not recovered was valued at the average amount paid out by insurance companies in the reference year.

The cost of robbery and theft in Costa Rica and Honduras was based on the Demoscopia survey conducted in both countries. Those surveys include questions on the goods stolen and the value of the losses, as well as the frequency of each type of crime.

Losses by Paraguayan households were based on information from the ENV, particularly the frequency with which households and persons were subject to some type of robbery (of homes as well as automobiles, motorcycles and scooters, bicycles, animals, and other objects). To estimate the value of these goods, the price used was that for the importation of certain items, based on information from the Customs Bureau. In this case,

the value of portable computers, cell phones, car radios, automobiles, motorcycles, and bicycles were accounted for. It was not possible to include in the estimations the prices corresponding to cars, jewelry clothing, appliances, tools, weapons, and animals.

In the case of Uruguay, the estimation of household losses was based on information from the Ministry of the Interior's 2011 Victimization Survey, which included questions on the frequency of households and persons being subject to some type of robbery (robbery from homes, robbery of automobiles, motorcycles or scooters, and bicycles). A list of goods robbed during the last year was prepared drawing on these responses,¹⁸ and based on that a list of market prices was prepared.¹⁹ The items included were automobiles, motorcycles and scooters, bicycles, televisions, DVD reproduction machines, audio equipment, cameras, computers, and compact discs.

Even though the value of the stolen goods was computed using replacement prices, resulting in an underestimation of costs, it should be taken into account that three factors mitigate this potential bias. First, most of the items with high technological content diminish in value due to technological advances. Second, some prices correspond to models cheaper than the market price (as in the case of automobiles). Third, the Victimization Survey only considers one good robbed per declaring person, whereas it can be expected that in some households more than one unit of the same type of good might have been stolen.

¹⁸ Even though the survey addresses the number of times that an individual has been the subject of a robbery, in order to avoid overestimations, it only recorded each positive response by a respondent one time.

¹⁹ Market prices were obtained from the INE registry of businesses, from which businesses classified as medium-sized or large retail sellers of these items were selected (Section 5233 of the CIIU rev.3. "Retail trade of equipment and apparatuses for domestic use"). This revealed the actual price in U.S. dollars of each stolen item.

In Chile, the calculation of the opportunity cost of those imprisoned in 2010 used data from the Gendarmería de Chile (GENCHI) on the adult population incarcerated during that year for crimes considered in this chapter, and the average hourly wage paid in Chile during the same year. In this way, the estimate refers only to incomes that persons stopped earning, only during this year, as a result of being incarcerated. The information from the GENCHI does not identify the characteristics of this population other than gender and the crimes for which persons were incarcerated, so it was decided to use the average remuneration, provided by the National Statistics Institute (*Instituto Nacional de Estadísticas*) (INE, 2013), in order to avoid bias by gender, age, socioeconomic status, or for other reasons.

To calculate the opportunity cost of persons in prison in Uruguay, data were used from a census of inmates conducted by the Social Sciences College of the Universidad de la República in 2010 in order to establish a profile of the prison population. Then, with data from the 2010 Household Survey, a profile of salaries according to education level, gender, and civil and parental status was obtained. The estimated salaries were then applied according to the population profile.

The cost of intrafamily violence in Chile has been estimated using data from the Intrafamily Violence Survey conducted in 2008 and information on the average remuneration of women provided by the INE. The survey shows that 4 percent of women were frequently impeded from working by their partner.

The costs of extortion and kidnapping in Costa Rica and Honduras were estimated based on data from the Demoscopia survey. The survey asked if the respondent has been the subject of these crimes and, if so, what amount was stolen.

Costs in Response to Crime

These costs are those incurred for the purpose of identifying those responsible for a given act

of crime or violence, pursuing those responsible via the justice system, and making them comply with the penalty assessed by the courts. In this way, this study focuses the analysis on those costs incurred by the State to respond to the criminal act. The entities analyzed are the police and judicial investigation agencies, the Public Ministry or Prosecutor, the Public Defender, and auxiliary entities, such as public agencies that provide laboratory expertise in support of police investigations and judicial decisions, and public agencies that care for children and adolescents in conflict with the law. The study also includes costs derived from the prison system, which include the cost of construction and maintenance of prisons as well as the costs to guard prisons.

The method followed to estimate the costs in response to a crime is the “attributable fraction.” This method supposes that the activities of units within each agency are synergistically interrelated to meet their responsibilities and that the budget is assigned for comprehensive compliance with the mission. The activity of upper management in the administrative areas and other support units generates effects on operational activities, which makes it necessary to consider the organization in its totality. This leads to identifying the fraction represented by the institutional activity related to crime of each of the entities indicated with respect to the total amount of activities carried out in a year. To that end, the total number of police procedures and judicial cases and the total penal population, and/or other indicators that shed light on the activities of the public entities, was identified. At the same time, the amount of activity (expressed in the same indicators) that these entities should devote to the crimes analyzed in this study was also identified. Assuming unity and integrity in the agency budget, the cost of crime for the agency will be that part of its budget equivalent to the proportion of its activity devoted to addressing the crime analyzed.

To estimate the cost using this method, institutional functions or areas of work that execute activities related to the crimes under analysis were identified. Following that, an accounting was made of the total amount of activities carried out annually (or by period) in the work areas, and of the total activities of the work areas specifically related to the crimes in the study. This determined the proportion that these activities represent in relation to the total amount of institutional activities executed in the same period. Just as in the case of the estimates of the costs as a consequence of crime, certain information was not available for all of the countries. Therefore, following the presentation of the estimates for which it was possible to obtain data for the five countries, we will present calculations for the care of adolescents in conflict with the law and the opportunity cost of those imprisoned—areas involved in the costs of crime for which it was not possible to obtain information for certain countries.

It is estimated that in Chile, 34 percent of procedures carried out by police officers, 43 percent of inquiries by police investigators, 47 percent of cases brought by the Public Prosecutor, 44 percent of cases transmitted by the Judicial Branch, 41 percent of cases of the Public Defender's Office, 34 percent of the expertise provided by the Legal Medical Services, 44 percent of prisoners held by the GENCHI, and 79 percent of the activities of the National Service for Minors are linked to crimes for which the costs of crime have been estimated. Each fraction applied the institutional budget, and the cost per agency in response to the crime was obtained. The sum of those costs represents the overall cost in response to crime.

In the case of Costa Rica,²⁰ it was estimated that 38 percent of cases handled by the Judicial Branch and the Public Prosecutor, 77 percent of the procedures handled by the judicial investigation agency, 50 percent of cases handled by the Public Defender Office and the Bureau for Social Adaptation, and 12 percent of the procedures

handled by the Citizen Security and Public Forces Service correspond to the crimes analyzed.

In the case of Honduras, information was only obtained for the equivalent portion of the Judicial Branch, and this was used as a proxy for the cases of the Public Prosecutor, National Forensics Bureau, National Police, and Prison Administration. The cases of Chile and Costa Rica suggest that the equivalent proportion of these entities is not quantitatively different from that of the Judicial Branch. Data for the Judicial Branch indicate 59 percent of cases handled are related to the crimes analyzed in this study

The Public Defender is a public service provided in different ways in the different countries. In Chile and Costa Rica, it is a public entity that provides the service directly to those who need it and meet the eligibility requirements. In Honduras, Paraguay, and Uruguay the service is provided through the Judicial Branch, and its cost is included in court costs.

After having identified the “attributable fraction,” it is necessary to identify, through the laws for the corresponding budgets, the budget assigned to each entity, and to analyze the budget lines that include it. The cost associated with crime results from assigning the proportion of the budget identified for each entity. In Paraguay, due to lack of information on the quantity of police procedures, judicial cases, and activities by public entities related to the crimes analyzed, the estimation is carried out using data from execution of the 2010 public budget for the National Police,

²⁰ In the case of Costa Rica, information could not be obtained that would have allowed for identifying the equivalent fraction for the Public Prosecutor, so the estimate for the Judicial Branch was used as a proxy. The same situation occurred in the case of the Bureau for Social Adaptation (*Dirección General de Adaptación Social*), where the equivalent fraction of the Public Penal Defense Service (*Servicio de Defensa Penal Pública*) was used as a proxy. On the other hand, in the case of the Citizen Security Service (*Servicio de Seguridad Ciudadana*), information on arrests in 2012 was published on the webpage of the Ministry of Public Security and used as a proxy for 2010.

Judicial Branch, Public Prosecutor, and Ministry of Justice and Labor. This involved identifying the budget lines for expenditures related to investigative actions by the police, the administration of justice in the capital and the Central Department, the Ministry of Public Defense, the National System of Judicial Facilitators, and the appellate courts in the case of the Judicial Branch, as well as the areas corresponding to penal and protective issues, ambulatory prosecution, the training center, the national forensics investigation program, infrastructure projects of the Public Ministry, and expenditures on the national prison system of the Ministry of Justice and Labor. In all of these cases, a corresponding fraction of administrative expenditures was assigned for each of these public entities.

In Uruguay, an equivalent fraction that represented cases handled by the Judicial Branch and the National Prosecutor was assigned to the budget of these entities. The expenditures of the Ministry of the Interior considered in the estimation of costs in response to crime were actions to control crime and administer the national penal system. In the case of the Ministry of National Defense and the Institute for Children and Adolescents in Uruguay (*Instituto del Niño y del Adolescente del Uruguay* - INAU), the budget line for management of incarceration was used. This estimation also included the budget line of the Ministry of Social Development for domestic violence and rehabilitation. In all of the cases, the fraction corresponding to administrative expenses of the public entities mentioned was assigned to the estimation of costs in response to crime.

Costs of Crime and Violence

As discussed in the introductory section, this study estimates the social costs of crime, understood as the total amounts, losses, expenditures, and investments by households, businesses, and the State to address the phenomenon of violence.

In this sense the objective goes beyond the estimation of the costs to victims and adds the costs to potential victims (those individuals who invest in security to avoid becoming victims); the opportunity cost of prisoners, which, as shown theoretically earlier, is a social loss in terms of well-being as well as the foregone lawful productivity that society loses because someone is in jail as a result of a crime; and expenditures and investments by the State. It is worth pointing out that the study does not estimate costs associated with fear, pain, or trauma suffered by victims. Nor does it estimate the costs of well-being lost as a result of conduct avoided with the objective of reducing the risk of victimization. In this way, following the classification suggested by Brand and Price (2000), the estimation of costs has been organized depending on whether the costs are produced in anticipation of crime, as a consequence of crime, or as a response to crime.

Comparison of Costs of Crime and Violence in the Five Countries Analyzed

Tables 3.8 and 3.9 present homogeneous estimates for those categories of the cost of crime for which information is available for the five countries, as well as absolute values such as the percentage of gross domestic product (GDP). Note that the two tables present basic estimates of the costs of crime and violence in the five countries analyzed given the information available for common components. To this must be added the value of the estimates presented in the next section for those countries for which the information available made such estimates possible.

Taking into account the GDP in each of the countries studied, the estimations in Table 3.9 show that Honduras has the highest costs in anticipation of crime, while Costa Rica has the lowest. In terms of the costs as a consequence of crime, Honduras once again has the highest cost among the five countries analyzed, quadrupling the cost

TABLE 3.8. Costs of Crime and Violence: Chile, Costa Rica, Honduras, Paraguay, and Uruguay, 2010 (in millions of 2010 U.S. dollars)

Cost item	Chile	Costa Rica	Honduras	Paraguay	Uruguay
In anticipation of crime:	1,546.2	124.2	231.3	145.1	190.3
Private cost	1,475.3	107.3	161.9	118.0	173.2
Public cost	70.8	16.9	69.4	27.2	17.0
As a consequence of crime:	1,259.8	302.7	315.1	273.0	205.1
Homicide and assault	783.5	96.0	61.0	228.5	106.6
Robbery and theft	285.5	143.0	221.6	25.0	62.5
Motor vehicle robbery	115.2	61.9	22.4	19.5	36.0
Health expenditure	75.6	1.8	10.2		
In response to crime:	1,083.5	257.9	157.8	344.9	500.3
Police	516.5	20.0	46.3	186.9	380.6
Judicial matters	269.9	157.5	47.5	83.7	30.9
Public Ministry/Prosecutor	95.2	21.5	23.0	54.7	4.4
Public Defender	32.3	16.5			
Prison administration	169.5	42.4	41.0	19.5	84.3
Cost of crime and violence	3,889.5	684.8	704.3	763.0	895.7

Source: Author's elaboration, based on data from ENUSC (2010); Demoscopia (2010) and ENV (2011).

Note: The costs of crime and violence reported in the table include those items for which information was available for the five countries. Given this situation, the subsequent section in this chapter on "Other Costs" reports estimates of additional items for which data were available only from some countries. A comprehensive estimate of the cost of crime in each country should include those other costs.

TABLE 3.9. Costs of Crime and Violence as a Percentage of Gross Domestic Product: Chile, Costa Rica, Honduras, Paraguay, and Uruguay, 2010

Cost item	Chile	Costa Rica	Honduras	Paraguay	Uruguay
In anticipation of crime	0.7	0.3	1.5	0.7	0.5
As a consequence of crime	0.6	0.8	2.0	1.4	0.5
In response to crime	0.5	0.7	1.0	1.7	1.3
Cost of crime and violence	1.8	1.9	4.6	3.8	2.3

Source: Author's elaboration, based on data from ENUSC (2010); Demoscopia (2010) and ENV (2011).

