# Inequality and Victimization: an individual level analysis in Ecuador

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## PRELIMINAR DRAFT

## Abstract

Using data of the Ecuadorian Victimization Survey of 2011, we estimate the impact of inequality on different types of victimization by controlling for individual and environmental characteristics. This paper finds that income inequality at the canton level increases household victimization related to burglary. In contrast, the effect of income inequality on the probability of victimization against the individuals is negative when controlling for individual and geographic characteristics.

#### JEL Classification: D63, I30, K42, R12.

Key words: Income Inequality, Victimization, Individual Characteristics.

## 1. Introduction

South American countries are traditionally characterized by high levels of poverty, inequality and criminality. Despite a reduction in the poverty rate by 15 points during the period 1997-2014, the income inequality only fell four points and the gap of the income distribution per quintiles remains unchanged.<sup>1</sup> At the same time, United Nations ranks the South American region as the third most violent in the world.<sup>2</sup> According to Latinobarometer Perception Survey (2015), 45% of the citizens have been victims of crime.<sup>3</sup> Using data of 117,737 respondents of the Victimization Survey, this paper estimates the impact of income inequality on the probability of victimization in Ecuador, by controlling for cantonal, intra-cantonal and individual characteristics.

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<sup>&</sup>lt;sup>1</sup> In Latin America, the proportion of people in the bottom quintile increased from 3.4 to 4% between 1997 and 2014, while the top quintile changed from 57.9 to 54.0%. Data available at <u>www.estadisticas.cepal.org</u>.

<sup>&</sup>lt;sup>2</sup> After Southern Africa and Central America, South America has on average 16–23 homicides per 100,000 inhabitants (ranking of homicide rates by sub-region). See Bourguignon (2001) and Soares and Naritomi (2010) for more evidence on the patterns of crime in Latin America.

<sup>&</sup>lt;sup>3</sup> Data available at <u>www.latinobarometro.org</u>

The influence of income inequalities on criminal activities has been investigated by both the economics and sociological literature. According to the economics of crime literature, individuals decide to commit criminal acts depending on the differential expected returns of legal versus illegal activities (Becker, 1968; Ehrlich, 1973). This decision is influenced by the probability of apprehension and the severity of punishment (Becker, 1968); or the time allocated to either legal or illegal activities (Ehrlich, 1973). According to this cost-benefit analysis, income inequalities raise the gap between the return from illegal activities such as property crimes and the return from legal activities for low-income individuals that are placed in proximity with high-income individuals. This relationship between the income distribution and pecuniary crime was formalized by Chiu and Madden (1998). They define social classes depending on the quality of housing and the income level. In the model, at the equilibrium, the poorest individuals decide to burglar high-quality housing that belongs to the richest individuals. A rise in income inequalities leads to more crime because highquality housing becomes even more attractive to burgle. However, the relationship between income inequality and crime in a given neighborhood can be non-linear. Assuming that rich individuals living in high-quality housing can protect themselves against burglary by installing an expensive and effective technology against crime, the level of crime fall in rich neighborhoods and rise in poor ones.

The sociological literature provides explanations for both property and violent crimes. According to Merton's (1938) strain theory, the society establishes the success as a goal for the entire population but the social structures restrict the access and opportunities to certain groups of population (predominantly located at the bottom of those structures). Unsuccessful individuals are frustrated and commit crime as response to discriminatory social structures, *whatever the net return to crime*. Importantly, the frustration of those individuals is exacerbated when they are confronted by the success of those around them (and therefore the level of inequality), which in turn could lead them to commit violent crime. The social disorganization theory also relates crime to inequalities, as far as they are associated with poverty (Shaw and McKay, 1947). Together with other structural disadvantages such as poverty, ethnic heterogeneity or residential mobility, inequality weakens community cohesion by limiting informal social networks and the ability of the community to exercise informal social control over the activities that occur within its boundaries. This leads to more crimes by reducing the social cost of crime.

