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# Inequality and Crime in Latin America and the Caribbean: New Data for an Old Question

RESEARCH

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## ABSTRACT

The purpose of this paper is to revisit the relationship between inequality and crime, with a focus on the Latin America and Caribbean region. We find a significant, positive, and robust association between these variables. Moreover, inequality is the only variable showing this robust regularity. Education levels, economic activity, income per capita, and poverty show weaker and unstable relationships with crime. With due caution, the use of historical variables to instrument for inequality in crime regressions suggests that a causal interpretation of this relationship is plausible. In addition, the analysis of the distribution of crime victimization indicates that men suffer more crime than women, and that the male-to-female homicide ratio grows with inequality. By socio-economic strata, high-income groups suffer more victimization relative to poorer groups in LAC countries, but the poor suffer more homicides.

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## I. INTRODUCTION

Inequality and violence are main and persistent features of the Latin America and Caribbean (LAC) region. The resources and policies to address these issues have been clearly insufficient. The roots of these shortcomings probably go back to colonial times. Although inequality and poverty fell in the region during the 2000s with the commodities boom and the expansion of cash transfer programs, crime levels are still the world's highest. Even before the COVID-19 pandemic, growth in the region stagnated again and new tensions rose, driven by discontent with the slow reductions in inequality.

The purpose of this paper is to study the relationship between income inequality and crime, with a focus on LAC countries. This is not a new topic. Since the seminal work of Ehrlich (1973), several empirical studies have analyzed the relationship between inequality and crime. Most studies show a positive association (e.g., Buonanno and Vargas 2019; Demombynes and Özler 2005; Fajnzylber, Lederman, and Loayza 2002a; Gould, Mustard, and Weinberg 2002; Kelly 2000; Machin and Meghir 2004), but some authors do not find a significant relationship (Bourguignon, Nuñez, and Sanchez Torres 2003; Corvalan and Pazzona 2019; Neumayer 2005). In particular, the papers closest to ours are those of Fajnzylber, Lederman, and Loayza (2002b) and Gaviria and Pagés (2002), whose data were collected more than 20 years ago. We build on this previous work and analyze new data from a recent period. The combination of the chronic relevance of crime as a main concern of the LAC population, the relative scarcity of crime research in the region, the variations in inequality experienced during the last two decades, and the potential long-lasting effects of the coronavirus pandemic make a fresh study of the relationship between inequality and crime especially timely.

For this research update, we use various databases with a panel or cross-sectional structure for different crime measures (homicides or crime victimization surveys) and distinct geographical coverages. We find a strong and robust positive relationship between inequality and crime: greater inequality is associated with a higher incidence of crime. Instead, poverty, education levels, economic activity, and income per capita show weaker and unstable relationships with crime. Moreover, relative to the rest of the world, LAC countries show excess crime for their levels of inequality. Thus, not only is LAC one of the regions with the greatest income inequality in the world, but also its crime levels seem too high relative to the inequality (and development) levels of the region.

We also study the distribution of crime victimization to address some complementary questions. Our analysis of homicide rates by gender shows not only that men suffer more homicides than women, but also that the man-to-woman homicide ratio is higher in more unequal societies, such as the LAC countries. Moreover, the individual victimization data indicate that men and youth are exposed to more crime than women and the elderly. More educated individuals experience higher crime victimization. In LAC countries, the rich are exposed to more crime than the poor, though this is not the case on other continents. The ethnic victimization differences do not seem strong. The analysis by type of crime shows that affluent Latin Americans suffer more robberies relative to their poor compatriots, but the poor suffer more homicides.

From the seminal models of Becker (1968) and Ehrlich (1973), the main economic channel linking inequality to crime is that, in unequal societies, the returns to legal opportunities are low relative to the value of booties from illegal activities. Since Merton (1938), sociologists have also postulated that the feelings of disadvantage, lack of opportunities, and unfairness leads the dispossessed to embrace crime and violence in response to frustration, and that inequality undermines the ability of communities to deter crime (Kelly 2000; Kornhauser 1978; Shaw and McKay 1942). We do not aim to distinguish among different theories. Moreover, these theories are probably complementary rather than competitive. Our focus is to provide an empirical analysis of the relationship between inequality and crime by exploiting renewed cross-country data.

Stealing from the rich may provide more substantial booties. It can also avenge relative deprivation. In any case, both the public and the private sectors respond to crime, and their capacities to react might depend on access to public and private resources. More affluent groups may alter the distribution of crime victimization by protecting themselves through private security measures, which are extremely common in LAC countries (Amodio 2019; Di Tella, Galiani, and Schargrodsky

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2010). Moreover, the rich may be able to skew the allocation of police resources in their favor. Even without these distributional biases, the allocation of police and justice resources respond endogenously to crime levels. Identifying the effect of police on crime requires highly specific set-ups (see Di Tella and Schargrodsky 2004; Draca, Machin, and Witt 2011; Klick and Tabarrok 2005; Levitt 1997; McCrary 2002), which are not feasible in cross-country studies. Moreover, uniform data on private security measures are not available, and their consideration would also require a specific identification strategy. Without instruments for these public and private measures, we undertake a reduced-form approach which estimates a relationship between inequality and crime that is already mitigated by these protection responses.

As mentioned, our focus is to study empirically the relationship between inequality and crime. Still, we also explore whether our results can be interpreted as a causal effect of inequality on crime. One main challenge to this interpretation is the potential presence of omitted variables. Common political and institutional factors, such as weak law enforcement, institutional failures, or a culture of violence, can simultaneously explain inequality and crime levels. A second challenge is reverse causality. Crime and violence can reproduce inequality, for example, if crime impedes the progress of the most vulnerable population segments, or affects investment, employment, and business activities (see, for example, Navajas-Ahumada 2020; Pshisva and Suarez 2010; Robles, Calderón, and Magaloni 2013; Utar 2018). The local focus of these studies highlights the relative advantage of identifying these reverse effects using microdata. But it may also underline that it could be more difficult for crime to affect inequality at the macro level.

The inclusion of country fixed effects that control for time-invariant factors, and the combination of macro-variables and household microdata from victimization surveys help to alleviate these endogeneity concerns. In a further exploration, we follow new institutional theories linking current inequality to colonial conditions (Acemoglu, Garcia-Jimeno, and Robinson 2012; Engerman and Sokoloff 1997; Soares, Assunção, and Goulart 2012) and the identification strategy of Buonanno and Vargas (2019) to instrument for inequality with historical variables in 2SLS regressions. Our first-stage regressions are strong, producing instrumented cross-sectional estimates that are similar to the OLS panel estimates. Moreover, the 2SLS results are robust to the inclusion of institutional proxies, and to additional tests and sensitivity analysis regarding the imperfect exogeneity of our instruments in order to challenge the validity of the exclusion restriction. With due caution, the 2SLS results suggest that a causal interpretation of the estimated effect of inequality on crime is plausible.

The rest of the paper is organized as follows. Section II summarizes theoretical predictions on the effect of inequality on crime. Section III describes our data and empirical strategy. Section IV presents our main results on the relationship between inequality and crime. Section V explores whether this relationship is causal, and presents the 2SLS results. Section VI complements the main findings by analyzing patterns in the distribution of crime victimization across population groups. Finally, Section VII summarizes the conclusions of our study.

## II. THEORETICAL PREDICTIONS

From the seminal model of Becker (1968), we can write the decision of a risk-neutral rational individual $j$ of committing or not a crime as follows:

$$(1-p_i)b_i - p_i f_i b_i > w_j \tag{1}$$

Thus, individual $j$ becomes involved in criminal activities when the individual's legal income, $w_j$, is lower than the individual's expected income from illegal activities, where $b_i$ is the value of the booty from victim $i$, and $p_i$ and $f_i$ are the probability of apprehension and the penalty under apprehension, respectively, when attacking victim $i$. For simplicity, we write this penalty as interacted with the booty as occurs in several legal systems. The subscript $i$ on the value of the booty, the probability of apprehension, and the penalty indicates that they can vary across victims.[1]

1 Although not modelled, there could be a destruction of value if only a fraction of the booty is enjoyed by the criminal.

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We can rewrite (1), the condition for committing a crime, as follows:

$$(1-p_i)-p_i f_i > \frac{w_j}{b_i} = \frac{1}{G_i} \tag{2}$$

Defining inequality, $G_i$, as the inverse of the ratio of the legal income, $w_j$, to the illegal income, $b_i$, we have that a fall in $w_j$, the opportunity cost associated with legal opportunities for individual $j$, or an increase in $b_i$, the booty from (rich) individual $i$, make crime more attractive. Thus, the inequality from larger wealth or income differences between the rich and the poor makes crime more likely as the widening gap increases the incentives to offend.[2]

The main sociological paradigms on crime also predict that inequality increases criminal activity. The strain theory, based on the seminal work of Merton (1938), states that the deprivation that the dispossessed experience relative to the abundance enjoyed by the rich and the feelings of disadvantage, lack of opportunities, and unfairness that arise from this perception lead the dispossessed to crime and violence. For the social disorganization theory (see Kelly 2000; Kornhauser 1978; Shaw and McKay 1942 for a richer discussion), inequality, poverty, and ethnic heterogeneity weaken networks of social control and undermine the ability of communities to deter crime. As mentioned above, we do not aim to distinguish between these different economic and sociological theories. Moreover, these theories are probably complementary rather than competitive. Our focus is the empirical analysis of the relationship between inequality and crime.

The simple model in equation (2) can also capture other forms of inequality. In particular, the probability of apprehension $p_i$ can vary across victims if some individuals can protect themselves by using security devices or hiring private security services (Amodio 2019; Di Tella, Galiani, and Schargrodsky 2010) or if individuals can alter or hide their consumption decisions to avoid becoming victims of crime (Galiani, Jaitman, and Weinschelbaum 2020; Mejía and Restrepo 2016). Moreover, public protection may be biased towards the more affluent groups in society. In addition, the penalty coefficient, $f_i$, can also vary across victims if some of them have differential resources to prosecute their aggressors.

Under these private and public responses, the rich may be able to avoid some crime victimization. This avoided crime can be displaced to other social groups or may not occur because the booty from other groups is less attractive. In the second case, total crime will fall, weakening ex post the link between inequality and crime.

But, even without distributional biases, police and justice resources respond endogenously to crime levels. Measuring the causal effect of police on crime requires highly specific identification strategies (see, for example, Di Tella and Schargrodsky 2004; Draca, Machin, and Witt 2011; Klick and Tabarrok 2005). The same is true for the effect of private security measures, with the additional difficulty that uniform data are not available. Without separate instruments for these direct endogenous responses to crime, we undertake a reduced-form approach instead of considering a structural crime model. Thus, in lieu of identifying an unconditional relationship between inequality and crime, our estimates are already mitigated by these public and private endogenous protection responses (see Corvalan and Pazzona 2019, for a methodological discussion).

## III. DATA AND EMPIRICAL STRATEGY

Data on crime in Latin America is notoriously poor in comparison with the severity and consequences of the problem (Prillaman 2003). The main shortcomings of LAC statistical systems on crime include deficits in periodicity and disaggregation, lack of uniform criteria in data collection and classification across government agencies, lack of independence and transparency, exposure to political intervention, and excess dependence on denounced crime data because of the absence of systematic victimization surveys. As Jaitman (2015) summarizes: "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."

2 For richer theoretical models on the relationship between inequality and crime, see, for example, Chiu and Madden (1998), İmrohoroğlu, Merlo, and Rupert (2000), and Corvalan and Pazzona (2019).

DOI: 10.31389/eco.413

As a result, there are no regular, standardized official crime statistics and victimization surveys in LAC for a systematic regional study of crime. The obvious source of crime data for the region should be crimes reported to the police, to the judicial system, or to other administrative offices. One problem with denounced crime data is that international comparability can be difficult under different legal definitions. However, the main concern is that denounced crime is prone to serious underreporting. Low reporting rates probably reflect the weak victims' confidence in the police force and the judiciary, and skepticism about the utility of their denounces. Moreover, reporting can be costly in time, and in monetary and emotional terms. It may also be risky for those who denounce the crimes. Still, if crime underreporting were uniform, denounced crime would be useful for our study. The additional problem is that crime reporting differs sharply across socio-economic groups (Soares 2004a, 2004b), making denounced crime data particularly inappropriate for our purposes. Crime reporting also varies by type of crime and by ethnic, gender, cultural and educational dimensions. In addition, denouncing rates normally decrease as the number of crimes increases (Di Tella, Galiani, and Schargrodsky 2010).