Note: The numbers may not add up exactly to the total displayed due to rounding.

in Uruguay, which is the lowest among the group. The analysis of costs in response to crime, which are essentially costs that pertain to the State, shows that, as a proportion of GDP, Chile has the lowest cost and Paraguay the highest. In general, considering the source of variability noted in the introductory section, and having taken into account that the comparison has been based on

cost items for which information was available for all five countries, the countries with relatively high costs in relation to GDP are Honduras and Paraguay, while those with the lowest ranges are Chile and Costa Rica.

Regarding this point, Honduras tends to be the paradigm, given that, of the five countries analyzed, it has the highest level of violence, as

TABLE 3.10. Principal Rates of Victimization, Violence, and Fear (in percent)

	Chile	Costa Rica	Honduras	Paraguay	Uruguay	Latin American and Caribbean average (18 countries)
Overall victimization	29	38	36	30	30	33
Violent victimization	14	22	15	14	16	18
Homicide rate (per 1,000 population)	4	11	82	11	6	25
Perception of growing insecurity	47	66	62	65	44	55
Perception of increased crime	78	93	80	89	84	83
Crime is the country's main problem	21	45	30	28	40	

Sources: Latinobarómetro 2011 and *Global Study on Homicide 2011*, (UNODC, 2011).

measured by the homicide rate, and the highest total costs in anticipation and as a consequence of crime. However, the situation is more diffuse in the countries with comparatively lower homicide rates. On the other hand, the estimation of costs reported does not show convergence with victimization rates reported by the respective surveys in the countries, with perceptions of an increase in insecurity or an increase in crime, or with the notion that crime is the country's principal problem.

Table 3.10 shows the lack of consistency between the indicators for victimization and perceptions of insecurity with the estimations of the cost of crime and violence. This raises the question as to whether the costs of crime have some relation with rates of victimization or fear as verified in each country, or, alternatively, whether the costs are influenced by other factors. Although the present study offers a first comparative impression, the data express a static vision in terms of this question. Given that situations are evolving, country-level investigations of changes in levels of victimization, fear, and the costs generated by crime and violence can shed light on this relationship and in so doing identify areas for intervention to reduce or contain these three areas of great concern.

Other Costs of Crime and Violence in the Five Countries Analyzed

The costs presented in the previous section are those for which information was available for the five countries under consideration. This section presents additional relevant costs for which there is information specific to one or more of those countries.

Cost of Domestic Violence in Chile

Intrafamily violence has been a crime of increasing concern in Chile. Following the estimations by Morrison and Orlando (1999) that 6 percent of women do not work as a result of this crime, the cost of intrafamily violence was estimated using information from the Intrafamily Violence Survey along with data on the value of the annualized average hourly wage for women in 2010.²¹ The survey indicates that more than 4 percent of women were very frequently prohibited from working by their partners. Thus the estimation

²¹ The estimates were made using the 2008 National Victimization Survey on Intrafamily Violence and Sexual Crimes (*Encuesta Nacional de Victimización por Violencia Intrafamiliar y Delitos Sexuales 2008*).

TABLE 3.11. Costs from Intrafamily Violence: Chile, 2010 (in millions of U.S. dollars)

	Millions of U.S. dollars
Foregone income	1,118.7
SERNAM – Center for Treatment and Prevention of Intrafamily Violence	8.2
SERNAM – Shelters	3.5
Total	1,130.4
Percent of GDP	0.5

Sources: Estimates by the authors based on data from the 2008 National Victimization Survey on Intrafamily Violence and Sexual Crimes (*Encuesta Nacional de Victimización por Violencia Intrafamiliar y Delitos Sexuales*), and the National Service for Women (*Servicio Nacional de la Mujer - SERNAM*).

of women's income foregone as a result of intrafamily violence in Chile in 2010 is US\$1,119 million (Table 3.11). The estimates shown that almost 99 percent of the cost of intrafamily violence corresponds to foregone income.

Costs of Extortion and Kidnapping in Costa Rica and Honduras

The estimation of the cost of extortion and kidnappings is based on data from the Demoscopia Survey (2010), which asked about amounts paid by families and the number of incidents in which household members were kidnapped, held against their will, extorted, or threatened.

Taking into account the size of the population and GDP, the estimates show that the problem of kidnappings and extortion are considerably more serious in Honduras than in Costa Rica (Table 3.12). In fact, the analysis shows that the per capita cost

of extortions is four times higher in Honduras than in Costa Rica. In terms of share of GDP, the cost of extortions in Honduras is 14 times higher than in Costa Rica. For kidnappings, from the standpoint of per capita costs, the amount is 66 times higher in Honduras than in Costa Rica.

Cost of Medical Care in Chile, Costa Rica, and Honduras

This type of cost refers to expenditures on medical treatment for persons who have been victims of assaults (Table 3.13). The data for Chile are from the ENUSC and represent the average cost of the treatment of victims of assaults admitted in the emergency room of the Hospital del Salvador. For Costa Rica, the information includes data from the Demoscopia Survey, expenditures per hospital from the Costa Rican Social Security Fund (*Caja Costarricense de Seguridad*

TABLE 3.12. Costs of Kidnapping and Extortion: Costa Rica and Honduras, 2010

	Measure	Costa Rica	Honduras
Extortion	Millions of U.S. dollars	2.5	15.1
	U.S. dollars per capita	0.5	2.0
	Percent of GDP	0.01	0.1
Kidnapping	Millions of U.S. dollars	0.2	20.5
	U.S. dollars per capita	0.04	2.7
	Percent of GDP	0.0005	0.1

Source: Prepared by the author based on data from Demoscopia (2010); and World Bank (2013) population and GDP data.

TABLE 3.13. Health Cost of Assaults: Chile, Costa Rica, and Honduras, 2010

Measure	Chile	Costa Rica	Honduras
Millions of U.S. dollars	76.6	1.8	10.2
U.S. dollars per capita	4.5	0.4	1.3
Percent of GDP	0.03	0.01	0.07

Source: Prepared by the authors based on data from ENUSC (2010), Demoscopia (2010), World Bank (2013) data on population and GDP, hospital statistics from El Salvador (Chile), Health Secretariat of the Teaching Hospital in Honduras (SSH 2007), and additional Demoscopia surveys in hospitals.

Social), and additional surveys by Demoscopia of directors, emergency room supervisors, and administrative supervisors from the main public hospitals on the proportion of emergency expenditures directed toward treating persons admitted for assaults. For Honduras, the data sources were the Demoscopia Survey, which identified victims, and the Health Secretariat of the Teaching Hospital (*Secretaría de Salud en el Hospital Escuela*) (SSH, 2007), which provided the updated value of expenditures on injuries from external causes.

Care for Adolescents in Conflict with the Law in Chile and Uruguay

Among the five countries analyzed, Chile and Uruguay identified in their budgets those public entities that develop programs to treat adolescents in conflict with the law. The entities are

TABLE 3.14. Care for Adolescents in Conflict with the Law: Chile and Uruguay, 2010

Measure	Chile	Uruguay
Millions of U.S. dollars	37.0	0.9
Percent of GDP	0.02	0.002

Source: Prepared by the authors based on data from the SENAME Boletín Estadístico 2010 (Chile), Law 20.407 on the Public Budget 2010 (Chile), Budget Execution 2010 from Uruguay, direct consultations with the Ministry of Social Development of Uruguay (MIDES), and World Bank (2013) population and GDP data.

the National Service for Minors (*Servicio Nacional de Menores de Chile* - SENAME) in Chile, and the Institute for Children and Adolescents (*Instituto del Niño y del Adolescente del Uruguay* - INAU) in Uruguay. The data in Table 3.14 show the share of public budgets in both countries corresponding to the crimes analyzed and the total activity of the respective agency. As a share of GDP, Table 3.14 shows that the expenditure of SENAME in Chile is almost seven times greater than that of INAU in Uruguay.

Treatment of Victims of Sexual Offenses in Chile

Data in this area were obtained from the budget of the Center for Treatment of Victims of Sexual Assaults (*Centro de Atención a Víctimas de Atentados Sexuales* - CAVAS) and the Police Investigation Unit. Taking into account contributions of the National Service for Women and the National Service for Minors, the budget for CAVAS in 2010 was approximately US\$451,000. CAVAS treated 12,670 persons in 2010, representing a per capita cost of US\$35.60.

Opportunity Cost of Prisoners in Chile and Uruguay

These estimations take into account the number of prisoners serving prison sentences for crimes against persons and property, and the average value of remunerations paid in 2010 on the labor market. As a proportion of GDP, the opportunity cost of being incarcerated in Uruguay is 1.6 times higher than in Chile (Table 3.15).

TABLE 3.15. Opportunity Cost of Prisoners: Chile and Uruguay, 2010

Measure	Chile	Uruguay
Millions of U.S. dollars	149.0	44.6
Percent of GDP	0.07	0.11

Sources: Gendarmería de Chile; Censo de Reclusos de la Universidad de la República del Uruguay; and INE Chile.

Cost of Economic Crime in Costa Rica and Honduras

This estimation is based on the Demoscopia Survey (2010), which investigated the losses incurred as a result of fraud and robbery from bank accounts and credit and debit cards (Table 3.16).

Summary of Including Other Costs

It is interesting to note that, even after including in the cost accounting the areas for which data are available only for some of the five countries analyzed, Honduras still has the highest cost of violence (4.8 percent). On the other hand, the cost of crime in Chile and Uruguay increases to 2.4 percent of GDP, and that of Costa Rica increases by almost 2 percentage points.

The magnitudes of the cost of crime and violence in countries such as Honduras and Paraguay, in comparison with the other three countries analyzed, shows the enormous negative effects of crime on their social and economic systems. The estimated cost of crime in Honduras is practically double that of Chile and Uruguay, and the estimated cost in Paraguay almost doubles that of Costa Rica. This raises the immediate question of how much the economic consequences of crime and violence would increase

TABLE 3.16. Cost of Economic Crimes, Costa Rica and Honduras: 2010

Measure	Costa Rica	Honduras
Millions of U.S. dollars	20.6	0.3
Percent of GDP	0.06	0.002

Source: Prepared by the author based on data from Demoscopia (2010).

if there were information for crimes for which we were not able to estimate costs in this study, if the differences demonstrated in the study would be increased or reduced, or if there were changes in the rankings of countries according to their costs of crime and violence.

Broader Comparison of Costs from an International Perspective

This section aims to put the results of this study in a perspective that goes beyond the five countries analyzed. It looks at published studies on the economic costs of crime and violence that have used the accounting methodology and whose estimation approaches, areas considered, types of information, and concepts employed are reasonably similar to or convergent with those used in the present study.

TABLE 3.17. Summary of Other Costs of Crime and Violence (in millions of U.S. dollars)

Other costs considered	Chile	Costa Rica	Honduras	Paraguay	Uruguay
Intrafamily violence	1,118.7				
Extortion and kidnapping		0.2	20.5		
Medical treatment	76.6	1.8	10.2		
Adolescents in conflict	37.0				0.9
Victims of sexual offenses	0.4				
Opportunity costs of prisoners	149.0				44.6
Cost of economic crimes		20.6	0.3		
Total	1,381.8	22.6	30.9		45.5
Other costs (percent of GDP)	0.63	0.06	0.21	—	0.11
All costs (percent of GDP)	2.42	1.95	4.78	3.81	2.42

Source: Author's elaboration, based on data from ENUSC (2010); Demoscopia (2010) and ENV (2011).

Note: The numbers may not add up exactly to the total displayed due to rounding.

As indicated in the initial sections of this chapter, estimations of the economic costs of crime are exercises that involve a certain amount of variability, so the results should be understood as “orders of magnitude” that encompass the costs calculated given the components analyzed, the methods employed, and the information available. Therefore, the comparison of costs between countries is a complex exercise that requires significant technical and analytical capacity. Nonetheless, the work is necessary both from the point of view of putting the results of the studies in a broader perspective and deriving notions of orders of magnitude that can encompass the cost of crime and violence in particular countries, as well as from the standpoint of gaining knowledge and refining the methods to estimate and produce information to advance the development of the most accurate estimations possible.

In Latin America, the studies in the decade starting in 2000 on the cost of crime have involved two approaches: one that takes a regional perspective and another that addresses national cases. In the first group is the work of Londoño, Gaviria, and Guerrero (2000) and Acevedo (2008). In the second group are studies of national cases that show the wide variety of estimations and cost categories considered.

An initial comparative view can be obtained from the work of Londoño and Guerrero (2000), whose summarized estimates, looking at areas similar to those in this study, are presented in Table 3.18.

In the area of health losses, Londoño and Guerrero incorporate the costs of medical attention and

the economic consequence of the years of healthy life lost (DALYs), while material losses include expenditures on public security, private security, and judicial procedures. Using this analysis, the economic costs in Honduras and Paraguay in 2010 resemble costs in Brazil, Peru, and Mexico at the end of the 1990s, and the costs of crime in Chile, Costa Rica, and Uruguay are significantly lower than those in Honduras and Paraguay and in the six countries studied by Londoño and Guerrero a decade earlier.

In addition, it is worth noting the armed conflict raging in Colombia toward the end of the 1990s, the end of the civil war in El Salvador giving way to high levels of criminal violence (Cruz et al. 2000), the wave of violence that would be unleashed in Mexico in 2006, Venezuela moving toward higher levels of violence, and Brazil and Peru recording similar rates of criminal victimization between the end of the 1990s and 2010, according to data from Latinobarómetro (Lagos and Dammert, 2012; Londoño and Guerrero, 2000).

The study by Acevedo (2008) offers another reference to the costs of crime and violence at the regional level. Table 3.19 presents the items that seem similar to the present study, excluding emotional damage.

According to Acevedo (2008), the average cost of crime in Central America toward the middle of the decade of the 2000s was 5.5 percent of GDP. The average cost of crime in the two Central American countries analyzed in the present study was slightly less than 4 percent of GDP. In addition, assuming reasonable comparability in

TABLE 3.18. Estimations of the Cost of Violence in Selected Latin American Countries toward the End of the 1990s (in percent of GDP)

Item	Brazil	Colombia	El Salvador	Mexico	Peru	Venezuela
Health losses	1.9	5.0	4.3	1.3	1.5	0.3
Material losses	1.4	6.4	4.9	3.6	1.4	6.6
Total direct costs	3.3	11.4	9.2	4.9	2.9	6.9

Source: Londoño and Guerrero (2000).

TABLE 3.19. Economic Costs of Violence in Central America, 2006 (percent of GDP)

Item	Central America	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua
Medical care	0.3	0.0	0.4	0.2	0.3	0.8
DALYs	1.4	0.5	2.3	1.8	1.2	0.7
Total losses in health	1.7	0.5	2.7	2.0	1.5	1.5
Public security	0.8	0.4	0.9	0.7	1.6	1.0
Justice	0.6	0.6	0.7	0.3	1.0	0.7
Total institutional costs	1.4	1.0	1.6	1.0	2.6	1.7
Household expenditure	0.4	0.2	0.4	0.5	0.5	0.6
Business expenditure	1.1	0.5	1.4	1.1	1.4	1.8
Total private expenditure	1.5	0.7	1.8	1.6	1.9	2.4
Material losses	0.9	0.4	1.4	0.8	1.2	1.5
Total	5.5	2.6	7.5	5.4	7.2	7.1

Source: Acevedo (2008).

Notes: DALYs = years of healthy life lost. The numbers may not add up exactly to the total displayed due to rounding.

the two studies, we hypothesize that the cost of crime in Costa Rica declined between 2006 and 2010 (2.6 versus 1.9 percent of GDP) and that it decreased significantly in Honduras (from 7.2 to 4.8 percent). Similarly, our review of the studies of Acevedo (2008) and Londoño and Guerrero (2000) indicates that the costs of crime probably went down in El Salvador between the end of the 1990s and the mid-2000s.

Among the national studies, the report by the World Bank (2007) shows that the cost of crime in Trinidad and Tobago was close to 1.6 percent of GDP in 2003, taking into account the costs of lost productivity, funerals, and insurance for businesses; that the cost associated with crime in Jamaica for medical treatment, lost productivity, and public expenditure on security increased to 3.7 percent of GDP in 2001; and that if Haiti, the Dominican Republic, Guyana, and Jamaica could reduce their homicide rates to the level of Costa Rica, they would increase their economic growth rates by 5.4 percent, 1.8 percent, 1.7 percent, and 5.4 percent, respectively. A study by the UNODC (2007), on the other hand, estimated the total cost of crime at 7.3 percent of GDP in Guatemala and 11.5 percent of GDP in El Salvador. Olavarria

Gambi (2009) calculated the cost of drug consumption in Chile in 2006 at 1 percent of GDP. A study on Brazil concluded that if there had been a reduction by 10 percent in the homicide rate per 100,000 population, there would have been an increase in GDP of between 0.7 and 2.9 percent (World Bank, 2006).

A study on Argentina based on victimization surveys estimates the cost of crime in that country at 14.5 percent of GDP (Ronconi, 2009). The calculation includes productivity losses, preventive measures, valuation of robberies, harm to physical health, insurance, harm to mental health, behavioral changes, and fear of crime.²² Ronconi calculates that the harm to physical and mental health as a result of crime is the equivalent to 6 percent of GDP, the sense of insecurity represents a cost of 5 percent of GDP, and the value of robberies and thefts is the equivalent of almost 4 percent of GDP.

²² The analysis of the five countries that are the focus of this study does not cover insurance costs, mental health problems, behavioral changes, and fear of crime. In turn, Ronconi (2009) does not make reference to public expenditure.

A study on Chile, using data from 2002, estimates the cost of crime in that country at 2 percent of GDP (Olavarría Gambi, 2005), including the cost of construction, operation, and maintenance of prisons. The estimation of the present study for Chile is 2.4 percent of GDP, without including the above-mentioned costs for prisons, which suggests that the cost generated by crime increased by at least 18 percent between 2002 and 2010.

Outside of Latin America, Brand and Price (2000) estimated the total cost of crime in England and Wales in 1999 and 2000 at 60 million pound sterling (7 percent of GDP). However, if only the costs of crime against persons and households are considered, the Brand and Rice study finds losses of 32 million pound sterling (approximately 3.8 percent of GDP). Updating the Brand and Price estimates to 2003/2004 (for the same countries and with methodological updates) shows that the cost of crimes against persons and households declined between 1999/2000 and 2003/2004 by 9 percent, costs of serious assaults declined and those of other assaults increased, and the cost of medical treatment and income foregone as a result of sexual assaults increased (Home Office, 2005).

Using the same approach, Rollings (2008) estimated the cost of crime in Australia at 4 percent of GDP in 2005. The Rollings study includes areas not covered in the present study, such as the cost of illegal consumption of drugs, organized crime, money laundering, insurance, fires, treatment of victims, and the value of time devoted by volunteers and others.

Roper and Thompson (2006) estimated the cost of crime in New Zealand at more than 6 percent of GDP, 77 percent of which corresponded to private costs and 23 percent to public sector costs. The categories analyzed in the New Zealand study included crimes against persons, such as violent crimes, sex crimes, and robberies; crimes against private property, such as theft, home burglary, damage to property, and fraud; and other crimes

without direct victims, such as crimes related to drugs, trafficking, etc.

A study of 10 countries in Europe, Oceania, and North America regarding public expenditures to address crime and violence as a share of GDP concluded that expenditure was 10 percent in Australia, 1.26 percent in Austria, 1.12 percent in Canada, 0.76 percent in Denmark, 1.51 percent in England and Wales, 0.83 percent in France, 1.04 percent in Germany, 1.16 percent in Holland, 1.03 percent in Sweden, and 1.56 percent in the United States (Van Dijk and De Waard, 2000). The average public expenditure in the 10 countries would be approximately 1 percent of GDP.

What this brief overview shows is that, when looking at similar components, there are diverse realities in terms of the economic consequences of crime: one group of countries with moderate costs and another group with high costs. Among the first group—of those reviewed in this section—are Chile, Costa Rica, Uruguay, and Peru, whose costs would be relatively close to those of England and Wales. The countries with high costs of crime are the two cases previously cited (Honduras and Paraguay) as well as El Salvador, Guatemala, Nicaragua, Colombia, Venezuela, Brazil, and Mexico.

Among the five countries on which this study has focused, those with lower costs have public expenditure near or notably below the average of the 10 countries reviewed in the analysis by Van Dijk and De Waard (2000). Chile's public expenditure is 0.5 percent of GDP, Costa Rica's 0.8 percent, and Uruguay's 1.3 percent. Meanwhile, Honduras and Paraguay have levels of expenditure on the order of 1.5 percent and 1.9 percent of GDP, respectively, which is higher than the average for the industrialized countries analyzed in the study.

Corollary

This study of the costs generated by crime, based on the accounting methodology, reflects the negative economic consequences generated by this

social ill. The monetary expression of the costs illustrates the consequences that this activity has on countries' perspectives for development and opportunities to improve the welfare of their populations. The estimations serve as a call for cost-effective interventions by governments, not only to reduce the cost of crime—which is highly necessary—but also to fundamentally expand opportunities for the liberty and well-being of citizens.

The analysis finds that in Latin America, the costs of crime tend to be moderate in countries with lower levels of crime and violence, while those costs are higher in countries where victimization rates are higher. The latter countries also spend more to address issues of crime, even reaching expenditure levels that, on average, are higher than those of industrialized countries, which implies less efficiency in the expenditure of those Latin American countries.²³

In closing out this chapter it is necessary to reiterate what was indicated in the introductory and methodological sections regarding the difficulty of estimating the costs of crime and making

comparisons between countries. The section that put forth a broader international comparison shows the range of the elements considered and the methods employed in these types of exercises. This prompts the need to analyze similar areas of cost and verify that the estimation methods employed in those studies allow for a reasonable comparison. Thus, this study should be considered both a provocation and an invitation to undertake additional research that, employing homogeneous analytical techniques, estimates the economic consequences of crime and violence in the region, in turn allowing for carrying out comparative analyses to identify priority areas for intervention and, importantly, to accumulate lessons and knowledge on how to reduce crime and its negative effects on the citizenry.

²³ Without a doubt, this commentary needs to take into account and be tempered by the social realities faced by these countries in relation to those of developed countries or the relatively more developed Latin American countries.

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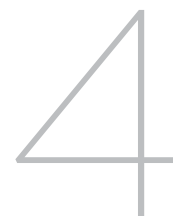
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Indirect Costs of Crime: Evidence from Latin America

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Crime is a costly phenomenon for modern societies, both at the individual and community levels, in terms of a variety of dimensions that range from psychological to sociological, institutional, and economic. In monetary terms, it is estimated that in Latin America, criminal activities represent at least 2 percent and, depending on the methodology used to determine the figure, as much as 14 percent of the region's gross domestic product (GDP) (Bourguignon, 1999; Londoño and Guerrero, 2000).

As can be deduced from the broadness of this range, the economic dimension of crime is difficult to capture with precision, given that while some consequences of criminal activities are direct and material, and thus measurable, others are indirect and intangible. Chapter 2 discussed how the many negative consequences of criminal activities make it difficult to construct a unified theoretical framework that simultaneously incorporates the multiple negative effects of crime and violence on welfare.

In terms of direct costs, several studies examine the welfare losses over time associated with criminal acts, losses that could have happened to

persons or families that internalize these costs or that take place in the area where they live. Typically, indirect costs include foregone income, opportunity costs, investments to reduce the risk of victimization, and other costs that can reasonably be considered to be the effects of criminal activity.

On the other hand, also considered as indirect costs are the negative consequences of crime and violence that are not directly visible or measurable, but that have a large impact on the well-being and quality of life of persons and communities. The nature of these costs is such that the literature also refers to them as intangible. Among the intangible costs frequently cited in the literature are pain, fear and suffering, the alteration of routines, personal and community underdevelopment, and lack of confidence.

This chapter presents a body of research on how some of the indirect dimensions of violence affect welfare, with a particular focus on the information and strategies used to estimate causal relationships. The chapter uses as a conceptual framework the model in Chapter 2 of this volume.

The findings are both worrying and promising: even though the costs of crime are high, there is evidence in the region that robustly identifies the tools and mechanisms that effectively reduce the negative impact of crime.

Recent Empirical Evidence

As discussed earlier, indirect costs include secondary economic effects over time that occur either as a consequence, externality, or opportunity of criminal activity, as well as negative effects on the well-being of persons and communities in terms of recurrent feelings of anguish, psychological suffering, effects on health, changes in conduct, and other situations that are not directly observable but that can have economic effects and be estimated monetarily. The most evident and frequently studied effects are foregone family income as a consequence of homicide, injuries suffered by breadwinners, health losses and expenditures on medical care, and conceptual changes in conduct adopted to reduce future risk of victimization (e.g., investment and production decisions, entrepreneurship, and expenditures on reinforcement and surveillance of homes and property, among others).

Using statistical records, Londoño and Guerrero (2000) present a descriptive analysis that involves a comparative study of the magnitude and costs of violence in Latin America, taking into account health losses, material losses, deterioration in consumption and work, and transfers between persons. The authors conclude that the aggregate cost of urban violence is equivalent to 12.1 percent of regional GDP and also involves transfers of 2.1 percent of GDP. The analysis also shows significant regional variations: while the economic cost of violence is approximately 5 to 10 percent of GDP in Peru and Brazil, it is close to 25 percent in El Salvador and Colombia.

Other dimensions not covered by this work but that have been studied in the literature are the effect of violence on electricity consumption, the

consequences of public policy interventions on criminal activities linked to the juvenile population, the effects on decisions to continue studies on juvenile offenders, and criminal recidivism.