To circumvent these limitations, we first follow previous authors and use homicide statistics at the country level collected for the Global Burden of Disease Study (GBDS).[3] Of course, homicides are a particular and extreme form of crime, but they are of critical concern. Moreover, homicide data have the advantages of low underreporting and international comparability (as they suffer the least from idiosyncratic classification). Using the GBDS data, we build an unbalanced panel of homicides per 100,000 population per year covering 125 countries from 1995 to 2017.[4] Appendix A1 provides the list of country-year observations included in this unbalanced panel.

The best alternative to administrative data for the measurement of crime are victimization surveys. In these surveys, randomly chosen households are interviewed about crimes that the respondent and other members of the household have suffered. The most common question—standardized by the United Nations International Crime Victims Survey[5]—is the following: "Have you or other members of your household been a victim of a crime in the last 12 months?" Crime levels drawn from victimization surveys tend to be much higher than denounced crime statistics, although there may still be significant underreporting, especially for some types of crime (domestic violence and sexual abuse, for example). Moreover, some socio-economic groups, particularly the very rich and the very poor, are likely underrepresented in surveys because they are typically difficult to reach. In addition, what people recollect as the experience of crime might depend on their previous crime exposure or on cultural factors (for example, what are perceived as minor crimes, threats, or a request for a bribe).[6]

To use a victimization survey with broad international coverage, we first consider the crime questions from the World Values Surveys (WVS).[7] The WVS interviews are (mainly) performed face to face at the respondent's place of residence. The crime victimization question was only included in the survey in one year for each country between 2010 and 2014.[8] Using this data source, we build a cross-sectional database covering 63,120 individuals sampled from 599 regions in 44 countries, although individuals in different countries were interviewed in different years. The questionnaires also include a set of socio-demographic variables that allow us to study some crime victimization patterns. Appendix A2 provides the list of countries and years included in the WVS crime data.

3 See GBD Results Tool (database), Global Burden of Disease Study, Global Health Data Exchange, Institute for Health Metrics and Evaluation, Seattle, http://ghdx.healthdata.org/gbd-results-tool.

4 Alternatively, we also use homicide data from the World Bank to build a somewhat smaller unbalanced panel of intentional homicides covering 106 countries from 1995 to 2017. See WDI (World Development Indicators) (database), World Bank, Washington, DC, http://datatopics.worldbank.org/world-development-indicators/.

5 See ICVS (International Crime Victims Survey) (dashboard), United Nations Interregional Crime and Justice Research Institute, Turin, Italy, http://www.unicri.it/services/library_documentation/publications/icvs/.

6 On habituation and desensitization to crime, see Di Tella et al. (2019).

7 For details, see WVS (World Values Survey) (Online Analysis), King's College, Old Aberdeen, United Kingdom, http://www.worldvaluessurvey.org/WVSOnline.jsp, and Inglehart et al. (2014).

8 See WVS (World Values Survey), Wave 6 (2010–2014) (dashboard), King's College, Old Aberdeen, United Kingdom, http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp.

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The WVS database has the advantage of allowing us to compare victimization in LAC countries relative to other regions of the world, at the cost of sacrificing the length of time under study and some rich data details. As a third database, we therefore use the Latinobarómetro survey. This yearly survey involved face to face interviews of an average of 14,000 individuals per year sampled from a total of 3,536 cities in 604 regions from 18 LAC countries. This database covers the period 1995 to 2018, although not all the countries, cities, and regions were included in every year.[9] The questionnaires also inquire about demographic variables, which allows us to study crime victimization patterns by socio-economic status, age, sex, educational attainment, and ethnicity. Moreover, additional questions were included in some years, such as questions on the type of crime suffered and general concerns about crime. Appendix A3 details the list of country-year observations included in the Latinobarómetro data.

Figure 1 presents, for the country-year observations in our samples, the country averages of GBDS homicide data and the WVS and Latinobarómetro victimization data for the LAC countries, and the overall homicide and WVS averages for the rest of the world. Some interesting facts may be observed. The first is that the incidence of crime is substantial in LAC countries. All the countries in the region are above the rest-of-the-world average in homicides and victimization rates (except Peru and Chile for homicides). Second, the Latinobarómetro and WVS surveys provide similar results (although Latinobarómetro covers a much longer period). Third, homicides and victimization rates show low correlation. In particular, some high-homicide countries, such as El Salvador, Honduras, Colombia, and Brazil, show survey victimization rates that are close to those of low-homicide countries, such as Chile, Argentina, Uruguay, Peru, Bolivia, and Costa Rica. This low correlation means that we will be performing our econometric exercises on databases that provide quite different information. Moreover, the low correlation may imply that, as mentioned, what people recollect as a suffered crime might depend on previous crime exposure, or on cultural factors. It may also result from the relatively low levels of gun ownership in some Southern Cone countries, which may explain the low number of homicides, although the levels of common crime in these countries are not different from the rest of the region. In any case, the incorporation of country fixed effects in our regressions helps control for these potential country differences.

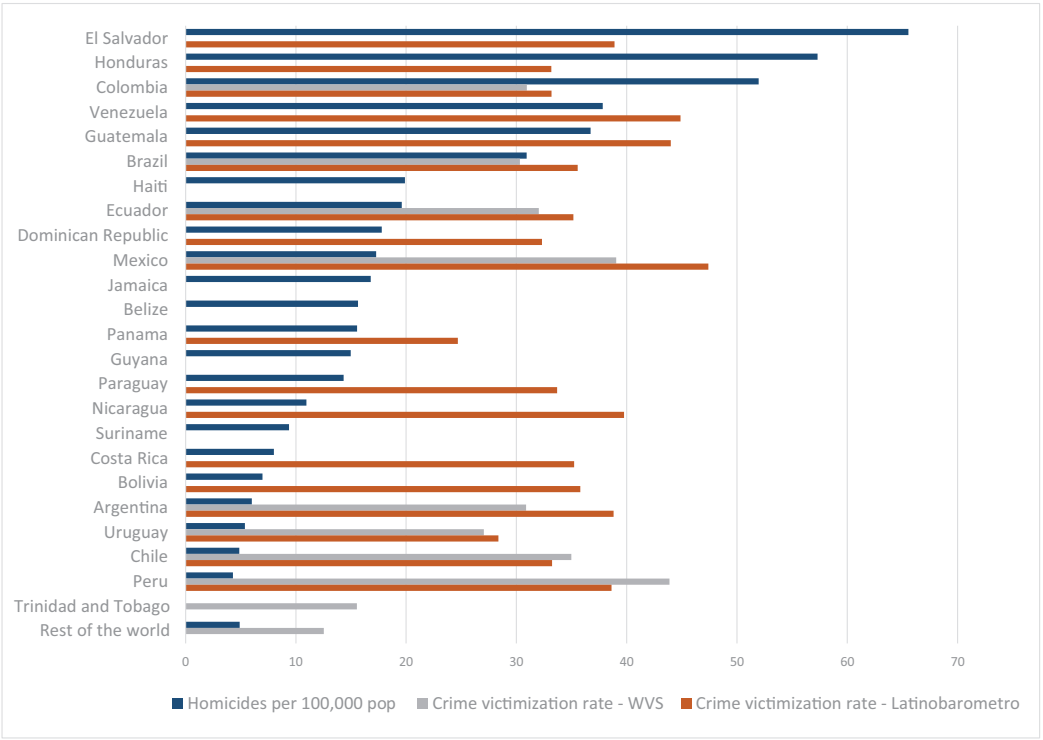


**Figure 1 Homicides and Victimization, Latin American and Caribbean Countries.**

*Note:* The blue bar represents the country average of intentional homicides per 100,000 population calculated for the available country-year observations from 1995 to 2017 (source: Global Burden of Disease Study). The grey bar represents the country crime victimization rate (the percentage of interviewed households in the country that indicate that at least one of its members has been the victim of a crime during the last 12 months) for the year (from 2010 to 2014) in which the survey was performed in the country (source: WVS). The red bar represents the country average of the crime victimization rate (the percentage of interviewed households in the country that indicate that at least one of their members has been the victim of a crime during the last 12 months) for the available LAC country-year observations in 1995–2018 (source: Latinobarómetro).

9 The Latinobarómetro survey was not performed in 1999, 2012 and 2014. The crime victimization questions were different for 2000, making the answers for that year not comparable. For details, see Latinobarómetro (dashboard), Corporación Latinobarómetro, Santiago, Chile, http://www.latinobarometro.org/lat.jsp.

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We supplemented these crime data sources with information on inequality and other control variables. For inequality, we use country Gini indexes obtained from the PovcalNet database of the World Bank.[10] The Gini index measures the extent to which the distribution within an economy deviates from a perfectly equal distribution and is the most widely cited measure of inequality. There are, of course, other inequality measures, such as the Atkinson's index, the Theil index, or the Palma ratio but they are not as widely used, nor they have a clear interpretation as the Gini Index, or they place unequal weights to certain parts of the distribution (for a discussion, see Afonso, LaFleur and Alarcón 2015). The Gini Index is available for several years since 1995 for over 180 countries in the PovcalNet database. These indexes are estimated directly from standard household surveys, which are available with a good coverage for developing countries.[11] We also use Gini indexes at the subnational level produced by CEDLAS for LAC countries with information from household surveys.[12]

To control for economic activity and proxy indirectly for unemployment, we use data on gross domestic product (GDP) variation (in constant prices) that are compiled by the International Monetary Fund.[13] In some specifications, we also use GDP per capita (and its log). For poverty, we use three alternative measures: the extreme poverty ratio and the poverty ratio (at $1.90 a day and at $3.20, respectively) from the World Development Indicators database, and the poverty gap from World Bank PovcalNet database.[14] For LAC countries, we also use poverty measures at the subnational level provided by CEDLAS. We use the primary completion rate from the World Development Indicators database to control for educational attainment.[15] For the poverty and education controls, if data are missing on a given country in some year, we extrapolate the variable using information on that country from the closest available years (the GDP data are never missing).

Using these various databases, we run panel regressions at the country level of the following form:

$$Crime_{it} = a\, Inequality_{it} + b\, X_{it} + \mu_t + \delta_i + \varepsilon_{it}, \tag{3}$$

where $Crime_{it}$, $Inequality_{it}$, and the controls $X_{it}$ (economic activity, poverty, and education) are measured for country $i$ and year $t$; $\mu_t$ are year fixed effects to control for common shocks; $\delta_i$ are geographic fixed effects to control for time-invariant characteristics, and $\varepsilon_{it}$ is the error term. Standard errors are clustered at the country level to allow for geographical and serial correlation.[16]

Similarly, we run cross-sectional or repeated cross-sectional regressions at the household or individual level of the form:

$$Crime_{itj} = a\, Inequality_{it} + b\, X_{it} + c\, H_j + \mu_t + \delta_i + \varepsilon_{itj}, \tag{4}$$

where $Crime_{itj}$ indicates crimes suffered by household or individual $j$ in country $i$ and year $t$; $Inequality_{it}$ and the controls $X_{it}$ (economic activity, poverty, and education) are measured for

10 The PovcalNet database was created in 2001 in response to increased demand for an international transparent methodology for poverty estimates. See PovcalNet: Data (database), World Bank, Washington, DC, http://iresearch.worldbank.org/PovcalNet/povOnDemand.aspx.

11 Most LAC countries now perform regular household surveys. Surprisingly for the relevance of crime as a main problem in the region, these surveys usually include numerous detailed questions on income and employment, but no questions on crime victimization.

12 See CEDLAS (Centre for Distributive, Labour, and Social Studies), Facultad de Ciencias Económicas, Universidad Nacional de La Plata, La Plata, Argentina, http://www.cedlas.econo.unlp.edu.ar/.

13 See IMF Data: Access to Macroeconomic and Financial Data (dashboard), International Monetary Fund, Washington, DC, https://data.imf.org/.

14 See WDI (World Development Indicators) (database), World Bank, Washington, DC, http://datatopics.worldbank.org/world-development-indicators/.

15 The primary completion rate is the total number of new entrants (enrolled, minus repeaters) in the last grade of primary education, regardless of age, expressed as a percentage of the population at the theoretical entrance age to the last grade of primary education.

16 Although there might be international spillovers, an advantage of cross-country data is that displacement effects and other crime externalities are largely internalized at the country level.

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country $i$ and year $t$; the controls $H_j$ indicate characteristics (socio-economic level, sex, age, ethnicity, educational attainment) of household or individual $j$; $\mu_t$ are year fixed effects to control for common shocks; $\delta_i$ are country fixed effects to control for time-invariant characteristics (when panel structure), and $\varepsilon_{itj}$ is the error term. In some specifications, $Inequality_{kt}$ and $Poverty_{kt}$ are defined at the subnational level $k$. Standard errors are clustered at the region (subnational) or city level to allow for geographical and serial correlation.