Ibáñez, Rodríguez, and Zarruk (2013) study the effect of judicial reforms on crime rates and school attendance of adolescents in Colombia, a country where adolescents are involved in violent activities and where victimization rates are relatively high (38 percent) in the Latin American context.²⁴ The authors exploit the natural experiment derived from the gradual implementation between March 2007 and December 2009 of the System for Criminal Responsibility of Adolescents (*Sistema de Responsabilidad Criminal de Adolescentes* - SRPA). The SRPA is an institutional mechanism to investigate and judge crimes committed by adolescents. In general, the SRPA prioritizes restorative justice measures (e.g., warnings, compliance with behavioral norms, probation, temporary detention, community work, and detention in specialized juvenile facilities) over punitive justice. In particular, the SRPA:

- Reduces sanctions against minors under 18 years of age (with the exception of homicides, kidnappings, and extortion)
- Raises the age for incarceration from 12 to 14
- Prohibits the judgment and incarceration of children under the age of 14.

Employing a duration model (see Galiani, Gertler, and Schargrodsky, 2005), the authors establish that the adoption of the SRPA in Colombia's judicial districts was exogenous once fixed effects at the municipal level were controlled for. This allowed for estimating the effect of the SRPA on urban crime rates (robberies and homicides)²⁵

²⁴ In the framework of the security survey, the rate of victimization is the percentage of the total surveyed population that report having been victim of a criminal act.

²⁵ The authors only use information on urban criminality so as not to confuse the effect of armed conflict.

and the schooling of adolescents using the difference-in-differences estimator.

In accordance with the technical framework presented in Chapter 2 in this volume, the SRPA should not reduce the cost of committing serious crimes (homicides, kidnapping, and extortion), given that the punitive justice schemes for these crimes remain in place. However, it is hoped that the cost of crime will be reduced for criminals (δ), given that there is a weaker dissuasion effect incurred in other illicit activities by prioritizing restorative justice, which is less severe. In fact, the study concludes that following implementation of the SRPA, robberies increased, while the homicide rate showed no change.

The authors also find that while robberies in municipalities with a larger proportion of adolescents under age 14 increased following adoption of the SRPA, there was a reduction in those municipalities with a larger proportion of adolescents between ages 14 and 17. This result is explained by a lower arrest rate and a consequent reduced cost of crime. In accordance with the conceptual framework developed in Chapter 2, the lower arrest rate for minors under age 14 would be explained by a lower probability of being apprehended $\vartheta(s,e)$, the result of the police being less motivated to pursue youths who, in light of the new legislation, would probably not face punitive charges.

Another result is that the SRPA does not have a statistically significant effect on the gross dropout rate for minors. The finding highlights that a reduction in the cost of crime does not give an incentive to drop out of school. Disaggregating the analysis by gender and age group, the authors report that the SRPA does not negatively affect the education decisions of either adolescents or of youths from families with low or high education levels. However, it does reduce the attendance rate of boys under 14 years of age from families with low education levels.

This finding can be explained, according to the authors, by the fact that implementation of

the law would be associated with a greater propensity of youths under age 14 to commit criminal acts, particularly robberies, and that this in turn would translate into an incentive for those adolescents to drop out of school.

However, another finding deduced from the same study but not made explicit by the authors is the change in the costs of crime that have had to be assumed by the inhabitants of the municipality with a large adolescent population. Given that robberies in those municipalities increased following approval of the SRPA, an increase in the indirect costs of crime for the population in those municipalities would be expected. As a result, the complementary security policies to improve coordination between the police and the judicial system, as well as to prevent crime among risk groups, should be implemented.

Guarín, Medina, and Tamayo (2013) also analyze the impact of the SRPA on levels of juvenile criminality, although in this case the authors concentrate on the effect of diverse punitive regimes, using data on total arrests that occurred between January 2002 and October 2012 in the Valle de Aburrá (Medellín), Colombia, and information related to the characteristics of those arrested.

The authors identified the effects of the severity of penalties on dissuasion, incapacitation, and human capital formation. The causal analysis exploited the discontinuous increase of the severity of penalties upon reaching 18 years of age,²⁶ which refers to the fact that the juvenile justice system is replaced at that point by the adult penal system. The stiffening of penalties is theoretically represented by a differential increase in δ (see Chapter 2), which is the loss of utility derived from the punishment imposed on criminals for having violated the law. Stated in a different way, this

²⁶ For example, in the case of intentional homicides, adults can receive a sentence of up to 40 years in prison, while minors can be held for between two and eight years in a specialized detention center.

change in the punitive regime should modify the incentives to commit illicit acts upon reaching the age of adulthood

Adopting the methodology proposed by Lee and McCrary (2009), the empirical strategy of the authors consists of constructing a panel of individuals between 17 and 19 years of age and estimating if there is discontinuity in the seminal probability of committing a crime upon reaching 18 years of age, assuming that the rest of the factors that affect said probability are maintained without change or have a neutral effect regarding reaching legal age of adulthood.

Note that this focus is conceptually distinct from the classic regression-discontinuity design (RDD). The identification strategy compares the same individuals before and after they reach 18 years of age, instead of comparing distinct individuals on both sides of this cut-off point. Thus the discontinuity in the density of the age at which the individuals are detained is the effect of dissuasion, while that in the RDD will show that the assumptions are invalid (Lee and McCrary, 2009).

The authors follow this by estimating the impact on incapacitation through the traditional RDD, where the variable that determines if an individual is affected by the adult penal system is the age when the first crime after having turned 18 is committed.²⁷

The authors then quantify the impact on education level, school attendance, and labor participation, first by obtaining the differential effect of having been arrested before versus after having reached legal adulthood and, as a function of this, through a two-stage model of the causal effect of having reoffended in a given period of time on these human capital indicators. They thus evaluate the change in the penal norms in terms of these indicators based on the RDD by using an identification strategy similar to that used to estimate the effect of incapacitation. Finally, the authors estimate the effect of the amount of time that goes by before an arrested person reoffends

on the human capital indicators based on a diffuse regression-discontinuity design (DRDD). It is diffuse because some individuals do not reoffend, while others return to criminal activities.²⁸

The authors find that there are dissuasion effects of more severe criminal penalties once persons reach 18 years of age (i.e., an increase in d) on those arrested for the first time before reaching 17 years of age. Recidivism among this group was reduced by 50 percent once they reached legal adult age.

Another finding is that persons arrested for a crime immediately after reaching 18 years of age reoffend approximately 300 days later than those arrested immediately before turning 18, and they are less likely to reoffend.

However, the increased severity of penalties or the longer time periods before recidivism upon turning 18 do not explain the future differences in human capital between those previously arrested just before and after reaching the legal age of adulthood. This finding suggests that the incapacitation effect is not explained by the impossibility of committing a crime while detained, but rather by the dissuasion effect derived from the experience of a more severe penalty for being arrested once persons are adults.

Similarly, among those who had committed crimes related to consumption of drugs, recidivism was reduced by 65 percent at the age of 18. Likewise, among individuals who had been arrested, regardless of whether the detention occurred before they turned 18, the authors estimate that recidivism was reduced by 30 percent

²⁷ Given that this variable is endogenously determined, the validity of the identification strategy depends on whether the possibility that the individuals can manipulate the day that they commit a crime is subject to factors outside of its control, in such a way that that the supposition of the experimental design around 18 years of age is not violated. The authors present evidence that validates this supposition.

²⁸ In contrast, under the RDD, the clear focus is that all of those eligible are treated and all of those who are ineligible are controlled.

in drug consumption cases and by 15 percent in drug trafficking cases at 18 years of age.

This study also found that those who had been arrested for violent crimes and crimes against property prior to turning 18 years of age took 290 more days to reoffend than those arrested after reaching this age. The delay in reoffending was 470 days if the crime was against property. Similarly, the probability of reoffending between 30 and 120 days after committing a crime is 15 percent less among those who committed a crime immediately after turning 18, which is in line with the proposition of our conceptual framework that an increase of d reduces the propensity to commit a crime and, therefore, contributes to less loss of social well-being.

For their part, Guarín, Medina, and Tamayo (2013) found that those who had been arrested had less probability (of between 6 and 17 percent) of having a formal education, and that they had slightly under one year less of education than those who had never been arrested.

The study by Guarín, Medina, and Tamayo (2013), like that of Ibáñez, Rodríguez, and Zarruk (2013), analyzes the costs of crime from the perspective of juvenile offenders, particularly those associated with less accumulation of human capital and with the difficult experience of having already been in prison and imprisoned longer after having turned 18 years of age. Following the logic of the conclusions of the study, the economic cost of crime for the society would be less in the cases of crimes committed by young people of legal adult age and who were arrested before turning 18, given that the stiffer penalties serve as substantial disincentives for those subject to them to get involved in criminal activity.

In this way, as a whole, both studies suggest that implementation of the law would have reduced the costs of criminal involvement for those under 18 years of age, which would imply an incentive to undertake these illicit acts, which in turn would increase the economic costs of crime for society.

As discussed in the introduction, aside from the indirect consequences of criminal activity there is the change in the productive decisions of economic agents. In terms of the theoretical model developed in Chapter 2 of this volume, this notion is captured by L_v , which is the welfare loss to victims caused by crime. For example, the intensification of violence associated with drugs typically generates extortion against business owners, attacks on infrastructure, and fear in the community ($\uparrow\sigma$), as well as robberies of businesses ($\uparrow p-x$). Furthermore, violence linked to drug trafficking overwhelms the capacity of the authorities ($\uparrow s$), reducing the possibility of punishment, increasing victimization ($\uparrow\pi(c_2)$), creating openings for opportunistic crimes, and unleashing serious damage to the economy (see Chapter 2).

Robles, Calderón, and Magaloni (2013) study this mechanism, estimating contractions in the economy and employment (i.e., an increase in L_v) as a result of increases of violence related to drug trafficking. They use data from 1,308 municipalities in Mexico from 2002 to 2010. The causal effect on economic activity of this violence—operationalized as the total number of homicides—should be separated from the inverted causality (i.e., good economic performance attracts cartels, whose conflicts to gain territory lead to greater levels of violence), for which the authors propose two identification strategies.

First, they use the share of seizures of cocaine in Colombia along with the distance from the municipality to the border with the United States as an instrument to isolate the variation in homicides of those factors that simultaneously affect the economy and levels of violence tied to drug trafficking, as well as the changes in the economy that can affect the homicide rate. When the share of cocaine seized in Colombia is higher, the world price of the drug—and as a consequence its market value—increases. The increased price of the drugs is higher in Mexican border areas because of their proximity to the U.S. market.

Given that the municipality is the unit of analysis for the study, the authors approximate economic activity using information on domestic consumption of electricity per inhabitant, given that there are no temporal series of the gross domestic product of municipalities. They use data on the share of persons employed, self-employed, and unemployed, as well as earned income, to capture relevant dimensions of the labor market.

The analysis with instrumental variables shows that an increase of one homicide related to drug trafficking per 100,000 inhabitants generates, at the municipal level, a 2 percent decline in the share of persons working in the same trimester and a reduction of 3 percent of those working in the next trimester. Similarly, this increase in the homicide rate leads to an increase of 1.5 percent in the unemployment rate; a decline of nearly 0.4 percent in the proportion of persons who own businesses; and a reduction of 0.5 percent in the share of persons self-employed. Thus, the authors find that an increase of one homicide linked to drug trafficking per 100,000 inhabitants generates an approximate decline in labor earnings of 1.2 percent. However, there is no evidence of significant effects of violence associated with drugs on the consumption of electricity. The authors hypothesize that violence associated with drugs has no linear impact on the economy.

Considering this lack of linearity, the authors propose a second identification strategy to evaluate the effect of violence associated with drugs on the economy based on synthetic controls. This method, proposed by Abadie and Gardeazabal (2003) and Abadie, Diamond, and Hainmueller (2010), is a variation of the matching strategy, the objective of which is to find the combination of nontreated municipalities whose weighted average better approximates the characteristics of those that are treated. For practical purposes of the analysis, the authors establish as an intervention the occurrence of waves of organized violence, defining a municipality as treated when the

number of homicides related to drug trafficking between one year and the next from 2006 and 2010 increased by more than three standard deviations relative to the historical average of homicides as of 1998.

The analysis with synthetic controls shows that “treated” municipalities consume, on average, 2 percent less electricity after suffering a year of organized violence relative to the counterfactual scenario. The decline in consumption increases to 4 percent after two years and intensifies to 7 percent four years after the violence. These findings, according to the authors, allude to the presence of a threshold effect (and hence to the nonlinearity of the impact) of the violence on economic activity. In cases where the levels of violence are not sufficiently high to exceed that threshold, the agents internalize the economic cost of obtaining better security and protection, decisions that are reflected in the labor market. In the contrary case, an escalation of violence that exceeds the threshold could produce an impact on the decisions of economic agents in terms of location, investments, and labor supply.

Thus the study concludes that the increase in violence associated with drug trafficking has had a high cost for local Mexican economies. From the standpoint of the types of costs generated, Robles, Calderón, and Magaloni (2013) find that the increase in violence associated with drugs has generated indirect costs to local Mexican economies, both in terms of less economic activity as well as a reduction in employment in the short term.

The wide range of mechanisms through which crime generates indirect costs also includes the effect of the perception of insecurity on housing values; the effect of intrafamily violence on reproductive health, women’s access to the labor market, and the well-being of their children; and the effect of anxiety of pregnant women who have been victims of violence on the health of newborns. The next section presents four studies that evaluate these effects.

Using micro data from the 2009 National Household Sample Survey on the characteristics of victims, crime victimization, and the perception of insecurity among more than 7,000 households in 10 metropolitan areas in Brazil, Vetter, Beltrão, and Massena (2013) examine whether households assign higher value to houses depending on such characteristics as space, location, and safety in such a way that makes it possible to attribute a monetary value to each one of them (Rosen 1974). In particular, if an individual is willing to pay a certain value to avoid or address levels of crime in a particular area, it is intuited that the increase in his or her well-being derived from a lower probability of victimization is at least of the same magnitude of said payment, i.e., $\pi(c_v)\sigma - L_v \geq 0$. In effect, hedonic price models indirectly estimate the willingness to pay for a reduction in the crime rate.

This model, estimated by weighted least squares, examines the median income and perception of insecurity as general indicators of the quality of the neighborhood, while the monthly rental price is used as a measure of the value of the house. The strategy consists of applying factorial analysis with extraction of principal components in order to identify the variables that affect the perception of security, using the resulting factor scores as independent variables in the hedonic model.

The authors find a strong, positive, and significant relationship between the amount of rent paid for housing and the household's perception of security. In particular, high-income households face a greater risk of being victims of robbery or theft, so they are willing to pay higher rents for houses that have greater security measures that, in part, create the perception of greater protection against crime.

The results of the estimations reveal that an increase in the perception of security in the household of one standard deviation would increase the average value of rents by US\$757 (using the average 2009 exchange rate), which would total

approximately US\$13.6 billion if the estimation were applied to the 18 million households in the area of the study.

An analysis with similar objectives conducted by Ajzenman, Galiani, and Seira (2015) evaluated the impact of homicides on housing prices in Mexico. Theoretically, the model suggests less willingness to pay for housing in violent areas that would reduce the well-being of the victims. Two sources of information are used: first, data on prices and other housing characteristics from more than 1.3 million housing and apartment appraisals linked to requests for mortgages as reported by the federal mortgage agency (*Sociedad Hipotecaria Federal*) between 2008 and 2011, which includes geo-referenced data; and second, data on homicides from the National Health Information System (*Sistema Nacional de Información en Salud - SINAIS*), which records the cause and date of death and where it occurred. The total number of observations allow for making a disaggregated evaluation of the effects of violence on social and residential housing.

The authors' identification strategy exploits the panel structure of the data conditioned by municipal fixed and temporary effects, as well as specific monthly trends for each municipality and other observable characteristics, assuming (and demonstrating empirically) that the changes in the accumulative homicide rates are exogenous to the model and not associated with the labor market or other economic variables.

Based on the proposed specification, the authors detect that an increase of 100 percent in the homicide rate is associated with a decline in the price of low-income homes of 0.9 to 1.2 percent, while overall housing (i.e., residential and low-income) prices are not affected. Extrapolating to the national level, and taking into account that between 2006 and 2011 the homicide rate jumped by more than 200 percent, the results indicate that during this period the prices of homes of the poorest families declined by 2.5 percent as a consequence of violence.

A subsequent cross-sectional analysis concluded that the escalation in homicide rates has a 64 to 81 percent higher impact on the poor than on those who are not poor, depending on the victimization indicator used. Even though the poor and the nonpoor both tend to move more in those municipalities with higher levels of violent homicides, the effect is 50 percent higher in the case of poor households. In addition, in those municipalities where violence has been more persistent—that is, as reflected in an increase of at least 150 percent in the number of homicides between 2008 and 2011, and with homicide rates successively increasing during this period—the reduction in the price of housing in poor areas has been 40 percent greater than in those areas that have experienced spikes of violent homicides that lasted a short period of time.

In summary, violence has a regressive distribution effect, with a greater effect on families with scarce resources than on those with higher incomes, reducing the value of one of the most important assets of the poor: their home. Given this, as well as the desire to find a place where one feels safer, the increase in violent homicide associated with drugs would have provoked intensified migration of poor households that lack the means to access higher-cost homes with greater means of protection. It is clear that the intangible costs of crime can exacerbate the poverty gap.

Similarly, another group particularly vulnerable to violence is women. Agüero (2013) analyzes the effect of domestic violence on women's reproductive health and the health of their children, as well as on their marital status and labor participation. From the standpoint of our theoretical framework, domestic violence increases the psychological and physiological costs for women (σ), in turn generating negative externalities for other members of the family (increasing even more the value of σ) and reducing, in the aggregate, social welfare, L_V .

The author uses information from more than 83,000 women from the Demography and

Health Survey Program (*Programa de Encuestas de Demografía y Salud*) for Colombia, Haiti, Honduras, Peru, and the Dominican Republic in order to determine associations between violence and indicators of the general well-being of women and their children.

Subsequently, the author exploits a natural experiment associated with domestic violence in order to estimate the causal effects on the health of children, using the expansion of the Women's Emergency Centers (*Centros Emergencia Mujer - CEMs*) in Peru from 13 in 1999 to 149 in 2012 as a source of exogenous variation in the prevalence of domestic violence.²⁹ The identification strategy consists of using the presence of CEMs as an instrument to isolate the variation in the events of physical violence from those factors that simultaneously affect child welfare and levels of intra-family violence, as well as potential changes in the health and well-being of children related to the number of acts of violence. Given that the distribution of the CEMs is not random, the author incorporates fixed effects in his specification to control for observable and nonobservable characteristics in the localities that remain constant over time.

In terms of the observational analysis, the author finds that the use of birth control pills, intra-uterine devices, injections, diaphragms, condoms, and female sterilization is positively correlated with the use of physical violence against women. The author also shows that women who suffer domestic violence have lower levels of hemoglobin and that their indices of anemia increase by between 9 and 15 percent in cases of physical violence. In addition, the study finds that each additional act of physical violence against women increases the probability of divorce by 4 percentage points. Women who are victims of domestic violence have an 83 percent greater probability

²⁹ The CEMs, established in March 1999 by Peru's Ministry of Women and Social Development, provide prevention and treatment services for cases of domestic violence.

of divorcing or separating than those who do not suffer such violence. If the domestic violence is considered severe, the rate of divorce increases by 13 percent.

Agüero (2013) also found that it is more probable that women who suffer domestic violence work. The author expresses caution regarding this result given the possibility that in reality this is capturing reverse causality. In other words, greater labor participation could be related to the fact that women subject to violence have a higher rate of separation from their partners, which would make them inclined to look for sustenance and independence by working. The author also presents evidence that suggests the externalities of domestic violence. Children of violent mothers showed a lower probability of having received minimum levels of pre-natal medical care, and a higher probability of suffering from illnesses and low birth weight. The negative externalities of domestic violence also tend to persist over the long term: according to the author's analysis, children of violent mothers have anthropometric deficiencies.

Finally, in terms of the causal analysis, Agüero (2013) shows that domestic violence increases the probability that children will develop gastrointestinal illnesses by 15 percentage points. However, the negative externalities of domestic violence are partially mitigated with higher levels of education of the mother.

Foureaux Koppensteiner and Manacorda (2013) complement that analysis with an evaluation of the effect of violence (approximated in this case by total homicides) on the health of newborns,³⁰ using micro data from the more than 20 million births and 500,000 homicides that occurred between 2000 and 2010. The authors focus on the 1,289 municipalities with populations of less than 5,000 inhabitants, given that in small municipalities and predominantly rural areas homicide rates are a more localized measure than violence. Once again, the underlying theory is that violence against women imposes psychological

and physiological costs on women and their children (represented as an increase in σ), directly adding to L_v , the loss of social welfare.

The identification strategy proposed by the authors is a difference-in-differences method that compares changes in the homicide rates over time and between municipalities, estimating the causal impact of homicides during distinct stages of pregnancy through weighted least squares. The authors demonstrate the validity of the strategy by introducing additional regressors of the homicide rates pre- and post-conception to the empirical specification and proving their statistical insignificance.

The results of the study indicate that, in the case of the average small municipality (i.e., with a population of 3,700 inhabitants), one additional homicide reduces by 12 grams the weight of newborns whose mothers were exposed to the violent environment that generated that homicide during the first trimester of pregnancy. This in turn increases the proportion of children with low, very low, and extremely low birthweight by 0.5, 0.2 percent, and 0.1 percent, respectively.

In addition, the authors estimate that the occurrence of homicides during the first trimester of pregnancy reduces the gestation period, increasing premature births and raising the risk of low birth weight. These effects are concentrated on mothers who have incomplete primary education, implying that exposure to violence is a factor that adds to the mechanism of intergenerational transmission of socioeconomic status.

On the other hand, the study found no evidence that showed an effect of exposure to violent homicide on infant mortality rates and fertility rates, or on Apgar scores. In summary, while the negative effects of violence identified by Agüero

³⁰ Health indicators for newborns used the analyses include the weight of the infant, duration of the gestation period, and substantiation of the evidence from , as well as information on neonatal, perinatal, and infant mortality.

(2013) and Foureaux Koppensteiner and Manacorda (2013) are not directly and tangibly observable, their consequences in terms of opportunities for well-being and thus in terms of economic costs are significant for vulnerable groups. In particular, the violence generates greater health costs for mothers and newborns, as well as for the victims of intrafamily violence in general, without even taking into account the significant social loss in terms of social contribution and productivity losses.

Conclusions

This chapter has reviewed seven studies conducted in the context of the call to develop research on the economic costs of crime in Latin America by the Inter-American Development Bank in 2013. The studies reviewed have examined cases of indirect costs generated by crime and violence, providing significant evidence on their effects on persons who are exposed to and suffer from being in environments where there is recurrent crime and violence.

The results of the analysis show that the costs for persons and households are significant, that the effects on opportunities for the well-being of persons are important, that the effects on opportunities for the well-being of persons and households are significant, and that the costs tend to be concentrated on the most vulnerable population groups, exacerbating their conditions of poverty and social marginalization.

Through the steps analyzed, these studies are transformed into an incentive to translate their findings into aggregated economic costs of crime and violence that societies need to address, as has been shown with precision. This would allow for providing information to determine the aggregate size of the problems exposed and to assign them top priority on government agendas.

For the authorities, the findings reported by these studies represent a call to urgently intervene in this area and to restore to those who have suffered the negative consequences identified the opportunities for well-being lost or, perhaps, not yet achieved.

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Building a Crime Statistics System in Latin America and the Caribbean

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In 1968, Gary Becker published the seminal article on what we now know as the economics of crime. In the five decades since, the field has expanded dramatically both in terms of methodologies and empirical findings, becoming one of the areas of greatest interest in the field of economics and the social sciences, and serving as a starting point for many ambitious public policies directed toward social welfare.

Paradoxically, however, Latin America and the Caribbean (LAC) has been relegated to a back seat in the study of this topic despite being the most violent region in the world, including entire countries in the region with homicide rates similar to or above those of countries involved in civil wars (UNODC, 2015).

The common denominator in this volume is the difficulty involved in the exercise of estimating the costs of crime and comparing them between countries. This is less a disincentive than it is an invitation to continue to develop sources of information on citizen security, explore new empirical methods and analysis, and promote State institutional capacity to implement policies to combat crime and violence.

Even though formal estimation of the costs of crime is a task complicated by the lack of robust information on this topic, public safety policies can and should gravitate toward the useful consolidation, consistency, and disaggregation of crime and violence indicators with efficient statistical systems that generate reliable data. As was made clear in all the chapters of this volume, strengthening regional statistical systems would be reflected in a greater number of academic contributions on this topic in the short and medium terms.

It is our opinion that, given the efforts at the institutional level of many agencies at all levels of government to collect statistical information and make it available, along with the greater emphasis on designing robust identification strategies for empirical analysis, the direction in which the study of the economics of crime is headed in LAC is indeed promising.

The Inter-American Development Bank, in particular, is promoting the development of operational capacity to implement standardized regional information systems and facilitating dialogue with a focus on the need, by way of an institutionalized agenda, for reliable information to be

available to measure the magnitude of the costs of crime (Jaitman and Guerrero Compeán, 2015).

The limitations of the present volume share the common problem of the lack of statistics. Improving crime statistics in LAC is a necessary condition to generate more and better knowledge about the causes and consequences of crime. This chapter presents an analysis of the characteristics of crime statistics systems in LAC and the typical and available indicators used in criminal justice systems. It also includes a discussion of how far the region is from what could be considered the ideal statistical system.

Crime Statistics Systems in Latin America and the Caribbean

This section describes the main features of crime statistics systems in LAC, focusing on the collection, processing, and sharing of citizen security indicators and on indicators of the responses of the criminal justice system and its attributes (that is, systemic resources, performance, and punitive measures).