## IV. THE ROBUST RELATIONSHIP BETWEEN INEQUALITY AND CRIME

The purpose of this study is to investigate the relationship between inequality and crime in LAC. As discussed in the introduction, this is not a new topic. The main previous studies on this issue for the world and LAC countries are Fajnzylber, Lederman, and Loayza (2002a) and Gaviria and Pagés (2002), respectively. In this paper, we cover the period 1995 through 2017–18, roughly the two decades subsequent to the years considered in those seminal studies. As Figure 2 shows, this is a period of average declining trends in both inequality and crime, with somewhat smoother changes in inequality than in homicides.[17] The relevance of the topic and this recent variation motivate our analysis of new data from a late period.

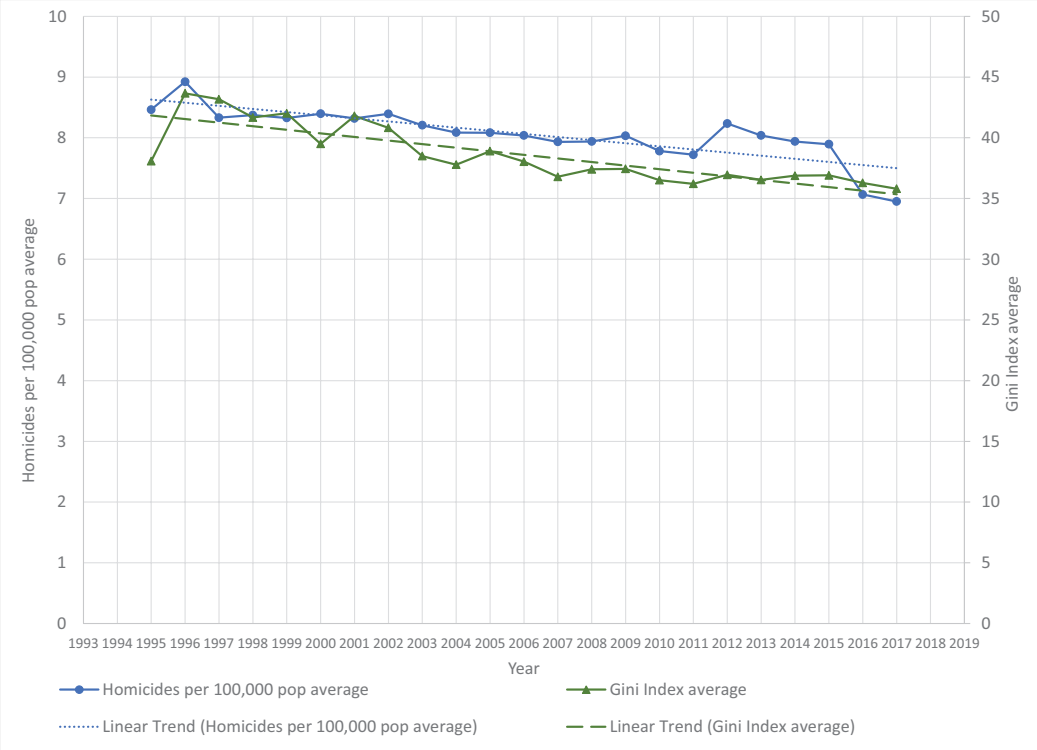


**Figure 2 Homicides and Inequality, World, 1995–2017.**

*Note:* The average of intentional homicides per 100,000 population (source: Global Burden of Disease Study) is shown on the left vertical axis, and the average of the Gini index (source: World Bank) is shown on the right vertical axis. Averages are calculated using all the countries available for each year. Linear trends are indicated by dotted lines.

In a cross-sectional illustration, Figure 3 presents the country average Gini indexes and homicide rates (calculating the country averages with the available observations for each country in 1995–2017). A graphical inspection of this figure suggests three main features. First, there is a positive (unconditional) relationship between inequality and homicides. Second, the LAC countries tend to be located in the upper-right area of the graph, exhibiting both high inequality and high crime relative to the rest of the world. Third, not only do LAC countries show high crime and high inequality, but their levels of crime are also too high according to what one might expect based on their inequality levels. LAC countries are usually outliers in crime regressions.[18]

17 Appendix Figure A1 shows similar trends using population-weighted averages.

18 In addition to inequality, Soares and Naritomi (2010) discuss that low incarceration rates and relatively small police forces are also important to explain this Latin American "exceptionalism" in crime rates. Organized crime is also prevalent in the region. See also Jaitman (2015).

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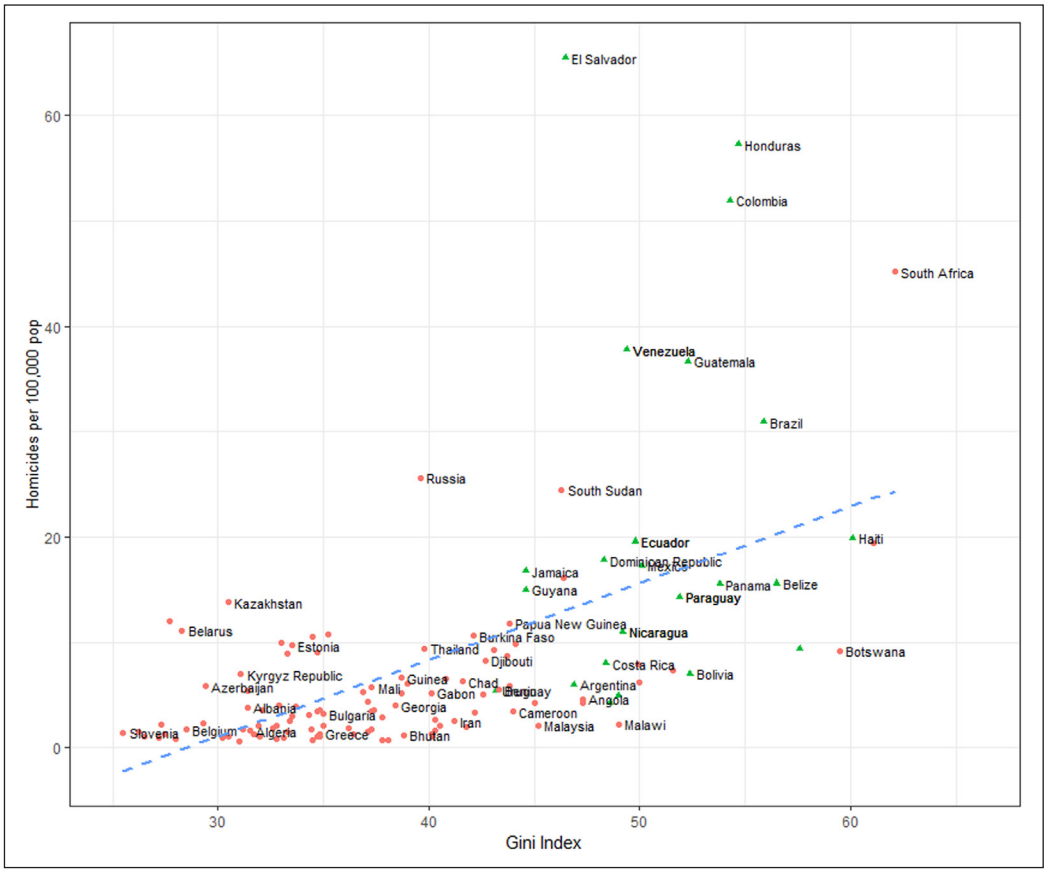


**Figure 3 Homicides and Inequality, World.**

*Note:* The vertical axis represents the country average of intentional homicides per 100,000 population (source: Global Burden of Disease Study), and the horizontal axis represents the country average Gini index (source: World Bank). In both cases, the averages are calculated for each country using the available year observations from 1995 to 2017. The total number of countries is 126: 23 countries in Latin America and the Caribbean, 39 countries in Africa, 2 countries in North America, 24 countries in Asia, 16 countries in Western Europe, 21 countries in Eastern Europe and 1 country in Oceania. LAC countries are indicated by green triangles.

The relationship between homicides and inequality at the country level is estimated in Table 1. The first column shows a strong, positive and significant relationship between inequality and crime. In the second column, we introduce as control variables the GDP variation (to control for economic activity and, thus, unemployment), the primary completion rate, and the poverty headcount ratio at $1.90 a day. The previous estimate is not affected by the introduction of controls. In particular, the inequality coefficient in column 2 implies that an increase in the Gini index of 10 points (our Gini index is defined from 0 to 100) is associated with 8.4 additional homicides per 100,000 population. Homicides seem to decrease with economic activity and education levels, but the coefficients are not significant. However, the coefficient on the poverty measure—the poverty headcount ratio at $1.90 a day—is significant and does not show the expected sign. Remember that we prefer not to incorporate variables directly endogenous to crime, such as the number of police officers or other public protection variables, to avoid strong sources of endogeneity (Di Tella and Schargrodsky 2004; Levitt 1997; McCrary 2002). For a similar reason, we would not include private security measures even if they were available. Our regressions should be interpreted as reduced-form specifications that already include public and private responses to crime.

In column 3, we introduce continental dummies aiming to control for time-invariant characteristics. We cannot include country dummies because this panel is very unbalanced, and there are only one or two observations for some countries. As expected, the coefficient on Latin America and the Caribbean is positive and significant. This indicates that, relative to the Western European countries (the omitted category), LAC countries have 12.99 extra homicides per year per 100,000 population. Moreover, the LAC coefficient is the largest of the regional coefficients, highlighting the size of the crime problem in Latin America and the Caribbean. Because the average homicide rate in the LAC countries in our sample is 21.22, the regional coefficient suggests that the "additional" crimes in Latin American and the Caribbean represent more than half of the total homicides.[19] If, in the LAC countries, we replace the continental dummy with individual country dummies, the countries with the highest coefficients are the same ones that showed the largest levels in Figure 1 and the excess homicides in Figure 2: El Salvador, Honduras, Colombia, Venezuela, Guatemala, and Brazil.

19 The population-weighted LAC homicide rate is 25.07, as more populated countries suffer more homicides.

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| VARIABLES | HOMICIDES | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Gini index | 0.7884*** | 0.8429*** | 0.4320* | 0.4467* | 0.4105* | 0.4327* | 0.4743** |
| | (0.1796) | (0.1888) | (0.2407) | (0.2472) | (0.2387) | (0.2398) | (0.2335) |
| GDP variation | | −0.1633 | −0.1582 | −0.1559 | −0.1631 | −0.1580 | −0.1846 |
| | | (0.1363) | (0.1155) | (0.1152) | (0.1170) | (0.1144) | (0.1203) |
| Primary completion rate | | −0.0215 | −0.0573 | −0.0682 | −0.0347 | −0.0613 | −0.0266 |
| | | (0.0640) | (0.0832) | (0.0892) | (0.0813) | (0.0845) | (0.0758) |
| Poverty ratio at $1.90 a day | | −0.1061** | 0.0159 | | | −0.0099 | −0.1012 |
| | | (0.0486) | (0.0645) | | | (0.0558) | (0.0647) |
| Poverty gap | | | | −0.0313 | | | |
| | | | | (0.1303) | | | |
| Poverty ratio at $3.20 a day | | | | | 0.0585 | | |
| | | | | | (0.0581) | | |
| GDP per capita | | | | | | −0.0001 | |
| | | | | | | (0.0001) | |
| Log (GDP per capita) | | | | | | | −3.6240 |
| | | | | | | | (2.5160) |
| Latin America and the Caribbean | | | 12.9887* | 12.8797* | 12.6954* | 9.1176 | 7.9493 |
| | | | (7.4286) | (7.5091) | (7.2942) | (6.5047) | (6.2028) |
| Eastern Europe | | | 4.8327*** | 4.8528*** | 4.5208*** | 1.5027 | 1.1069 |
| | | | (1.4061) | (1.3840) | (1.4721) | (2.6726) | (2.7701) |
| North America | | | 0.9646 | 0.8672 | 1.1278 | 0.9343 | 0.8700 |
| | | | (1.7282) | (1.7565) | (1.7279) | (1.9815) | (1.8128) |
| Africa | | | −1.5484 | −0.9421 | −3.4975 | −5.5329 | −6.2647 |
| | | | (5.4408) | (4.9597) | (5.9284) | (6.9513) | (7.2228) |
| Asia | | | 1.9730 | 2.0751 | 0.7491 | −1.9528 | −3.1356 |
| | | | (2.1634) | (2.1084) | (2.6182) | (3.7539) | (4.3606) |
| Oceania | | | 2.3091 | 2.9142 | 0.3086 | −1.5985 | −1.1744 |
| | | | (5.5673) | (5.1159) | (6.0587) | (6.8233) | (6.5243) |
| Observations | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 |
| R-squared | 0.2707 | 0.2830 | 0.3429 | 0.3428 | 0.3458 | 0.3480 | 0.3554 |
| Year dummies | YES | YES | YES | YES | YES | YES | YES |
| Standard errors | Country cluster | Country cluster | Country cluster | Country cluster | Country cluster | Country cluster | Country cluster |

**Table 1 Homicides and Inequality, World, 1995–2017.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable is the rate of **Homicides** per 100,000 population (source: Global Burden of Disease Study). **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Poverty gap** is the mean shortfall of income from the poverty line. **Poverty headcount ratio at $3.20 a day** is the percentage of the population living on less than $3.20 a day at 2011 international prices. **Latin America and the Caribbean**, **Eastern Europe**, **North America**, **Africa**, **Asia**, and **Oceania** are continental dummies (Western Europe is excluded). 125 countries are included. All regressions include year dummies. The constant is not presented. Standard errors clustered at the country level in parentheses. *** p < .01; ** p < .05; * p < .1.