Citizen Security Indicators

Typically, there are three sources of data for crime and citizen security: official data collected by state agencies such as the police, courts, or morgues, among other institutions; self-reporting; and victimization or inmate surveys. Within the region, official statistics on recorded crimes are the most basic unit for crime analysis as well as the most readily available type of data. Virtually all law enforcement systems keep records of crimes committed—mainly homicide, injuries, robbery and theft—in their respective jurisdictions. However, there are scant data from official sources on other type of crimes such as kidnappings, drug trafficking, or consumption of illegal drugs. In those cases, most estimates derive from self-reporting (survey respondents) and from data-bases of international organizations.

Table 5.1 shows the principal sources of official statistics of different types of crimes and their periodicity by LAC country. As illustrated in the table, the police force has the primary

TABLE 5.1. Offense Records, Sources, and Periodicity for Selected Latin American and Caribbean Countries

Country	Main source	Periodicity	Period available
Argentina	National Crime Policy Directorate – Ministry of Justice and Human Rights	Monthly ^a	2002–2013
Bahamas	Royal Bahamas Police Force	Annual	2008–2012
Barbados	Royal Barbados Police Force	Annual	2009–2013
Belize	Police Force	Annual	2005–2008
Bolivia	National Citizen Security Observatory	Annual	2005–2013
Brazil	National Statistics System on Public Security and Criminal Justice – Ministry of Justice	Annual	2007–2012
Chile	National Criminal Information System – Ministry of the Interior	Quarterly	2001–2014
	National Statistics Institute (INE)	Annual	1997–2009
Colombia	National Police, the Attorney General's Office	Annual	2003–2014
	National Institute of Legal Medicine and Forensic Sciences	Annual	2005–2014
Costa Rica	Ministry of Justice	Annual	2001–2014

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TABLE 5.1. Offense Records, Sources, and Periodicity for Selected Latin American and Caribbean Countries (*continued*)

Country	Main source	Periodicity	Period available
	National Statistics and Census Institute (INEC)	Annual	2001–2014
Dominican Republic	Criminal Investigation System – Office of the Prosecutor General	Annual	2005–2013
Ecuador	Ministry of the Interior – National Observatory on Public Security	Annual	2004–2014
El Salvador	Ministry of Justice and Public Security	Annual	2010–2014
	Supreme Court of El Salvador– National Institute of Legal Medicine	Annual	2010–2014
Guatemala	National Police – National Statistics Institute	Annual	2008–2013
	National Population Register– National Statistics Institute (INE)		
Guyana	Ministry of Home Affairs, Ministry of Health, and the Police Force	Annual	2004–2009
Honduras	Honduras’ Police Statistic System	Monthly/ Annual	2009–2015
Jamaica	Constabulary Force and the Legal Medical Unit	Annual	2000–2010
Mexico	Platform Mexico – Public Security Research Institute	Annual	2002–2014
	National Institute of Statistics and Geography (INEGI)	Annual	1990–2013
Nicaragua	National Police	Annual	1997–2013
Panama	National Integrated System of Criminal Statistics	Annual	2007–2010
Paraguay	General Directorate of Statistics, Surveys and Censuses, and National Police	Annual	2000–2013
Peru	National Institute of Statistics and Informatics	Monthly	2003–2013
Saint Lucia	Royal Saint Lucia Police Force	Annual	2000–2011
Suriname	National Police	Not applicable	Not applicable
Trinidad and Tobago	Trinidad and Tobago Police Service	Monthly	2000–2013
Uruguay	Department of Data, Statistics and Analysis – Ministry of the Interior and National Observatory of Crime and Violence	Quarterly/ Annual	2005–2013
Venezuela	Scientific, Penal, and Criminal Investigative Body	Annual	Not applicable

Source: Prepared by the author.

^a Crime data published by the National Office of Crime Policy have no longer been available on its website since late 2007.

responsibility to manage information about criminal acts, which is then systematized by each country’s national statistics institute. In addition, data on homicides and intentional injuries are usually collected and tabulated by the countries’ health authorities and serve as an alternative, or complement, to the violent crime statistics collected through law enforcement agencies.

The frequency of information delivery varies among countries. For Honduras and Peru, for example, delivery is on a monthly basis (Table 5.1). The Metropolitan District of Quito releases frequent upgrades of criminal statistics, although the means to access them are different. Chile and Uruguay disseminate police reports quarterly and then consolidated annually, while the remainder

of the countries in the region disseminate crime information annually.

Another important aspect regarding crime indicators is the availability and updating of this information. Most countries publish crime data and reports on police records through their respective websites. The exceptions are Argentina, Cuba, Haiti, and Venezuela. In Argentina, the National Office of Crime Policy (NOCP) is in charge of compiling criminal data and producing a report within the National Criminal Information System. This report used to be published annually on the NOCP's website together with criminal statistics and reports of the National Statistics System for the Execution of Sentences, which compiles information about persons incarcerated throughout the country. However, since 2007 there have been significant delays in posting this information, and at present the NOCP's website is no longer available, which makes it more difficult to access to crime data (Bazzano and Pol, 2010). Reports on crimes committed in the country are available on the Ministry of Justice website but only until 2009. Finally, in Cuba, Haiti, and Venezuela the availability of administrative crime information is very limited and the information is difficult to obtain.

Administrative data on reported crime are available for a rather short period of time and are frequently published in aggregated terms, hindering the construction of times series and comparability across countries. For the purpose of cross-country comparability, it is also important to ensure that data reflect shared concepts and clear definitions. Unfortunately, within the region there are significant institutional differences in recording crime and in the efficiency of public agencies.³¹ This is also true within countries when different government agencies are in charge of reporting crime statistics. There are no clear guidelines about how to code information, and there are no proper standards to judge the quality of information. All of this raises a number of questions regarding validity and credibility. There

are also major concerns about the collapse of the auditing process and the lack of a systematization of records (Bergman and Whitehead, 2009).

Finally, official statistics are affected by problems of underreporting, that is, people tend to not report crimes of which they have been victims. This may stem from the distance to the institutions where crimes should be reported, doubts about the usefulness of reporting crimes, or fear of being victimized again.³² In any case, the result is negatively correlated with economic and institutional development (Soares, 2004; Naritomi and Soares, 2010; Sanguinetti et al., 2015).³³ While in the past only police data were used to measure crime, it is now widely acknowledged that such information alone is not sufficient and should be integrated with victimization survey results. These surveys are large-scale studies that ask randomly sampled members of the population about their experiences with crime. Generally, these surveys consist of two parts. In the first part, respondents are asked questions from a "screening questionnaire" where they provide socio-demographic information about themselves as well as information regarding fear of crime and attitudes toward the criminal justice system. In the second part, a detailed series of questions about the victimization incident are included. These surveys constitute the

³¹ For example, consider the case of Honduras. In 2007, that country listed six different categories of homicide: assassination, simple homicide, homicide with prejudice, parricide, other crimes against life, and traffic accidents that result in death. This kind of statistical scattering makes it difficult to determine just what the homicide rate is and compare with other countries that list a single unified homicide rate.

³² Underreporting is partly due to the low levels of confidence in the police. In a 2008 Americas Barometer survey, more than 44 percent of respondents said that their local police were involved in crime, while only 38 percent said their local police protected citizens. In Argentina, Bolivia, Guatemala, and Venezuela more than 60 percent of those surveyed thought that their local police were involved in criminal activities (Cruz, 2010).

³³ Soares (2004) and Naritomi and Soares (2010) show that per capita income explains 65 percent of the cross-country variation in the percentage of crimes that are reported.

most accurate instrument to measure criminal incidence, especially given the inherent constraints of administrative data and potential underreporting in LAC.

International, regional, and national victimization surveys have been conducted in LAC countries. At the international level, the International Crime Victimization Survey is the only structured survey that seeks to be representative across all regions. This survey has been conducted since 1989, with the last wave conducted during the period from 2005–2008. The survey provides information on crime and victimization through a standard questionnaire, the results of which are internationally comparable. To ensure comparability, all aspects of the methodology have been standardized to the maximum possible extent. The survey also uses a standard sample population size of 2,000 individuals for each country. According to information provided by the United Nations Interregional Crime and Justice Research Institute, the participation of LAC countries has been scarce and nonsystematic. For example, the first survey in 1989 did not include any country in the region, while the 1992 survey had the participation of Argentina (Buenos Aires), Brazil (Rio de Janeiro), and Costa Rica (San Jose). Since 2002 other Latin American countries have been involved, including Bolivia, Colombia, Mexico, Panama, Paraguay, and Peru (Dammert et al., 2010).

At a regional level, the most important surveys are: Latinobarometer,³⁴ Americas Barometer of the Latin American Public Opinion Project (LAPOP) of Vanderbilt University,³⁵ and Ecosocial.³⁶ The Latinobarometer is an annual public opinion survey covering 18 Latin American countries. This survey, which has been the one conducted most often in the region since 1995, includes questions on delinquency (personal or family victimization in the last two months) that have been repeated in all waves of the survey. For its part, LAPOP's Americas Barometer has as one of its focus areas a section entitled "Crime and the Rule of Law," which

addresses such questions as victimization, links with the justice system, perception of insecurity, and satisfaction with related policies and institutions. Finally, Ecosocial incorporates in the "Social Fabric Model" questions about fear, victimization, institutional aspects (the police and the criminal justice system), and the quality of life in the neighborhood (Dammert et al., 2010).

The sample sizes of these surveys are relatively constant at around 1,500 respondents per country. It is important to note that these surveys are not designed for the disaggregated analysis of victimization, but rather only to shed light on general victimization figures and the perception of insecurity. However, as will be discussed later, very few countries undertake periodic victimization surveys with a national reach (with samples of more than 5,000 or more households) that would serve as an effective option for a regional overview (Sanguinetti et al., 2015).

In the late 1990s, state institutions in most LAC countries began to coordinate the design and implementation of victimization surveys, or started to collect information on victimization through modules in multipurpose surveys. Nevertheless, these efforts have been sporadic, and only a small group of countries has established mechanisms for collecting information on victimization surveys in a standardized and systematized way.

³⁴ For more details see <http://www.latinobarometro.org>.

³⁵ For more details see the Latin American Public Opinion Project, Vanderbilt University, at <http://sitemason.vanderbilt.edu/lapop/links>.

³⁶ Ecosocial is a study developed by the Corporación de Estudios para Latinoamérica (CIEPLAN) and the Instituto Fernando Henrique Cardoso (Brazil) as part of the New Agenda for Social Cohesion for Latin America Project, financed by the European Union and the United Nations Development Programme. The survey was conducted in seven countries in the region (Argentina, Brazil, Chile, Colombia, Guatemala, Mexico, and Peru) involving a total of 10,000 interviews and covering four areas: the quality of the social fabric, the quality of the political fabric, perceptions about opportunities and social mobility, and happiness. For more details see <http://www.ecosocialsurvey.org>.

Table 5.2 shows the list of countries that have conducted a victimization survey along with the survey period and coverage. Note that a common factor is the great heterogeneity across countries in terms of coverage and frequency. Only Chile and Mexico have conducted annual victimization surveys on a national scale since 2003 and 2002, respectively; Guatemala has conducted victimization surveys biannually since 2004; and Uruguay has carried out surveys annually since 2008. However, the samples in these surveys are not representative of the national population. Also note that six countries (the Bahamas, Barbados, Belize, Bolivia, Costa Rica, and Paraguay) conducted one-time victimization surveys, while the remaining countries conducted regular but less frequent

victimizations surveys, every three, five, eight, and even ten years.

Another group of countries, instead of conducting victimization surveys, collects crime data through multipurpose surveys that include victimization modules. This is the case of Dominican Republic, which uses a module on public security in the Multi-Purpose National Household Survey (a probabilistic sample survey conducted on a representative sample of the country's general population) to gather information on patterns of victimization. Another example is Costa Rica, which conducted only one victimization survey in 2004, but included victimization modules in household surveys carried out in 1989, 1992, 1994, 1997 and, most recently, in 2010 and 2014.

TABLE 5.2. Victimization Surveys Conducted by Latin American and Caribbean Countries by Period and Scope

Country	Data available	National scope	Most important cities
Argentina ^a	Annually from 1997–2007		X
	2007	X	
Bahamas ^b	2014		X
Barbados	2002	X	
Belize	2008		X
Bolivia	2011	X	
Brazil	1992		X
	1996		X
	1997		X
	2002		X
	2010	X	
Chile	Annually since 2003	X	
Colombia	2003		X
	2012		X
	2013		X
	2014		X
Costa Rica	2004	X	
Ecuador	2003		X
	2008	X	

(continued on next page)

In terms of the availability of victimization survey data, there is a significant gap in the region. In general, databases are not freely available, with the exception of Chile and Mexico, which publish statistics by way of victimization surveys, which are available via the Internet. The other countries, when they publish data, do so in aggregate form in various different reports. Finally, is it possible to compare data from different surveys? There is no simple answer to that question, mainly because the countries use different methodologies in terms of the design of the questionnaire and the sampling method. Unfortunately in LAC, no consensus has been reached on implementing standardized surveys on victimization or perceptions of insecurity. Even with identical

questions, difficulties can arise if different scales are used to measure the responses. Differences in the sample selection are even more delicate and difficult to detect. For example, the selection of the reference population varies considerably among countries: there are eight different age ranges used to explore the phenomena of crime. Another example is sample size, which usually does not make victimization surveys statistically representative of the population of more disaggregated areas or allow for determining prevalence. For example, if the survey is conducted by telephone, respondents represent only those persons who have a fixed telephone line, who are concentrated among middle- and high-income groups, and cannot be extrapolated for the entire country.