The coefficient on inequality falls by half once the regional dummies are included but remains significant. This implies that an increase in the Gini of 10 points is associated with 4.3 additional homicides per 100,000 population. The coefficient on poverty now turns to the expected positive sign (higher crime is associated with higher poverty), but becomes statistically insignificant, as the coefficients on GDP variation and primary completion rate.

In columns 4 and 5, the poverty coefficients remain insignificant when we alternatively use the poverty gap and the poverty headcount ratio at $3.20 a day. In columns 6 and 7, we also include controls for GDP per capita and its log. The coefficients show the expected negative sign (crime falls with average country income) but are insignificant. If we control for per capita income, the LAC coefficient falls to around 9 and becomes statistically insignificant, but it is still the highest of the continental coefficients. The size and significance of the inequality coefficient show very little change throughout these different specifications. Instead, poverty seems to show a weak and unstable relationship with crime.

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Importantly, the estimated coefficients are in a similar range to those previously presented by Fajnzylber, Lederman, and Loayza (2002a, 2002b), the cross-country estimations most comparable to ours in the previous literature.[20] Moreover, all these homicide results are extremely similar when we consider the somewhat smaller alternative database, produced by World Bank, in Appendix Table A1.

We now turn to different crime variables: the results of crime victimization surveys. Figure 4 presents the relationship between inequality and crime victimization rates from the World Values Surveys. As explained above, the crime victimization question was included in the WVS only in one year for each country between 2010 and 2014. Similar to Figure 3, Figure 4 suggests, first, that there is a positive (unconditional) relationship between inequality and crime; second, that LAC countries tend to show both high inequality and high crime relative to the rest of the world; and, third, that their crime levels are too high, even in the face of their high inequality levels.

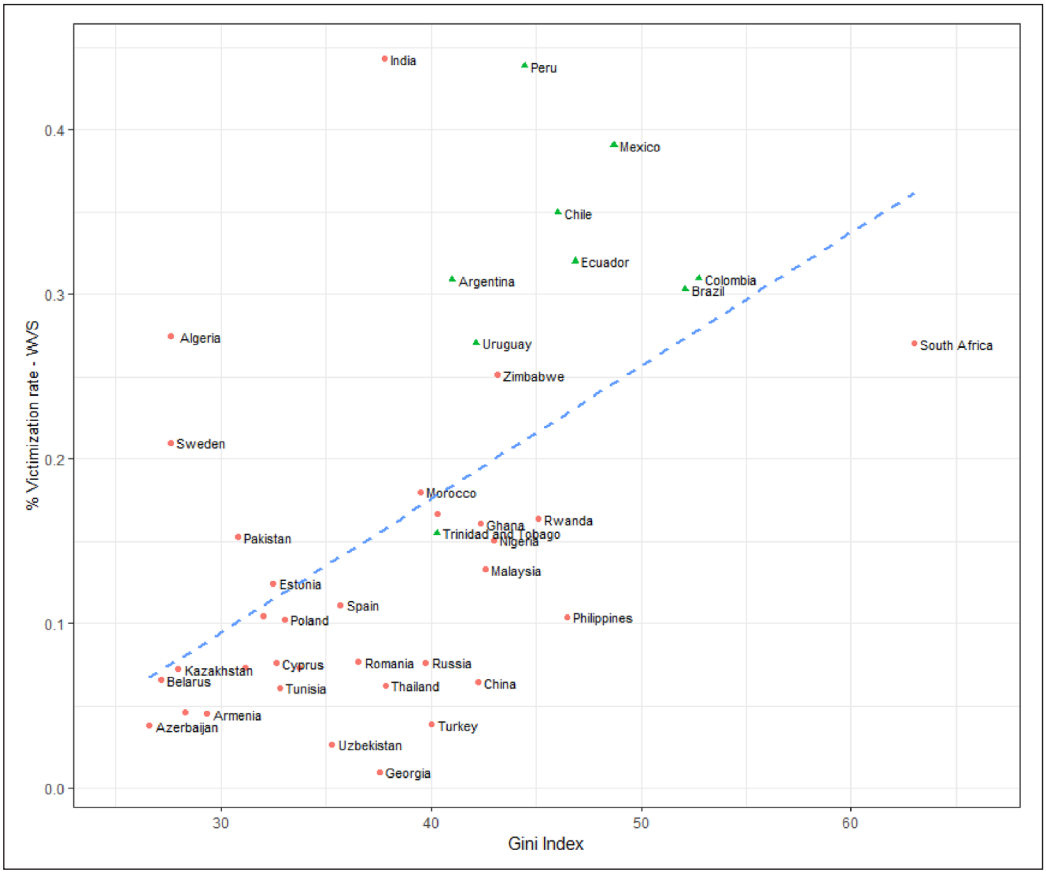


**Figure 4 Crime Victimization Rate and Inequality, World.**

*Note:* The vertical axis represents the country crime victimization rate (source: World Values Survey) and the horizontal axis represents the Gini index (source: World Bank). For each country, the crime victimization rate is the percentage of families that indicated that at least one of its members had been the victim of a crime during the last twelve months. The crime victimization question was included in the World Values Surveys between 2010 and 2014, but only in one year for each country. For each country, the Gini index corresponds to the year the victimization rate is available, or the closest available year. The total number of countries is 44: 9 countries in Latin America and the Caribbean, 9 countries in Africa, 1 country in North America, 12 countries in Asia, 3 countries in Western Europe, and 10 countries in Eastern Europe. LAC countries are indicated by green triangles.

We use the WVS data in Table 2. Each observation corresponds to an interviewed household. The first column, without control variables, shows a significant and positive coefficient for inequality. The inequality coefficient and its significance do not change in column 2 when controls are included. The GDP variation has the expected sign, but poverty and education do not. As happened with homicides, when we include dummies per continent in column 3, the LAC region shows the highest positive coefficient (the excluded region is Western Europe). Because the average WVS victimization rate for the LAC countries is 33.64 percent, the 0.1302 regional coefficient indicates that the unexplained "additional" crime in LAC represents more than one third of the region's total crime victimization.[21] Once the continental dummies are included, the coefficient on inequality falls, but remains positive and significant. The estimated coefficient relates a Gini increase of 10

20 The estimated coefficients of the Gini index on the log of homicide rates range between 0.0146 and 0.0813 in Fajnzylber, Lederman, and Loayza (2002b), and between 0.023 and 0.067 in Fajnzylber, Lederman, and Loayza (2002a). In a log specification, our estimates in Table 1 vary between 0.0352 and 0.0802.

21 For the LAC countries in the WVS survey, the population-weighted average victimization rate is 33.67 percent, almost the same as the simple average.

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points to an increase in the victimization rate of 2.6 percentage points, that is, an increase of about 16 percent of the baseline level.[22,23]

| VARIABLES | CRIME VICTIMIZATION | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Gini index | 0.0065*** | 0.0067*** | 0.0026** | 0.0027** | 0.0023** | 0.0026** | 0.0026** |
| | (0.0007) | (0.0008) | (0.0011) | (0.0011) | (0.0011) | (0.0011) | (0.0011) |
| GDP variation | | −0.0006 | 0.0049*** | 0.0040** | 0.0037** | 0.0049** | 0.0048** |
| | | (0.0019) | (0.0019) | (0.0019) | (0.0018) | (0.0019) | (0.0020) |
| Primary completion rate | | 0.0019** | 0.0002 | −0.0003 | 0.0009 | 0.0002 | 0.0002 |
| | | (0.0009) | (0.0008) | (0.0007) | (0.0008) | (0.0008) | (0.0009) |
| Poverty ratio at $1.90 a day | | −0.0000 | −0.0001 | | | −0.0001 | −0.0001 |
| | | (0.0005) | (0.0004) | | | (0.0004) | (0.0004) |
| Poverty gap | | | | −0.0016* | | | |
| | | | | (0.0009) | | | |
| Poverty ratio at $3.20 a day | | | | | 0.0006* | | |
| | | | | | (0.0004) | | |
| GDP per capita | | | | | | −0.0000 | |
| | | | | | | (0.0000) | |
| Log (GDP per capita) | | | | | | | −0.0018 |
| | | | | | | | (0.0128) |
| Latin America and the Caribbean | | | 0.1302*** | 0.1482*** | 0.1324*** | 0.1292*** | 0.1287*** |
| | | | (0.0233) | (0.0236) | (0.0235) | (0.0290) | (0.0265) |
| Eastern Europe | | | −0.0718*** | −0.0732*** | −0.0678*** | −0.0726*** | −0.0728*** |
| | | | (0.0178) | (0.0171) | (0.0180) | (0.0198) | (0.0180) |
| North America | | | 0.0254 | 0.0194 | 0.0309 | 0.0257 | 0.0255 |
| | | | (0.0216) | (0.0211) | (0.0218) | (0.0228) | (0.0216) |
| Africa | | | 0.0006 | 0.0138 | −0.0070 | −0.0005 | −0.0014 |
| | | | (0.0217) | (0.0212) | (0.0226) | (0.0289) | (0.0261) |
| Asia | | | −0.0711*** | −0.0641*** | −0.0734*** | −0.0721*** | −0.0723*** |
| | | | (0.0198) | (0.0190) | (0.0201) | (0.0253) | (0.0214) |
| Observations | 63,120 | 63,120 | 63,120 | 62,122 | 63,120 | 63,120 | 63,120 |
| R-squared | 0.0354 | 0.0380 | 0.0639 | 0.0669 | 0.0646 | 0.0639 | 0.0639 |
| Year dummies | YES | YES | YES | YES | YES | YES | YES |
| Standard errors | Region cluster | Region cluster | Region cluster | Region cluster | Region cluster | Region cluster | Region cluster |

**Table 2 Crime Victimization and Inequality, World, 2010–2014.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable **Crime victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of a crime during the last twelve months, and 0 otherwise (source: World Values Survey). **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Poverty gap** is the mean shortfall of income from the poverty line. **Poverty headcount ratio at $3.20 a day** is the percentage of the population living on less than $3.20 a day at 2011 international prices. **Latin America and the Caribbean**, **Eastern Europe**, **North America**, **Africa** and **Asia** are continental dummies (Western Europe is excluded). 44 countries are included. All regressions include year dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses. *** p < .01; ** p < .05; * p < .1.

As before, we introduce alternative poverty measures (the poverty gap in column 4, and the poverty headcount ratio at $3.20 a day in column 5). The signs of the poverty coefficients are unstable. We control for GDP per capita in column 6, and its log in column 7. In both cases, GDP per capita has the expected negative sign, but it is never statistically significant. The relationship that always appears positive and statistically significant in all these specifications is the one between inequality and crime. The size of this coefficient is also stable (once the continental dummies are included).

22 The simple average of the WVS country victimization rates in the sample is 15.88 percent. The population-weighted average is 21.25 percent as larger countries show higher victimization rates. The results are similar using WVS sampling weights in weighted regressions.

23 The standard errors are clustered at the region (subnational) level. If, instead, country-level clusters are considered, the significance levels are similar for the first two columns of Table 2 but fall below standard levels when controls are introduced.

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We now turn to the Latinobarómetro crime victimization results collected on the LAC countries for the period 1995–2018. Figure 5 shows the trends in inequality and crime victimization averages in the region. Both inequality and victimization increased until 1999, but declined thereafter, with smoother changes in inequality than in victimization.[24]

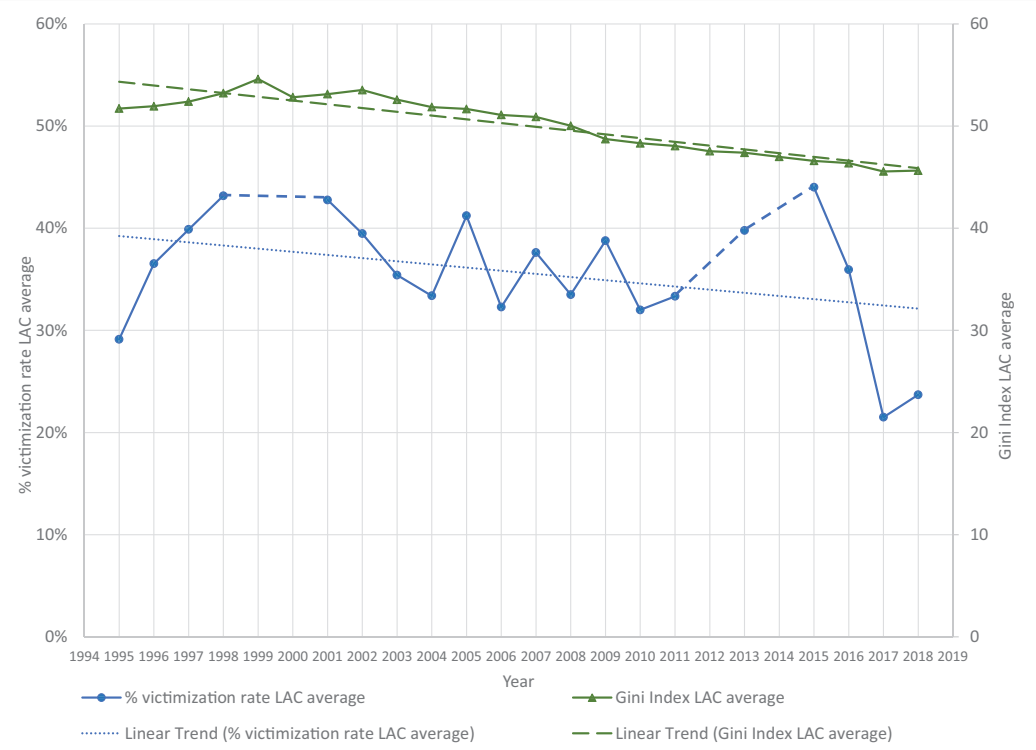


**Figure 5 Victimization Rate and Inequality, Latin American and Caribbean Countries, 1995–2018.**

*Note:* The graph represents the victimization rate average on the left vertical axis (source: Latinobarómetro), and the Gini index average on the right vertical axis (source: World Bank). For each country-year, the victimization rate is the percentage of families that answered in the Latinobarómetro survey that at least one of its members had been a victim of a crime during the last twelve months. Averages are calculated using the sample of countries available for each year. Although not every country is available every year, the sample includes 18 LAC countries. Linear trends are shown by dotted lines.

In Table 3, we use the Latinobarómetro victimization data for our econometric analysis. For each specification, we consider standard errors clustered at the regional (subnational) level and city level. All regressions include country fixed effects. The first two columns show a positive coefficient for inequality, and no difference in statistical significance under the different standard error estimations. The inequality coefficient and its significance do not vary in columns 3 and 4 when control variables are included. The coefficients on GDP variation, educational attainment and poverty have the expected signs, although the poverty coefficient is not significant. The simple average of the (average) country victimization rates in the sample is 36.79 percent.[25] The estimated coefficient associates an increase in the Gini index of 10 points with an increase in the victimization rate of 5.8 percentage points, that is, an increase of 16 percent of the baseline level.[26]

As before, in the rest of the table we introduce alternative poverty measures: the poverty gap in columns 5 and 6, and the poverty headcount ratio at $3.20 a day in columns 7 and 8. The signs of the poverty coefficients are unstable. Again, the relationship that appears always positive and statistically significant in all these specifications is the one between inequality and crime.[27]

The positive and significant relationship between inequality and crime is also robust to exploiting data on inequality and poverty at the subnational level, provided by CEDLAS. The number of Latinobarómetro observations that can be used under this specification is reduced because these data cover a shorter time span, but we gain intra-country variability in inequality and poverty. Using

24 Appendix Figure A2 shows similar trends for the population-weighted Latinobarómetro averages.

25 The population-weighted average of the (average) country victimization rates is 38.99 percent. The results are also unaltered using Latinobarómetro sampling weights in weighted regressions.

26 The individual country dummies indicate that the countries with the highest "excess" victimization are Mexico, Venezuela, Guatemala, Argentina, Peru, and El Salvador, in that order.

27 The inequality coefficients are significant at the 10% level if standard errors are clustered at the country level. The results on inequality do not vary if we control for GDP per capita or its log, although the coefficients on these variables have, unexpectedly, a positive sign (remember, however, that the regressions already include country fixed effects and GDP variations).

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these variables, Appendix Table A2 reproduces the main columns of Table 3 and reaches similar results. The coefficient on inequality is positive and significant. Poverty increases are unexpectedly associated with crime reductions when the subregional poverty measures are considered in the last two columns.

| VARIABLES | CRIME VICTIMIZATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Gini index | 0.0053*** | 0.0053*** | 0.0058*** | 0.0058*** | 0.0060*** | 0.0060*** | 0.0052** | 0.0052*** |
| | (0.0018) | (0.0013) | (0.0022) | (0.0017) | (0.0021) | (0.0016) | (0.0023) | (0.0018) |
| GDP variation | | | −0.0026*** | −0.0026*** | −0.0026*** | −0.0026*** | −0.0026*** | −0.0026*** |
| | | | (0.0009) | (0.0007) | (0.0009) | (0.0007) | (0.0009) | (0.0007) |
| Primary completion rate | | | −0.0013 | −0.0013** | −0.0013 | −0.0013** | −0.0013 | −0.0013** |
| | | | (0.0008) | (0.0006) | (0.0008) | (0.0006) | (0.0008) | (0.0006) |
| Poverty ratio at $1.90 a day | | | 0.0002 | 0.0002 | | | | |
| | | | (0.0017) | (0.0014) | | | | |
| Poverty gap | | | | | −0.0003 | −0.0003 | | |
| | | | | | (0.0028) | (0.0023) | | |
| Poverty ratio at $3.20 a day | | | | | | | 0.0007 | 0.0007 |
| | | | | | | | (0.0012) | (0.0010) |
| Observations | 281,418 | 281,418 | 281,418 | 281,418 | 281,418 | 281,418 | 281,418 | 281,418 |
| R-squared | 0.0264 | 0.0264 | 0.0267 | 0.0267 | 0.0267 | 0.0267 | 0.0267 | 0.0267 |
| Country dummies | YES | YES | YES | YES | YES | YES | YES | YES |
| Year dummies | YES | YES | YES | YES | YES | YES | YES | YES |
| Standard errors | Region cluster | City cluster | Region cluster | City cluster | Region cluster | City cluster | Region cluster | City cluster |

**Table 3 Crime Victimization and Inequality, Latin American and Caribbean Countries, 1995–2018.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable **Crime victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of a crime during the last twelve months, and 0 otherwise (source: Latinobarómetro). The Latinobarómetro survey was not performed in 1999, 2012 and 2014. The crime victimization question was not included in the 2000 Latinobarómetro survey. **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Poverty gap** is the mean shortfall of income from the poverty line. **Poverty headcount ratio at $3.20 a day** is the percentage of the population living on less than $3.20 a day at 2011 international prices. 18 countries are included. All regressions include year and country dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses in columns 1, 3, 5 and 7. Standard errors clustered at the city level in parentheses in columns 2, 4, 6 and 8. *** p < .01; ** p < .05; * p < .1.

In summary, we find a positive, significant, and robust relationship between inequality and crime using homicide and survey victimization data from four alternative databases that cover countries on different continents or that focus on Latin America and the Caribbean, considering various controls and standard error estimates, and including inequality measures at the national and subnational levels. Moreover, inequality is the only variable showing this robust regularity. Educational attainment, economic activity, income per capita, and poverty show much weaker and unstable relationships with crime levels.

## V. IS THERE A CAUSAL RELATIONSHIP BETWEEN INEQUALITY AND CRIME?

In the previous section, we have shown a positive, significant, and robust relationship between inequality and crime. In this section we cautiously explore whether this relationship is causal. One challenge to a causal interpretation of our estimates of the relationship between inequality and crime is reverse causality. Property crime can itself be redistributive if criminals are poorer than victims. This would not represent a serious identification challenge because this pecuniary redistribution would tend to reduce the possibility of finding an association between inequality and crime. However, our estimated Gini indexes are based on declared family income and thus are not likely to incorporate income from illegal sources. Endogeneity would tend, instead, to inflate estimates if crime can reproduce inequality. Pshisva and Suarez (2010) show that extortionate kidnappings adversely influence corporate investment in Colombia. Robles, Calderón, and Magaloni (2013) find a negative impact of drug violence on economic performance and employment in local Mexican economies. Utar (2018) shows negative effects of the Mexican drug war on firm-level performance in the manufacturing sector. Recent work by Navajas-Ahumada (2020) studies effects on crime avoidance costs and labor market outcomes in the aftermath of homicides near employee workplaces in São Paulo, Brazil. Crime may also impose additional costs on the private sector through extra security expenditures and losses from theft (see Sutton 2017, on Caribbean countries). The local focus of these studies highlights the relative advantage of microdata for identifying these effects. But it may also underline that it is unlikely that crime is sufficiently pervasive to affect inequality at the macro level.

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A second challenge is that common political and institutional factors, such as weak law enforcement and institutional failures, can simultaneously affect inequality and crime. For example, elites may limit the access of lower socio-economic groups to economic opportunities, while weakening tax collection and the financing of state capacities to fight crime. Similarly, institutional biases in the allocation of public resources may reproduce inequity by hampering equality of opportunities in the access to education, health care and other public services, while concentrating police and judicial protection in favor of the upper strata to the disadvantage of other groups in society. Although it is extremely difficult to exhaustively measure and control for these factors in a cross-country study, as they are, by and large, time-invariant, these endogeneity concerns should be alleviated by our inclusion of country (or similar) fixed effects in databases that combine macro inequality variables with micro victimization survey data.

As a further analysis to explore the presence of a causal channel, we apply new institutional theories linking current inequality levels to historical conditions (Acemoglu, Garcia-Jimeno, and Robinson 2012; Engerman and Sokoloff 1997; Soares, Assunção, and Goulart 2012) in order to instrument for inequality in 2SLS regressions. In particular, we follow the identification strategy of Buonanno and Vargas (2019), who used Colombian municipality-level slavery data from the 19th century to instrument for current land inequality in crime regressions.[28] For this exercise, we use historical variables to instrument for inequality in 2SLS regressions of the form:

$$Crime_i = a\, Inequality_i + b\, X_i + \varepsilon_i, \tag{5}$$

where $Crime_i$, $Inequality_i$ and the controls $X_i$ are the averages of these variables for all the observations in our sample for country $i$, and $\varepsilon_i$ is the error term. The 2SLS regressions are cross-sectional and run on country averages, as the instruments do not vary over time. The number of observations gets further reduced because the instruments are not available for all the countries in our samples.[29] The $Crime_i$ dependent variables are country average homicide rates from the GBDS database,[30] and WVS country victimization rates. $Inequality_i$ is instrumented by the African and Native slavery measures of Soares, Assunção, and Goulart (2012), and the ex-colony dummy from Acemoglu, Johnson, and Robinson (2001). *African Slavery* is the (natural logarithm of the) average ratio of the number of African slaves received to the local population in each 25-year interval during colonial times (only for countries that had no significant black population before the beginning of the slave trade). *Native Slavery* is the ratio of the native population in 1500 to the total population in 1850, but only for former colonies in the Americas; it is set to zero for other countries.[31] *Ex-Colony* is a dummy for whether a country was a former colony.

Our 2SLS regressions are presented in Table 4. Both without and with controls for GDP variation, education, and poverty (columns 1 and 2, respectively), the three instruments seem positive and significant determinants of current inequality in the first-stage regressions. Moreover, the 2SLS regressions show a positive and significant effect of inequality on homicides. For the crime victimization rates in columns 3 and 4 (without and with controls, respectively), *Ex-Colony* and *Native Slavery* are positive and significant in the first-stage regressions, and the 2SLS regressions show again a positive and significant effect of inequality on crime victimization. The explanatory power of the instruments in the first-stage regressions is high across the different specifications.[32] Moreover, a comparison of the inequality coefficients of Table 4 to the coefficients of an OLS version of the same table (see second four columns of Appendix Table A3), and also to the OLS coefficients of the first two columns of Tables 1 and 2, respectively, shows that the estimates are close and that the respective confidence intervals overlap. Thus, our previous OLS estimates are similar to these 2SLS estimates.

28 Enamorado, Lopez-Calva, Rodriguez-Castelan and Winkler (2016) also study the effect of inequality on crime in the context of the Mexican drug war using a 2SLS strategy but instrumenting for municipality Gini indexes with the income distribution predicted by past local income distribution and national patterns of income growth.

29 In particular, the intersection between the WVS and the Soares et al. (2012) samples is limited.

30 The results are similar using the World Bank homicide database.

31 The definition of slavery is taken from Soares et al. (2012), and it encompasses various systems of forced labour of the Native American population, including the Spanish *mita*, *encomienda* and *yanaconazgo*.