TABLE 5.2. Victimization Surveys Conducted by Latin American and Caribbean Countries by Period and Scope *(continued)*

Country	Data available	National scope	Most important cities
El Salvador	2001	X	
	2004	X	
	2009	X	
Guatemala	Biannually since 2004		X
Jamaica	2006	X	
	2009	X	
	2012	X	
Mexico	Annually since 2002	X	
Paraguay	2009	X	
Peru	2005	X	
	2009		X
	2011		X
	2012		X
Uruguay	Annually since 2008		X
Venezuela	2006	X	
	2009	X	

Source: Prepared by the author.

^a In the case of Argentina, the Laboratory of Research on Crime, Institutions and Policy (Universidad Torcuato di Tella) has carried out telephone victimization surveys in 40 different urban areas of the country since 2006. The survey is conducted monthly and respondents are asked about their experiences with crimes during the last calendar year.

^b The Ministry of National Security launched its own survey in January 2014 when Urban Renewal Officers began conducting the Bahamas Crime and Social & Economic Conditions Community Survey. At the time of this report the survey was being conducted in three communities. It contained questions relating to social and economic conditions and the perceived levels and types of crime experienced in these communities.

Indicators of the Criminal Justice System

This subsection assesses the methodologies of data collection for the main components of criminal justice institutions, which are the police force, prosecutors, courts, and prisons. These indicators can be classified in four broad categories: (1) case-load data that measure the responses of the criminal justice system (e.g., the number of persons who have been prosecuted, convicted, or incarcerated); (2) resources of justice institutions (e.g., police and prosecution personnel, prison staff, and public spending); (3) performance of the system, that is, quantitative productivity of the different criminal justice components (e.g., persons prosecuted per prosecutor, persons brought before a criminal court per prosecutor, and persons convicted per prosecutor); and (4) systemic punishment (e.g., the rate of total persons incarcerated per total persons convicted).

Regarding the main sources of such data, supreme courts and public ministries compile judiciary statistics, even if they are not complete or do not include information from all the courts in the country. Regarding prison statistics, ministries of justice and national statistics and census agencies are the main sources of data at the national level.

Since 2004, the Center for Justice Studies of the Americas has developed an annual index of web-based accessibility to judicial information.³⁷ Regarding LAC countries, the 2012 report lists Chile, Costa Rica, Brazil, Mexico, and Panama at the top of the ranking as the countries with the largest quantity of information on the web. For example, Chile publishes annual information on the number of new and ended cases in the different components of the judicial system, disaggregated by type of offense, for the period 1998–2013. In addition, Chile's Public Prosecutor disseminates quarterly, biannual, and annual statistical bulletins that include the most relevant information about crimes that were handled by prosecutors from 2000–2014. In Costa Rica,

detailed statistics on the work of courts are periodically published on the web page of the judicial system.³⁸ This information is later compiled in annual statistical reports, available for the period from 2001–2012. Quarterly documents with relevant data are also disseminated to maintain an updated level of information on statistical trends in judicial offices.

In contrast, at the other end of the index are the Bahamas, Barbados, Belize, Guyana, Haiti, Saint Lucia, and Suriname, countries that in some cases have no information at all available on the Internet (Herrero and López, 2010).

Although the availability of information on the criminal justice system varies from country to country, there are no good comparative data on judicial personnel in the region. One possible explanation for this is the traditional reluctance of the courts—or, at best, their insufficiently proactive attitude—to disseminate information related to their budget management, procurement and purchases, and human resources (Herrero and López, 2010).³⁹ Furthermore, comparability of quantitative available data on the responses of criminal justice systems (police forces, prosecutors, courts, and prisons) and the systems' resources, as well as performance across countries, is limited because of a lack of common definitions and statistical

³⁷ The index is developed by examining 25 indicators to evaluate judicial branches and 19 indicators to evaluate public prosecutors. These indicators include aspects such as publishing of statistics on cases filed, resolved and pending, access, and the information regime. For more information, see www.cejamerica.org.

³⁸ For more details see <http://sitios.poder-judicial.go.cr/sala-constitucional/estadisticas.htm>.

³⁹ Judiciary systems in the region have been the target of numerous reform programs, but reforms related to transparency and access to information have received scant attention. It could be said that Latin American countries have made progress on various fronts, introducing different types of innovations in their judicial systems, but only in a handful of cases have the reforms been aimed at reversing the opacity of judicial institutions or putting in place arrangements that might lead to a better access to judicial information (Herrero and López, 2010).

systems. Furthermore, resources of the police are hard to measure because there are rarely reports on budgets or equipment.

In addition, there are difficulties in terms of the dissemination and periodicity of the indicators; other times there is a lack of punctuality—although the data are published, the release is delayed. As an example, Table 5.3 shows that there is wide heterogeneity across selected LAC countries in the availability of prison statistics, with 2006–2009 being the period that covers most information. Finally, in many countries the information is dispersed across different

document and reports, generally in aggregate form (Barbolla, 2012).

What Is an Ideal Crime Statistics System? How Far Away Is Latin America and the Caribbean from this Ideal?

An efficient system for the collection, analysis and dissemination of information on crime and criminal justice is a prerequisite for crime analysis and effective prevention. In view of that, this section first describes what an ideal crime statistic system is and provides examples of best practices

TABLE 5.3. Prison Statistics from Official Records, Selected Countries

	Prior to														
	2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Argentina	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bolivia		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Brazil				✓	✓	✓	✓	✓	✓	✓	✓				
Chile	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Colombia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Costa Rica	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dominican Republic								✓	✓	✓	✓	✓			
Ecuador		✓	✓	✓	✓	✓	✓								
El Salvador		✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Guatemala							✓	✓	✓	✓	✓	✓	✓	✓	✓
Mexico		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panama				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Paraguay					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Peru								✓	✓	✓	✓	✓	✓	✓	✓
Trinidad Tobago														✓	✓
Uruguay		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				

Sources: Ministry of Justice and Human Rights of Argentina; General Directorate of the Penitentiary System and National Statistics Institute of Bolivia; Ministry of Justice of Brazil; Ministry of Justice-Gendarmerie of Chile; National Penitentiary and Prison Institute of Colombia; Ministry of Justice and Peace-National Prison System of Costa Rica; National Social Rehabilitation Service of Ecuador; Ministry of Justice and Public Security-General Prison Directorate of El Salvador; National Security Committee of Mexico; National Statistics Institute of Panama; National Institute of Statistics and Informatics of Peru; the Report of the Supreme Court of Justice of Paraguay, Trinidad and Tobago Prison Service, and the Ministry of the Interior of Uruguay.

in developed countries. It then ventures to assess where systems of crime statistics in LAC stand in relation to this ideal and highlights the region's major limitations.

Ideal Crime Statistic System

There are three prerequisites for the development of a solid system of crime statistics. The first is the availability of specific data collection methods and instruments adapted to the local context. The second is the availability of technical expertise and/or equipment to carry out data collection and analysis. And the third is the commitment of relevant government agencies to introduce a strategic approach to the collection and analysis of crime and criminal justice statistics (Harrendorf, Heiskanen, and Malby, 2010). In addition, according to the *United Nations Manual for the Development of a System of Criminal Justice Statistics* (UNDESA, 2003), an ideal system of crime statistics must be:

- *User-oriented:* Statistics must serve the users in a variety of ways (decision-making, research, and general knowledge). A given body of statistics is most meaningful when linked to other statistics both within and outside the subject matter. This emphasizes the importance of coordination and harmonization of concepts, definitions, classifications, methods, and procedures.
- *Effectively planned and managed:* Since the production of statistics is complex and potentially costly, effective management of human and fiscal resources is imperative.
- *Articulated and integrated:* The scope and content of the system should be clearly articulated and integrated. An important step toward this end is the development and use of common concepts and classifications both within and across components of the criminal justice system and, to the extent possible, between the

criminal justice system and outside agencies. A standard classification scheme will allow for producing comparable data between and within countries. In addition, statistical information must be timely and credible.

- *Neutral and known:* The system must maintain political neutrality and a high public profile. This will contribute to a higher level of dissemination of statistical information and hence to widened utilization of that information.

An ideal system of crime statistics must provide a combination of administrative statistics and survey-based indicators. As discussed in the previous section, this is because administrative data, which are the most frequently used source, underestimate the actual incidence of crime because only a fraction of all offenses ever make their way into official statistics. This happens because victims frequently do not report crimes to the police, especially when minor offenses are involved, when victims do not have confidence in the local authorities, and when victims view the event as a private matter.⁴⁰ These limitations of official records as a source of statistics have prompted criminologists and researchers to seek alternative sources for measuring crime. Two major efforts in this regard are victimization surveys and self-reporting surveys. When this type of dataset is merged with data on the population at large, it is then possible to identify how criminals differ from average citizens. Both victimization and self-reporting surveys have the main advantage of including incidents not reported to the police. Therefore, data from these sources provide somewhat different perspectives on the profile of criminal offenders and their socio-demographic characteristics.

⁴⁰ The difference between how much crime occurs and how much crime is reported or discovered by the police is usually referred to as the "dark figure of crime" (UNDESA, 2003; Skogan, 1974).

Regarding the scope and content of an ideal system of crime statistics, Becker's (1968) model of crime and punishment suggests that five broad categories of information should be given the highest priority. The first category includes crime data that indicates the incidence of victimization in society, by type of crime, as well as the level of fear of crime. The second includes caseload data that measure the volume of events in the justice system, including indicators such as the number of offenses reported to the police, number of cases initiated and disposed in the court, number of convictions, prison population, recidivism rate, etc. The third category includes case characteristic data that provide more detail on the caseload. Some indicators included in this category are type of offenses committed, age and sex of offenders, length of proceeding in court, and the socio-demographic characteristics of inmates. The fourth category includes resource data, that is, information that quantifies the costs of administering the justice system and provides in-depth information on officer staffing, facilities, tools and technology available to officers, transportation, expenditures on wages and salaries, operating costs, etc. Resource data, when combined with caseload data, can provide performance indicators such as the percentage of crimes solved by the police out of all of the criminal incidents reported and the proportion of crimes resulting in charges. Finally, the fifth category includes qualitative information that describes the criminal justice process, organizational structure, legislative authority, responsibilities, and programs within each component of the justice system. This type of information is essential because it provides the context within which caseload, case characteristic, and resource data can be meaningfully interpreted. In addition, statistics on the social and economic context are an important component of an ideal crime statistics system. Access to such data is necessary to develop crime and criminal justice indicators, provide a context for

understanding crime data, and facilitate policy analysis and research.

Countries differ greatly in their level of statistical development in the field of criminal justice, and only a few of them have achieved the ultimate goal of developing a full statistical system. It is possible to identify best practices in the collection, processing, and dissemination of crime statistics. The remainder of this subsection briefly describes some of the most reliable crime systems in developed countries—in this case the United States and United Kingdom. It is intended to be used as a map for determining how criminal justice data should be organized and which data variables are key to ensuring that the most useful set of data is collected.

U.S. System of Crime Statistics

The United States is often considered as a benchmark in crime statistics. The major sources of crime statistics commonly used in this country are the Uniform Crime Reports (UCR), the National Incident-Based Reporting System (NIBRS) and the National Crime Victimization Surveys (NCVS).

The country's most comprehensive database of crime reports is the UCR database. Data in this program are collected on a monthly basis from participating local law enforcement agencies, and they are typically submitted to a centralized crime records facility. These completed crime reports are then returned to the Federal Bureau of Investigation (FBI) for purposes of compiling, publishing, and distributing them (FBI, 2014). The UCR system uses standard operating procedures and uniform practices in the collection, processing, and delivery of data.

Regarding the content of the UCR, it collects data on the number and type of offenses reported as well as arrests by age, sex, and race, among other variables. It also collects basic information on law enforcement officers, including the number per agency, gender, and information on law enforcement officers killed or assaulted. In

addition, there are two important supplementary reports, the Supplementary Homicide Report and Supplementary Property Report.⁴¹

A recent enhancement to the UCR program is the development of an incident-based reporting system for reporting offenses and arrests, the NIBRS. This system is designed for the collection of more detailed and comprehensive crime statistics than the UCR.

Apart from this, the NCVS has been periodically conducted since 1973. These surveys employ a complex, stratified, multi-stage cluster. Household selection uses a rotated panel design under which each household is interviewed seven times at six-month intervals over the course of 3.5 years. These intervals allow for controlling for telescoping (Mosher et al., 2010).⁴²

Finally, the system of crime statistics also contains data about management and administration of state and local law enforcement agencies through the Law Enforcement Management and Administrative Statistics (LEMAS) Program. The LEMAS provides in-depth information (618 discrete variables) including, among other indicators, the employment status of officers, the demographic composition of law enforcement agencies, the facilities, tools and technology available to officers, and data on police hiring and characteristics (Tabarrok, Heaton, and Helland, 2010).