32 The reported Sargan-Hansen statistic test of overidentifying restrictions shows that we cannot reject the joint null hypothesis that the instruments are valid in the models estimated in Table 4. For completeness, the first four columns of Appendix Table A3 present the reduced-form version of the 2SLS regressions of Table 4. Although the instruments are individually insignificant in the homicide regressions, they are jointly significant at standard significance levels.

**Table 4 Instrumenting Inequality with Historical Data.**

*Note:* Two-stage least squares (2SLS) regression estimates. In columns 1 and 2 the dependent variable **Homicides** is the country average of intentional homicides per 100,000 population for the available year observations for each country from 1995 to 2017 (source: Global Burden of Disease Study). In columns 3 and 4 the dependent variable **Crime victimization rate** is the percentage of families in the country in which the respondent indicates that at least one of its members has been the victim of a crime during the last twelve months (source: World Values Survey). **Gini index** is defined from 0 to 100 (source: World Bank). **Ex-colony** was taken from Acemoglu, Johnson, and Robinson (2001) and is a dummy variable that equals one if the country was a former colony, zero otherwise. **African slavery** and **Native slavery** were taken from Soares, Assunção, and Goulart (2012). **African slavery** is the ln of the average of the number of African slaves received for each country in each 25-year interval divided by historical populations. **Native slavery** is the country population in 1500 divided by its population in 1850. **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. The **Sargan-Hansen statistic test** of overidentifying restrictions tests the joint null hypothesis of validity of the instruments. The **FAR test** is the fractionally resampled Anderson–Rubin test, a modification of the Anderson–Rubin test that accounts for violations of the orthogonality condition, under the null hypothesis the Gini index coefficient is equal to zero (note that the result of this last test depends on the selected subsamples, so the result might vary from one estimation to the other). For all the variables (but the historical instruments), each observation corresponds to the country average using all the available year observations from 1995 to 2017. The constants are not presented. Robust standard errors in parentheses. *** p < .01; ** p < .05; * p < .1.

| VARIABLES | HOMICIDES | HOMICIDES | CRIME VICTIMIZATION RATE | CRIME VICTIMIZATION RATE |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Second stage:** | | | | |
| Gini index | 0.8482*** | 0.8333*** | 0.0192*** | 0.0186*** |
| | (0.1744) | (0.1760) | (0.0032) | (0.0038) |
| GDP variation | | −1.3676** | | −0.0059 |
| | | (0.6884) | | (0.0077) |
| Primary completion rate | | 0.0068 | | 0.0025 |
| | | (0.1654) | | (0.0039) |
| Poverty ratio at $1.90 a day | | 0.1121 | | −0.0019 |
| | | (0.1058) | | (0.0012) |
| Adj R-squared (second stage) | 0.3772 | 0.3773 | 0.0605 | 0.0919 |
| **First stage:** | | | | |
| GDP variation | | 0.0808 | | 0.2655 |
| | | (0.3423) | | (0.4125) |
| Primary completion rate | | −0.1075 | | −0.0682 |
| | | (0.0948) | | (0.2217) |
| Poverty ratio at $1.90 a day | | 0.1150* | | 0.0641 |
| | | (0.0643) | | (0.0724) |
| Ex-colony | 14.1138*** | 12.6452*** | 8.1255 | 8.8815* |
| | (2.9952) | (2.9988) | (4.8091) | (5.1930) |
| African Slavery | 1.0894** | 0.9420** | 0.7935 | 0.8681 |
| | (0.4960) | (0.4636) | (0.9705) | (1.0394) |
| Native Slavery | 17.6913*** | 17.4522*** | 17.1376** | 16.6643** |
| | (5.5683) | (5.4500) | (6.6070) | (7.7548) |
| Adj R-squared (first stage) | 0.6916 | 0.7231 | 0.4446 | 0.3900 |
| Observations | 73 | 73 | 35 | 33 |
| Sargan-Hansen test of overidentifying restrictions | 0.833 | 0.738 | 2.035 | 2.760 |
| FAR test p-value | 0.0288** | 0.0426** | 0.0098*** | 0.0242** |

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These 2SLS results suggest the presence of a causal effect of inequality on crime. However, the historical determinants that these instrumental variables aim to capture can also affect crime through other channels besides inequality, such as weak law enforcement, culture of violence, corruption, or ethnic fractionalization (Demombynes and Özler 2005; Gouda and Rigterink 2016). In other words, the validity of the exclusion restriction is questionable as these instruments could affect crime through channels other than inequality. In order to alleviate this legitimate concern, we perform three alternative strategies. First, in Appendix Table A4 we include additional controls for indicators of current institutional and governance quality using the country averages of the Worldwide Governance Indicators (WGI), and some specific WGI components, such as political stability and lack of violence, rule of law, and control of corruption.[33] Our previous 2SLS inequality results remain unaltered if we include these proxies for institutional quality. Second, we follow Buonanno and Vargas (2019) who apply the Fractionally resampled Anderson–Rubin test (FAR) of Berkowitz et al. (2012) to assess the significance of endogenous regressors in an instrumental variables estimation (see also Riquelme et al. 2013). The bottom line of Table 4 shows that, in presence of a plausible violation of the exclusion restriction, we reject the null hypothesis of the FAR test that the impact of inequality on crime is equal to zero. Finally, we also follow Buonanno and Vargas (2019) to conduct the sensitivity analysis proposed by Conley et al. (2012). Appendix Table A5 shows that the confidence bounds of our estimates of the effect of inequality on crime remain positive after allowing for plausible amounts of imperfect exogeneity of our instruments.[34] These complementary results cautiously suggest the plausible presence of a causal effect of inequality on crime, even under potentially imperfect exogeneity of our instruments.

## VI. THE DISTRIBUTION OF CRIME VICTIMIZATION

In this section, we explore the distribution of crime victimization across population groups by considering gender, socio-economic level, age, education, and ethnicity. We also analyze patterns by type of crime, and concerns about crime.

We first consider homicide victimization by gender.[35] Men suffer more homicides than women. The average female-to-male homicide ratio in our world sample is 0.315. The gender difference, however, is wider in LAC countries. There are 0.194 female homicides per each male homicide in LAC, whereas the average for the rest of the world is 0.343. Figure 6 presents the female and male average homicide rates (calculating the country averages using the available observations for each country for the period 1995–2017) per 100,000 population for the LAC countries and for the rest of the world. The ratio of female to male homicides in every LAC country (but Honduras) is lower than the average in the rest of the world.[36]

Table 5 reproduces the main regressions from Table 1 but disaggregated by gender. Columns 1 and 3 show a positive and significant relationship between inequality and homicides for both female and male homicides. When the continental dummies are introduced in columns 2 and 4, the effect of inequality on homicides remains significant in the case of male homicides, but not for female homicides. Moreover, when we consider the country-year ratio of female to male homicides as our dependent variable in columns 5 and 6, the negative and significant coefficient shows that male homicides grow faster with inequality than female homicides. This result is confirmed in Appendix Table A7 in which log regressions show that the elasticity of male homicides to inequality is about

33 The World Bank WGI measures six dimensions of governance—voice and accountability, political stability and lack of violence, government effectiveness, regulatory quality, rule of law, and control of corruption—since 1996. For details, see WGI (Worldwide Governance Indicators) (dashboard), World Bank, Washington, DC, http://info.worldbank.org/governance/wgi/#home. We use here the 1996–2017 country averages.

34 All the 2SLS results of Table 4 are robust to including a settler mortality variable (deaths per 1,000 settlers per annum) from Acemoglu, Johnson, and Robinson (2001). In that case, settler mortality is significant in the first-stage of the 2SLS homicide regressions, but not for the crime victimization regressions. The results on the FAR test and on the inclusion of additional WGI controls also remain unchanged, but the confidence bounds on the inequality coefficient presented in Appendix Table A5 include the zero when the settler mortality variable is introduced.

35 The gender disaggregated GBDS homicide data are available for 1,296 of the 1,333 country-year observations previously utilized in Table 1. Appendix Table A6 reproduces Table 1 only for these 1,296 observations with no change in results. Appendix A4 lists these country-year observations with available GBDS gender homicide data. All the gender results are similar using alternatively the World Bank homicide statistics disaggregated by victim gender.

36 Jaitman and Torre (2017) show a striking concentration of homicides among young males in LAC. See also De Mello and Schneider (2010).

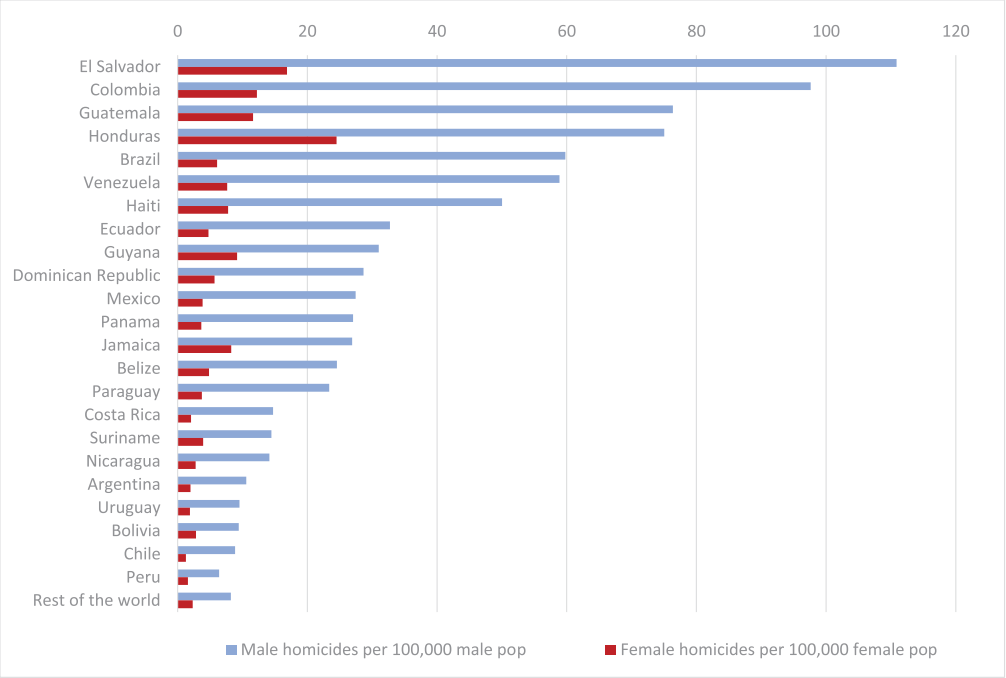


**Figure 6 Male and Female Homicides, Latin American and Caribbean Countries.**

*Note:* The horizontal blue bar represents the country average of intentional male homicides per 100,000 male population calculated for the available country-year observations from 1995 to 2017 (source: Global Burden of Disease Study). The red bar represents the country average of intentional female homicides per 100,000 female population calculated for the available country-year observations from 1995 to 2017 (source: Global Burden of Disease Study).

| VARIABLES | FEMALE HOMICIDES | | MALE HOMICIDES | | RATIO OF FEMALE TO MALE HOMICIDES | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Gini index | 0.2114*** | 0.1361 | 1.4589*** | 0.7935* | −0.0111*** | −0.0050*** |
| | (0.0727) | (0.0865) | (0.3034) | (0.4231) | (0.0015) | (0.0018) |
| GDP variation | −0.0348 | −0.0372 | −0.2996 | −0.3333* | −0.0068*** | −0.0009 |
| | (0.0458) | (0.0380) | (0.2381) | (0.2008) | (0.0020) | (0.0017) |
| Primary completion rate | −0.0264 | −0.0435 | 0.0118 | −0.0190 | −0.0014 | −0.0016* |
| | (0.0277) | (0.0394) | (0.1022) | (0.1217) | (0.0012) | (0.0009) |
| Poverty ratio at $1.90 a Day | −0.0326* | 0.0024 | −0.1656** | −0.0239 | −0.0005 | 0.0009 |
| | (0.0196) | (0.0268) | (0.0807) | (0.1047) | (0.0008) | (0.0006) |
| Latin America and the Caribbean | | 2.9577 | | 21.1787 | | −0.2833*** |
| | | (2.0565) | | (12.9411) | | (0.0623) |
| Eastern Europe | | 2.3568*** | | 8.3201*** | | −0.1827*** |
| | | (0.7242) | | (2.7050) | | (0.0544) |
| North America | | 0.3675 | | 1.0559 | | −0.2254*** |
| | | (0.6892) | | (2.9528) | | (0.0503) |
| Africa | | −0.8446 | | 2.7351 | | −0.2939*** |
| | | (2.5562) | | (7.6149) | | (0.0613) |
| Asia | | 0.6287 | | 4.8226 | | −0.2732*** |
| | | (0.8979) | | (3.6712) | | (0.0528) |
| Oceania | | −1.7534 | | −2.1557 | | −0.2743*** |
| | | (2.6659) | | (7.5243) | | (0.0649) |
| Observations | 1,296 | 1,296 | 1,296 | 1,296 | 1,296 | 1,296 |
| R-squared | 0.1922 | 0.2479 | 0.2919 | 0.3373 | 0.3482 | 0.5410 |
| Year dummies | YES | YES | YES | YES | YES | YES |
| Standard errors | Country cluster | Country cluster | Country cluster | Country cluster | Country cluster | Country cluster |

**Table 5 Inequality and Homicides by Gender, World, 1995–2017.**

*Note:* Ordinary least squares (OLS) regression estimates. **Female homicides** is the rate of intentional female homicides per 100,000 female population, and **Male Homicides** is the rate of intentional male homicides per 100,000 male population (source: Global Burden of Disease Study). **Ratio: female homicides to male homicides** is the ratio of the rate of intentional **Female homicides** per 100,000 female population to the rate of intentional **Male homicides** per 100,000 male population. **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Latin America and the Caribbean**, **Eastern Europe**, **North America**, **Africa**, **Asia**, and **Oceania** are continental dummies (Western Europe is excluded). 123 countries are included. All regressions include year dummies. The constant is not presented. Standard errors clustered at the country level in parentheses. *** p < .01; ** p < .05; * p < .1.

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twice larger than the corresponding elasticity of female homicides. A potential explanation for this finding is that, relative to female homicides, male homicides are more closely tied to economic motives and, thus, to inequality.

Turning again to the WVS and Latinobarómetro surveys, we now perform a different exercise by exploiting the available information on individual characteristics to explore additional victimization patterns. First for the WVS database in Table 6, we include the sex and age of the interviewed person in column 1. Males declare higher victimization. Moreover, victimization falls with age, showing a peak at age 18, the lowest age bound of the WVS surveyed population.[37] Although it is important to bear in mind that the WVS questionnaire refers to household victimization, young males seem to bear higher victimization rates.

**Table 6 Victimization Rate, Inequality, and Household Characteristics, World, 2010–2014.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable **Crime victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of a crime during the last twelve months, and 0 otherwise (source: World Values Survey). **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Male** is a dummy variable that equals one if the respondent is a man, zero otherwise. **Age** is the age of the respondent. **Socio-economic status** are dummies variables defining the socio-economic status of the household according to income brackets declared by the respondent (the highest socio-economic status is excluded). **Education** are the years of education of the respondent. **Latin America and the Caribbean**, **Eastern Europe**, **North America**, **Africa** and **Asia** are continental dummies (Western Europe is excluded). 44 countries are included. All regressions include year dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses. *** p < .01; ** p < .05; * p < .1.

| VARIABLES | CRIME VICTIMIZATION | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gini index | 0.0026** | 0.0026** | 0.0025** |
| | (0.0011) | (0.0011) | (0.0011) |
| GDP variation | 0.0049*** | 0.0050*** | 0.0048*** |
| | (0.0018) | (0.0019) | (0.0019) |
| Primary completion rate | 0.0002 | 0.0002 | 0.0001 |
| | (0.0008) | (0.0008) | (0.0008) |
| Poverty ratio at $1.90 a day | −0.0001 | −0.0001 | −0.0002 |
| | (0.0004) | (0.0004) | (0.0004) |
| Male | 0.0094*** | 0.0095*** | 0.0088** |
| | (0.0036) | (0.0036) | (0.0036) |
| Age | 0.0002 | 0.0001 | 0.0001 |
| | (0.0006) | (0.0006) | (0.0006) |
| Age^2 | −0.0000** | −0.0000** | −0.0000** |
| | (0.0000) | (0.0000) | (0.0000) |
| Socio-economic status: high | | −0.0116* | −0.0108* |
| | | (0.0065) | (0.0065) |
| Socio-economic status: middle | | −0.0068 | −0.0049 |
| | | (0.0071) | (0.0071) |
| Socio-economic status: low | | −0.0068 | −0.0038 |
| | | (0.0070) | (0.0069) |
| Socio-economic status: very low | | 0.0196** | 0.0243*** |
| | | (0.0091) | (0.0091) |
| Education | | | 0.0017* |
| | | | (0.0009) |
| Latin America and the Caribbean | 0.1244*** | 0.1229*** | 0.1259*** |
| | (0.0232) | (0.0234) | (0.0233) |
| Eastern Europe | −0.0725*** | −0.0732*** | −0.0762*** |
| | (0.0178) | (0.0179) | (0.0176) |
| North America | 0.0270 | 0.0282 | 0.0238 |
| | (0.0214) | (0.0215) | (0.0218) |
| Africa | −0.0111 | −0.0118 | −0.0052 |
| | (0.0218) | (0.0219) | (0.0220) |
| Asia | −0.0775*** | −0.0779*** | −0.0754*** |
| | (0.0198) | (0.0199) | (0.0195) |
| Observations | 63,086 | 61,638 | 61,481 |
| R-squared | 0.0664 | 0.0669 | 0.0673 |
| Year dummies | YES | YES | YES |
| Standard errors | Region cluster | Region cluster | Region cluster |

37 For a tiny number of cases, the WVS respondents are 16 or 17 years old.

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We then include a set of dummies for five socio-economic categories constructed by WVS from an income scale question. The surveyed households are classified into five categories; the baseline is the richest group.[38] The results in column 2 show that poorest households are the ones suffering highest crime victimization rates in the WVS database. The last column shows that victimization increases with the years of education of the respondent, without change in the results for the other individual characteristics. The previous results on inequality, economic activity, country educational level, and poverty remain unaltered when these individual characteristics are included.

In Table 7, we consider the available individual characteristics in the Latinobarómetro database. In columns 1 and 2, we first include the sex and age of the interviewed person. As in the WVS database, LAC males declare higher victimization. Moreover, victimization falls with age, showing a peak at age 18, the lowest age bound of the Latinobarómetro surveyed population.[39] Thus, young males in the LAC region seem to bear higher victimization rates (although remember again that the questionnaire refers to household victimization).

In columns 3 and 4 of Table 7, we include a set of socio-economic status dummies constructed by Latinobarómetro from interviewer evaluations. The surveyed households are classified into five categories, and the richest group is the omitted category in the regressions.[40] The results suggest that, in LAC countries, higher-income groups suffer more victimization than lower strata, and that the differences are monotonous and statistically significant. These findings are similar to those obtained by Gaviria and Pagés (2002) using the 1996 to 1998 Latinobarómetro waves. Olavarría Gambi (2015) also shows a concentration of crime victimization in the upper socio-economic strata in Chile, Costa Rica and Honduras, and in Montevideo utilizing other victimization surveys.[41] These Latinobarómetro results seem to contradict the previous findings using the WVS database. However, if we restrict the WVS sample only to the LAC countries, the richest seem to bear the main burden of crime (although the strata differences are not statistically significant).

We cannot discard that these observed higher victimization rates for the upper socio-economic group in the Latinobarómetro database actually reflect that the rich may perceive being a victim of a crime at some situations that the poor do not, as they may have become habituated to them (see, for example, Di Tella et al. 2019, on how previous exposure induces desensitization to crime). However, if this finding is explained by socio-economic differences in crime reporting and perceptions, these reporting biases should be particularly stronger in societies, like the LAC region, more unequal or with higher crime levels as this phenomenon is not observed in the WVS database for the rest of the world.

The results do not vary if we include the years of education of the respondent in columns 5 and 6. Victimization increases with years of education, although this variable may be capturing part of an imperfect socio-economic level classification.

We also explore differences in crime victimization by ethnicity. Since 2007, the Latinobarómetro survey registers seven self-declared ethnic groups: White, Mulatto, Mestizo, Indigenous, Black, Asian, and Other. Leaving the residual category as the baseline group, the last two columns of Table 7 show no significant ethnic differences in crime victimization.[42] The previous results on inequality, economic activity, education, and poverty remain unaltered when all these individual characteristics are included in the Latinobarómetro regressions.

38 The proportion of households in each socio-economic category in the WVS survey is: very high (21.04 percent), high (15.32 percent), middle (22.27 percent), low (26.50 percent), and very low (14.86 percent).

39 In a small number of cases, the Latinobarómetro respondents are ages 15–17.

40 The proportion of households in each socio-economic category in the Latinobarómetro survey is: very high (8.36 percent), high (35.13 percent), middle (41.18 percent), low (12.56 percent), and very low (2.77 percent).

41 Focusing on increases in crime victimization rather than levels, Di Tella, Galiani, and Schargrodsky (2010) find that most of the increases in crime victimization in Argentina during the 1990s were concentrated among the poor.

42 Jaitman and Torre (2017) report higher homicide victimization among Afro-descendants in Brazil and in Trinidad and Tobago.

**Table 7 Victimization Rate, Inequality and Household Characteristics, Latin American and Caribbean Countries, 1995–2018.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable **Crime victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of a crime during the last twelve months, and 0 otherwise (source: Latinobarómetro). The Latinobarómetro survey was not performed in 1999, 2012 and 2014, and the crime victimization question was not included in 2000. **Gini index** defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Male** is a dummy variable that equals one if the respondent is a man, zero otherwise. **Age** is the age of the respondent. **Socio-economic status** are dummy variables for the socio-economic status of the household determined by the interviewer (the highest socio-economic status is excluded). **Education** are the years of education of the respondent. **Ethnicity** are dummy variables indicating the self-declared ethnicity of the respondent (available since 2007). 18 countries are included. All regressions include year and country dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses in columns 1, 3, 5 and 7. Standard errors clustered at the city level in parentheses in columns 2, 4, 6 and 8. *** p < .01; ** p < .05; * p < .1.

| VARIABLES | CRIME VICTIMIZATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Gini index | 0.0056** | 0.0056*** | 0.0059*** | 0.0059*** | 0.0047** | 0.0047*** | 0.0074* | 0.0074** |
| | (0.0022) | (0.0017) | (0.0022) | (0.0016) | (0.0021) | (0.0016) | (0.0038) | (0.0034) |
| GDP variation | −0.0026*** | −0.0026*** | −0.0026*** | −0.0026*** | −0.0023** | −0.0023*** | −0.0036* | −0.0036** |
| | (0.0009) | (0.0007) | (0.0009) | (0.0007) | (0.0009) | (0.0007) | (0.0021) | (0.0017) |
| Primary completion rate | −0.0013 | −0.0013** | −0.0013 | −0.0013** | −0.0010 | −0.0010* | −0.0016 | −0.0016* |
| | (0.0008) | (0.0006) | (0.0008) | (0.0006) | (0.0008) | (0.0006) | (0.0012) | (0.0009) |
| Poverty ratio at $1.90 a day | 0.0001 | 0.0001 | 0.0001 | 0.0001 | −0.0003 | −0.0003 | 0.0034 | 0.0034 |
| | (0.0017) | (0.0014) | (0.0017) | (0.0014) | (0.0017) | (0.0013) | (0.0040) | (0.0037) |
| Male | 0.0100*** | 0.0100*** | 0.0090*** | 0.0090*** | 0.0065*** | 0.0065*** | 0.0095*** | 0.0095*** |
| | (0.0025) | (0.0022) | (0.0024) | (0.0022) | (0.0023) | (0.0021) | (0.0027) | (0.0026) |
| Age | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0002 | 0.0002 |
| | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0004) | (0.0004) |
| Age^2 | −0.0000*** | −0.0000*** | −0.0000*** | −0.0000*** | −0.0000*** | −0.0000*** | −0.0000*** | −0.0000*** |
| | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Socio-economic status: high | | | −0.0473*** | −0.0473*** | −0.0316*** | −0.0316*** | −0.0297*** | −0.0297*** |
| | | | (0.0046) | (0.0042) | (0.0045) | (0.0041) | (0.0065) | (0.0057) |
| Socio-economic status: middle | | | −0.0833*** | −0.0833*** | −0.0471*** | −0.0471*** | −0.0473*** | −0.0473*** |
| | | | (0.0057) | (0.0050) | (0.0052) | (0.0046) | (0.0074) | (0.0063) |
| Socio-economic status: low | | | −0.1128*** | −0.1128*** | −0.0563*** | −0.0563*** | −0.0609*** | −0.0609*** |
| | | | (0.0063) | (0.0059) | (0.0058) | (0.0055) | (0.0083) | (0.0074) |
| Socio-economic status: very low | | | −0.1250*** | −0.1250*** | −0.0572*** | −0.0572*** | −0.0617*** | −0.0617*** |
| | | | (0.0098) | (0.0087) | (0.0090) | (0.0083) | (0.0134) | (0.0127) |