U.K. System of Crime Statistics

The two main sources of national crime statistics in the United Kingdom are police records of the crime and the Crime Survey for England and Wales (CSEW). The coverage of police-recorded crime statistics includes a broad range of offenses, from murder to minor criminal damage, theft, and public order offenses,⁴³ and can be disaggregated by geography and time period. Police records also include information on the quality of forces, police personnel, finances, and the workforce at the police force level. The dissemination of data is adequate in terms of

periodicity: crime data are published annually and provisional recorded crime data are published each month on a rolling 12-month basis and financial year-to-date basis.

The CSEW, formerly known as the British Crime Survey, is a face-to-face victimization survey that measures the extent and nature of criminal victimization against adults. The CSEW interviews a sample of 46,000 adults, which provides a means of estimating aspects of household and personal crime. Specifically, respondents are asked about their experiences with a range of crimes in the 12 months prior to the interview, their attitudes toward different crime-related issues such as the police and the criminal justice system, and their perceptions of crime and anti-social behavior. The survey includes elements that allow for controlling for telescoping.

Both the CSEW and police-recorded crimes are complementary series that together provide a better picture of crime than could be obtained from either series alone. These data are summarized in criminal justice statistical bulletins. A quarterly statistical bulletin also draws on data from other sources to provide a more comprehensive

⁴¹ The Supplementary Homicide Reports include information on the race, age, and gender of the offender (where known) and the victim. There are also data on the relationship between the offender and victim (stranger, boyfriend, husband, etc.) and the circumstances of the homicide. Supplementary Property Reports (SPRs) include information on property stolen during a murder, rape, robbery, burglary, motor vehicle theft, or larceny. The SPRs contain data on the basic nature of the crime, the monetary value of the stolen property, and the type of property stolen.

⁴² The results of the first interview are not counted in victimization statistics but are used to bind subsequent interviews. Therefore if the same incident is described in a subsequent interview, the interviewer can ask the respondent to clarify whether this incident is indeed a new incident. This scheme allows for controlling for telescoping.

⁴³ There are some mainly less serious offenses that are excluded from the recorded crime collection. These “non-notifiable” crimes include many incidents that might generally be considered to be “anti-social behavior” but that may also be crimes in law (including by-laws) such as littering, begging, and drunkenness.

picture of crime and anti-social behavior, including data from the courts, the National Fraud Intelligence Bureau, and the Commercial Victimization Survey.⁴⁴ In addition to quarterly updates, a number of supplementary volumes are produced that contain in-depth analysis of issues such as property crime, homicide, violent crime, perceptions of police, and perceptions of crime and anti-social behavior. Finally, the Ministry of Justice also collects and publishes data on court outcomes and sentencing, prison and probation data, proven re-offending, and criminal histories. These series are published on quarterly basis.

Where Is Latin America and the Caribbean in terms of the Ideal System of Crime Statistics?

LAC systems of crime statistics are far away from the ideal system and the best practices of collecting and systematizing crime data described in the previous subsection. Indeed, despite the increased incidence of crime and violence in the region, much remains to be done to achieve statistics with methodological rigor and adequate frequency that make it possible to quantitatively assess crime and violence. The main limitations can be categorized into three broad areas: collection, sharing, and methodological issues.

There are four main difficulties around data collection. First, data-collecting offices usually correspond to different levels of government (e.g., the central government, provinces, or municipalities) and to different agencies within each level (e.g., the police, the Ministry of Health, the Ministry of Justice). This implies the need for major coordination efforts and institutional capacity to agree on standards (including quality control) and to provide free access to the information on a regular basis and in a clear format (Sanguinetti, et al. 2015).

Second, data collection is still an uncertain and unsystematic science in many contexts.⁴⁵ In

contrast to other areas, international standards for the field of public security have not been introduced in all LAC countries.

In this vein, a third problem is the institutional and technical inability to generate and systematize information. Most countries in the region lack national institutions capable of consolidating and systematizing crime statistics (Dammert et al., 2010). Moreover, collecting data on crime is not a priority in many LAC countries, and the collection of administrative data on the justice system is not the result of systematic planning but rather of ad hoc and incremental efforts. Thus, a country may find it has extensive statistical data on police activities and virtually no data on judicial activities.

Fourth, there is underreporting, which makes comparisons even more difficult. While victimization surveys are useful tools to overcome the unreliability and underreporting of official records, the certainty of developing this type of survey in the region is still limited. Lack of resources and institutional arrangements are among the main reasons why some surveys are not conducted regularly.

Lack of data sharing is also a major impediment. Micro data related to crime are not made widely available in most countries of the region. Furthermore, when available, data are frequently presented in aggregated terms, which limits crime analysis and obstructs a holistic understanding of how different types of crime and violence are connected.

Furthermore, LAC countries employ different methodologies and standards to compile data. There are also difficulties both in technical and

⁴⁴ The Commercial Victimization Survey was developed with the aim of addressing the significant gap in crime statistics that existed for crimes against businesses.

⁴⁵ LAC countries have made progress in crafting a wide range of social and economic statistics, such as GDP, poverty, inflation, income distribution, among others, which are estimated with statistical rigor by both national and local authorities. Nevertheless, as it is described in this chapter, regarding insecurity, the relative backwardness in the region is remarkable (Sanguinetti et al., 2015).

operational dimensions. For instance, there are several sub-categories of classification and even different denominations to systematize presumably criminal acts which affect both the comparability and quality of data. Thus, even in as basic indicators as the homicide rate, there are important differences depending on the source (Sanguinetti et al., 2015).

In summary, crime statistics systems in the region lag behind the ideal statistics system. However, there are some countries, such as Chile and Mexico, that have made considerable progress and are moving toward having useful and interconnected information systems.

A National Information System on Crime (NISC) in place in Chile since 1997 compiles and consolidates information on police reports and arrests. This information is published through quarterly statistics and monthly reports. The NISC also developed a geographic information system of crime, which complements the statistical information (police records and victimization surveys) with spatial variables allowing for the contextualization of crime. Furthermore, standardized victimizations surveys (such as the National Urban Survey of Citizen Security—*Encuesta Nacional Urbana de Seguridad Ciudadana*) are conducted periodically, allowing for comparison of crime levels both within the country and over time.

For its part, Mexico has promoted Platform Mexico, a significant investment in technology and telecommunications to compile criminal information. Platform Mexico aims to create real-time interconnectivity within Mexico's police force by developing an integrated national crime database to facilitate tracking drug criminals. This platform is a nationwide network of databases with information on vehicle registration, weapons, public and private security personnel, prison censuses, arrest records, and the like. It is expected that, federal, state, and local law enforcement personnel will provide constant updates, and the information will be available to authorized users throughout

the country (Bailey, 2010). Moreover, the Mexican National Institute of Statistics and Geography publishes data on justice systems, prison systems, victimology, transportation safety, and resources for citizen safety.

International Projects to Improve Crime Statistics

The initiatives of a group of organizations that have worked to improve crime data generation and dissemination in LAC deserve recognition. For example, the United Nations Surveys on Crime Trends and the Operations Criminal Justice Systems (known as the UN-CTS) collect basic information on recorded crimes and on resources of the main components of the criminal justice system (police, prosecution, courts, and prisons). These surveys are completed by designated officials to the best of their abilities given the country's available data, and then distributed to officials in every member country of the United Nations. An ample variety of indicators are included. However, the countries participating in the survey and the indicators available vary across waves. The latest wave covered 2013 and included 15 LAC countries.

The IDB has led the creation of regional data-driven initiatives, including the Standardized Regional System of Indicators for Citizen Security and Violence Prevention as well as crime observatories in different countries with both national and subnational partners. In addition to this, the IDB supported the regional team on Victimization Surveys for LAC, which developed a standardized questionnaire for a victimization survey for the region. Through these initiatives, the IDB seeks to support consensus-building on concepts and methods for measuring crime and violence both among the countries in the region and among the national institutions responsible for this information. Similarly, the Inter-American Observatory on Security, Crime and Violence was created in 2009 as an instrument to collect, measure, analyze and

disseminate quantitative and qualitative information on crime and violence in member countries of the Organization of American States.

Another attempt toward harmonizing crime statistics is the development of the International Classification of Crime for Statistical Purposes (ICCS) under the United Nations Office on Drugs and Crime (UNODC). This project, initiated in 2012, is believed to be having a positive impact on the comparability and consistency of crime statistics. The ICCS provides a common classification framework for data from administrative sources and victimization surveys and therefore facilitates the measurement of the gap between crimes reported to the police and those experienced by the victims. While the ICCS by itself will not solve all data quality challenges, it offers a standard reference for the way crime is defined and classified (UNODC, 2015).

The Conference of Ministers of Justice of the Ibero-American States is another initiative that has contributed to improving and disseminating statistics on justice issues in the region through the periodic publication of a statistical report since 2007. The report is comprised of six sections based on the area of the justice system involved: the courts, public prosecutor, public defender, police and criminality, penal institutions, and advocacy. Detailed indicators are provided for each component of the justice system regarding budgetary resources, human resources, and developments in terms of issues or volume of activity from 2000 to 2011 (Barbolla, 2012).

Finally, the International Centre for Prison Studies (ICPS) at the University of London collects, systematizes, and disseminates prison system statistics. In 2000, the center launched the World Prison Brief, a database that provides information on prison population rates, occupancy rates, pre-trial/remand prisoners, female prisoners, and foreign prisoners in 222 countries. Most LAC countries are included.⁴⁶ The latest information available is for 2013.

These types of initiatives need to be continued in order to more strongly establish the need to promote access to comparable data on both citizen security in general and on the citizen security component of the judiciary system in LAC countries.

Conclusions

LAC has one of the highest crime rates in the world. Ominously, during the last two decades these crime rates have been growing in several countries, imposing significant costs on societies and often making the problem of crime the primary concern of citizens in the region. However, this increasing crime trend does not appear to have been accompanied by a significant investment to learn more about this problem and about the effectiveness of the policies designed to tackle it (Di Tella, Edwards, and Schargrotsky, 2010). A possible explanation for this is the lack of reliable data on crime in the region. In other words, an efficient system for the collection, processing, and dissemination of information on crime and criminal justice is a prerequisite for crime analysis and effective crime prevention.

This chapter has comprehensively shown that in matters relating to collecting and sharing crime information, the region is particularly backward, with major data gaps that hinder policymaking and crime analysis. In general terms, LAC systems of crime statistics differ from ideal statistic systems in a variety of ways.

First, they are not user-oriented. Considering Becker's (1968) model as a guide, an ideal system of crime statistics should produce, at least, citizen security indicators (such as the crime rate by type of offense) and indicators of the responses of the

⁴⁶ The World Prison Population List is compiled from a variety of sources. In almost all cases the original source is the national prison administration of the country concerned, or else the ministry responsible for prison administration.

criminal justice system (resources, performance, and systemic punishment). However, information provided by crime statistics systems in the region is often not publicly available and lacks periodicity and detail.

Second, crime statistics systems are not effectively planned and managed. In fact, data-collecting offices usually correspond to different levels of government and to different agencies within each government level. Furthermore, in most countries the lack of resources and training are important obstacles to the collection and analysis of statistics.

Third, the systems do not maintain political neutrality or a high public profile; instead the importance of crime as a concern for potential voters has sometimes induced political manipulation in the content and timing of the release of statistics on criminality (Di Tella, Edwards, and Schargrodsky, 2010).

Finally, the scope and content of the region's crime statistics systems are not clearly articulated or integrated. The information provided does not reflect the response to the problem of crime by the criminal justice system, and systems do not use common concepts and classifications.

This lack of uniform and regularly available information has forced researchers to rely exclusively on homicide statistics collected by the World Health Organization from national health registries for international comparisons. Despite varying definitions, "homicide" is perhaps the most widely collected and reported crime in law enforcement and criminal justice statistics in the region. Perhaps that is why the scholarship on criminality in Latin America has concentrated overwhelmingly on homicides.

That said, it is essential to improve the availability and quality of reliable statistics as a prerequisite to better estimate the welfare costs of crime and violence in the region. It is necessary to develop more accurate data collection tools, notably an integrated information system to allow cross-referencing of data on reported crimes, detentions, penal populations, and judicial processes, as well as data from victimization surveys (Bergman and Whitehead, 2009). Efforts in that vein are a prerequisite to understand a phenomenon as complex as the cost of crime and violence and its determinants, to spur a constructive debate, and to develop rigorous evaluations that increase and improve knowledge on crime.

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“This volume is the first step toward a systematic and rigorous analysis of the costs of crime and violence in Latin America and the Caribbean. I hope it serves as motivation to promote knowledge and incentivize further theoretical and empirical research on this topic in the region.”

—Santiago Levy
Vice-President for Sectors and Knowledge
Inter-American Development Bank

“The work is very relevant to understand the dimension of the costs of crime, guide future discussions, and better inform public policy decisions in this sector.”

—Jorge Vazquez
Deputy Minister of Interior of Uruguay

“This volume is a necessary reading for researchers and policymakers interested in crime, now one of the main problems faced by Latin America and the Caribbean. I commend this rigorous research effort, which starts to close an important knowledge gap in the region.”

—Sebastian Galiani
Professor, University of Maryland