(Contd.)

| VARIABLES | CRIME VICTIMIZATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Education | | | | | 0.0103*** | 0.0103*** | 0.0098*** | 0.0098*** |
| | | | | | (0.0004) | (0.0004) | (0.0005) | (0.0005) |
| Ethnicity: Asian | | | | | | | 0.0274 | 0.0274 |
| | | | | | | | (0.0191) | (0.0182) |
| Ethnicity: black | | | | | | | 0.0093 | 0.0093 |
| | | | | | | | (0.0131) | (0.0118) |
| Ethnicity: indigenous | | | | | | | 0.0066 | 0.0066 |
| | | | | | | | (0.0134) | (0.0126) |
| Ethnicity: mestizo | | | | | | | 0.0168 | 0.0168 |
| | | | | | | | (0.0114) | (0.0109) |
| Ethnicity: mulatto | | | | | | | 0.0174 | 0.0174 |
| | | | | | | | (0.0119) | (0.0117) |
| Ethnicity: white | | | | | | | −0.0049 | −0.0049 |
| | | | | | | | (0.0112) | (0.0106) |
| Observations | 281,283 | 281,283 | 281,084 | 281,084 | 279,293 | 279,293 | 137,587 | 137,587 |
| R-squared | 0.0330 | 0.0330 | 0.0370 | 0.0370 | 0.0441 | 0.0441 | 0.0443 | 0.0443 |
| Country dummies | YES | YES | YES | YES | YES | YES | YES | YES |
| Year dummies | YES | YES | YES | YES | YES | YES | YES | YES |
| Standard errors | Region cluster | City cluster | Region cluster | City cluster | Region cluster | City cluster | Region cluster | City cluster |

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For the 2000 and 2010 waves, the Latinobarómetro survey included additional questions about the type of crime suffered by the interviewed households. In Table 8, we consider the two main types of crime: homicides and robbery/theft/larceny.[43] The comparison by socio-economic stratum is striking. The higher socio-economic groups report that they have suffered more robberies, thefts, and larceny, but the lower socio-economic households suffer more homicides. This is consistent with previous studies. For Colombia, Gaviria and Velez (2002) find kidnappings concentrated on the rich, and homicides on the poor. For Brazil, Soares (2006) presents evidence that homicides are concentrated among the lower socio-economic strata.

| VARIABLES | HOMICIDE VICTIMIZATION | | ROBBERY/THEFT/LARCENY VICTIMIZATION | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Socio-economic status: high | 0.0030 | 0.0030 | −0.0104 | −0.0104 |
| | (0.0021) | (0.0020) | (0.0115) | (0.0107) |
| Socio-economic status: middle | 0.0032 | 0.0032* | −0.0436*** | −0.0436*** |
| | (0.0022) | (0.0019) | (0.0134) | (0.0120) |
| Socio-economic status: low | 0.0072** | 0.0072*** | −0.0754*** | −0.0754*** |
| | (0.0029) | (0.0027) | (0.0143) | (0.0132) |
| Socio-economic status: very low | 0.0137*** | 0.0137*** | −0.0695*** | −0.0695*** |
| | (0.0045) | (0.0042) | (0.0243) | (0.0227) |
| Male | −0.0018* | −0.0018* | 0.0059 | 0.0059 |
| | (0.0010) | (0.0010) | (0.0047) | (0.0050) |
| Age | −0.0000 | −0.0000 | −0.0002 | −0.0002 |
| | (0.0002) | (0.0002) | (0.0008) | (0.0008) |
| Age^2 | −0.0000 | −0.0000 | −0.0000* | −0.0000* |
| | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Observations | 37,717 | 37,717 | 37,717 | 37,717 |
| R-squared | 0.0077 | 0.0077 | 0.0319 | 0.0319 |
| Country dummies | YES | YES | YES | YES |
| Year dummies | YES | YES | YES | YES |
| Standard errors | Region cluster | City cluster | Region cluster | City cluster |

**Table 8 Type of Crime and Socio-Economic Status, Latin American and Caribbean Countries, 2000 and 2010.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable **Homicide victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of a homicide during the last twelve months, and 0 otherwise. The dependent variable **Robbery/Theft/Larceny victimization** is a dummy which takes the value 1 if the respondent indicates that at least one of the family members has been the victim of robbery, theft or larceny during the last twelve months, and 0 otherwise (source: Latinobarómetro). **Socio-economic status** are dummies variables defining the socio-economic status of the respondent determined by the interviewer (the highest socio-economic status is excluded). **Male** is a dummy variable that equals one if the respondent was a man, zero otherwise. **Age** is the age of the respondent. 18 countries are included. All regressions include country and year dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses in columns 1 and 3. Standard errors clustered at the city level in parentheses in columns 2 and 4. *** p < .01; ** p < .05; * p < .1.

In Table 9, we consider a different dependent variable from the Latinobarómetro questionnaire: concern about becoming a victim of a violent crime.[44] The first two columns show a positive relationship between country inequality and concern about becoming a victim of a crime, but the coefficient is not significant. Moreover, although we previously found that men suffer more crime, they are less concerned. The quadratic age effect indicates that concern about crime peaks at age 60. As happened with crime victimization, the concern about crime falls among lower socio-economic strata (columns 3 and 4) and increases with educational attainment (columns 5 and 6).

43 The crime classifications differed between these two Latinobarómetro waves. We group robbery, theft, and larceny to allow comparability. Regarding homicides, the gender dummy refers to the respondent, not to the victim.

44 The questionnaire asks: "How often are you concerned about becoming a victim of a violent crime?" The four possible answers are: all or almost all the time, sometimes, occasionally, and never. We treat these four answers cardinally, but the results are similar if they are treated ordinally.

**Table 9 Concern about Crime Victimization and Inequality, Latin American and Caribbean Countries, 2007–2018.**

*Note:* Ordinary least squares (OLS) regression estimates. The dependent variable is the **Concern about being a victim of a violent crime** which can take four values: 1 (never), 2 (occasionally), 3 (sometimes) and 4 (all or almost all the time) (source: Latinobarómetro). The Latinobarómetro survey was not performed in 2012 and 2014, and the concern about being a victim of a violent crime was not asked in 2008. **Gini index** is defined from 0 to 100 (source: World Bank). **GDP variation** in constant prices defined in percentages. **Primary completion rate** is the number of new entrants (enrolled minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education. **Poverty headcount ratio at $1.90 a day** is the percentage of the population living on less than $1.90 a day at 2011 international prices. **Male** is a dummy variable that equals one if the respondent was a man, zero otherwise. **Age** is the age of the respondent. **Socio-economic status** are dummies variables defining the socio-economic status of the respondent determined by the interviewer (the highest socio-economic status is excluded). **Education** are the years of education of the respondent. 16 countries are included. All regressions include year and country dummies. The constant is not presented. Standard errors clustered at the region (subnational) level in parentheses in columns 1, 3 and 5. Standard errors clustered at the city level in parentheses in columns 2, 4 and 6. *** p < .01; ** p < .05; * p < .1.

| VARIABLES | CONCERN ABOUT BECOMING A VICTIM OF A VIOLENT CRIME | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Gini index | 0.0066 | 0.0066 | 0.0072 | 0.0072 | 0.0055 | 0.0055 |
| | (0.0095) | (0.0062) | (0.0094) | (0.0061) | (0.0093) | (0.0061) |
| GDP variation | −0.0050 | −0.0050 | −0.0053 | −0.0053 | −0.0053 | −0.0053 |
| | (0.0046) | (0.0035) | (0.0045) | (0.0035) | (0.0045) | (0.0035) |
| Primary completion rate | −0.0013 | −0.0013 | −0.0012 | −0.0012 | −0.0013 | −0.0013 |
| | (0.0029) | (0.0020) | (0.0029) | (0.0020) | (0.0029) | (0.0020) |
| Poverty ratio at $1.90 a day | −0.0003 | −0.0003 | 0.0004 | 0.0004 | 0.0019 | 0.0019 |
| | (0.0106) | (0.0078) | (0.0105) | (0.0076) | (0.0104) | (0.0076) |
| Male | −0.0941*** | −0.0941*** | −0.0964*** | −0.0964*** | −0.0997*** | −0.0997*** |
| | (0.0105) | (0.0089) | (0.0103) | (0.0087) | (0.0100) | (0.0085) |
| Age | 0.0121*** | 0.0121*** | 0.0121*** | 0.0121*** | 0.0121*** | 0.0121*** |
| | (0.0010) | (0.0011) | (0.0010) | (0.0011) | (0.0010) | (0.0011) |
| Age^2 | −0.0001*** | −0.0001*** | −0.0001*** | −0.0001*** | −0.0001*** | −0.0001*** |
| | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Socio-economic status: high | | | −0.0258* | −0.0258** | −0.0028 | −0.0028 |
| | | | (0.0156) | (0.0109) | (0.0157) | (0.0110) |
| Socio-economic status: middle | | | −0.0746*** | −0.0746*** | −0.0214 | −0.0214* |
| | | | (0.0172) | (0.0126) | (0.0170) | (0.0122) |
| Socio-economic status: low | | | −0.1387*** | −0.1387*** | −0.0551*** | −0.0551*** |
| | | | (0.0207) | (0.0176) | (0.0204) | (0.0169) |
| Socio-economic status: very low | | | −0.1903*** | −0.1903*** | −0.0877** | −0.0877*** |
| | | | (0.0350) | (0.0300) | (0.0342) | (0.0296) |
| Education | | | | | 0.0153*** | 0.0153*** |
| | | | | | (0.0013) | (0.0011) |
| Observations | 134,218 | 134,218 | 134,218 | 134,218 | 134,218 | 134,218 |
| R-squared | 0.0304 | 0.0304 | 0.0322 | 0.0322 | 0.0358 | 0.0358 |
| Country dummies | YES | YES | YES | YES | YES | YES |
| Year dummies | YES | YES | YES | YES | YES | YES |
| Standard errors | Region cluster | City cluster | Region cluster | City cluster | Region cluster | City cluster |

In summary, our analysis of the distribution of crime victimization across population groups suggests several interesting results. Both male and female homicides increase with inequality, but the male homicide elasticity is higher. Moreover, the share of male homicides is higher than the share of female homicides worldwide, but the ratio is almost two times larger in LAC countries. According to crime victimization surveys, young males suffer the main burden of crime. By socio-economic stratum, the higher-income (and more educated) groups suffer, in general, more victimization than poorer groups in LAC countries, although this is not the case on other continents. The analysis by type of crime shows that affluent Latin Americans suffer more robberies, but homicides in the region are concentrated among the poor.

## VII. CONCLUSIONS

The main conclusion of this paper is that income inequality and crime show a significant and positive relationship. This result is robust to the use of various homicide databases and crime victimization surveys, the inclusion of countries on all continents or a focus on Latin America and the Caribbean, the consideration of different sets of controls and standard error estimates, and the measurement of inequality by applying Gini indexes at the national and subnational levels. The significant and positive results also persist if historical variables are used to instrument for inequality in crime regressions, cautiously suggesting that a causal interpretation of the estimated effect is plausible, in spite of the potentially imperfect exogeneity of our instruments. Moreover, inequality is the only variable showing this robust regularity. Educational attainment, economic activity, income per capita, and poverty show much weaker and unstable relationships with crime.

The analysis of the distribution of crime victimization across groups also provides interesting results. Men suffer more homicides than women, and this ratio is higher in more unequal societies, such as the LAC countries. Moreover, men and youth suffer more crime than women and the elderly according to victimization surveys. By socio-economic stratum, high-income groups generally suffer more victimization than poorer groups in LAC countries, although this is not the case in other continents. Individuals that are more educated suffer higher crime victimization. Ethnic victimization differences do not seem strong in the LAC region. Finally, the analysis by type of crime shows that affluent Latin Americans suffer more robberies, but the poor suffer more homicides.

Although the study of the relationship between inequality and crime is not a new topic, we have analyzed it using new data from a recent period. The relevance of the problem in Latin America and the current events affecting the world make this revision particularly timely. The COVID-19 pandemic is having huge impacts on economic activity throughout the world, and its differential impacts are affecting unemployment, poverty, and inequality. Although early research (Nivette et al., 2021, Perez-Vincent, Schargrodsky and Garcia Mejía, 2021) suggests that, with fewer people and more police on the streets, lockdowns reduced crime in the short-run, our results warn that the coronavirus can become associated, through increased inequality, with a rebounded epidemic of crime in Latin America and the Caribbean.

## ADDITIONAL FILE

The additional file for this article can be found as follows:

- **ON-LINE APPENDICES.** Appendices A1–A4, Tables A1–A7 and Figures A1–A2. DOI: https://doi.org/10.31389/eco.413.s1

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## COMPETING INTERESTS

The authors have no competing interests to declare.

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