Those predictions regarding the influence of inequality on crime have been widely confronted with the data. In a recent study, Rufrancos *et al.* (2013) analyze 17 time-series studies and provide evidence that income inequality raises property crimes, but the effect is mixed on violent crimes. An important conclusion from their study is that the methodology and the geographic level matter for the strength of the estimations. To illustrate this point, we refer to studies using different econometric techniques at different geographic levels. At international level, Fajnzylber et al. (2002) perform a GMM estimation of crime rates to account for criminal inertia. The results show that income inequality exerts a significant and positive impact on homicide and robbery rates. Kelly (2000) considers the U.S. county level, to estimate a Poisson regression of both property and violent crime rates. Estimations indicate that income inequality contributes to explain violent crimes but not property crimes. Using data on 2000 Mexican municipalities, Enamorado et al. (2016) evaluate through a 2SLS estimation the impact of inequality on crimes related to the Mexican drug

war. They show that a one-point increase in the income Gini raises by 36% the number of drug-related homicides per 100,000 inhabitants. Finally, Demombynes and Özler (2005) investigate a lower geographical scale by using data on police precincts in South Africa. Results from the Negative Binomial estimation reveal that inequality is positively related to burglary and vehicle theft. Regarding violent crime rates, what matter is inequality at the criminal catchment area level rather than the precinct level.<sup>4</sup>

While these studies have been improved by considering local crime determinants, they still suffer an important drawback. Even if some of these studies (Demombynes and Özler, 2005;) rely on victimization data to correct the under-reported bias associated with police data, they still use aggregated data which makes it impossible to control for individual characteristics of victims.<sup>5</sup> This is an important problem as far as the above theories make different predictions regarding the income status of potential victims. The Strain theory suggests that criminals should target high-income individuals, unless they can afford an effective protection against crime. In contrast, sociological theories do not mention clear predictions regarding victims or violent crime. Our main contribution consists in investigating the inequality – crime relationship in Ecuador through the use of victimization data as dependent variable.<sup>6</sup> Therefore, our interest primarily relies on crime prevalence rather than crime incidence<sup>7</sup>. Does inequality affect the prevalence of property and violent crimes? Is this effect significant when controlling for the individual characteristics of victims? Do the geographic factors matter for this inequality-victimization relationship?

To answer those questions, we estimate the impact of income inequality on property *versus* violent crime victimization, by controlling for cantons, intra-cantons and individual characteristics. Our database combines two surveys. First, the Victimization Survey provides information on the types of crime, the individual income and socioeconomic characteristics of people in 1917 zones (intra-cantons) of 177 cantons. Second, the Unemployment Survey provides data regarding the income Gini index at the cantonal level. Our main findings are: a) Income inequality, at the cantonal level, increases the probability of victimization by burglary. b) Income inequality, at the cantonal level, reduces the probability of victimization of individuals related to robbery.

<sup>&</sup>lt;sup>4</sup> Demombynes and Özler (2005) define the "police precinct" as the area where the crime occurred while the "criminal catchment area" contains the own precinct and the bordering precincts where the criminal may live. <sup>5</sup> This is crucial to address the under-reporting issue when considering the relationship between crime rates

and inequalities. More unequal areas are often associated with a higher poverty rate, and one can expect the rate of reporting crimes to be lower among poor individuals. Consequently, the underestimation of crime associated with official data could be more severe in poor and unequal areas.

<sup>&</sup>lt;sup>6</sup> To our knowledge, there are few existing papers that estimate the victimization probability. Levitt (1999) uses the U.S. National Crime Victimization Survey to recognize the potential victims of crime regarding income groups and skin color. Gaviria and Vélez (2001) use the Social Survey of Fedesarrollo to understand the distribution of crime across victims in Colombia. Hémet (2013) uses the French Victimization Survey to identify the determinants of victimization at the neighborhood level.

<sup>&</sup>lt;sup>7</sup> According to the U.S. National Institute of Justice, incidence measures how many crimes take place during a particular period of time whereas prevalence measures how many people experience a particular crime during a specific period of time.

The remainder of the paper is as follows. Section 2 presents some stylized facts of inequality and victimization in Ecuador. Section 3 describes the econometric application and the results. Section 4 concludes.

# 2. Income inequalities and victimization in Ecuador: some stylized facts

## 2.1. The Latin American context

Using data from the Economic Commission for Latin America and the Caribbean (hereafter, ECLAC), we first describe statistics of income inequalities and victimization in South American countries, over the period 2001-2011 (Figure 1).<sup>8</sup> Income inequalities have been reduced in all countries for which data is available, with the strongest decline of the Gini index (by at least 8 points) in Bolivia, Brazil and Venezuela. Meanwhile, all countries except Columbia have seen their percentage of victimization falling. Note that the decline in victimization reaches a maximum of 24 percentage points in Ecuador, where the Gini index also fell by 6.6 points over the ten-year period.







In the following, we focus on the case of Ecuador by describing how we collected data on crime (section 2.2.) and income inequalities (section 2.3.).

# **2.2. Victimization Data**

It is well-known that developing countries are confronted with specific crimes that are not common in the developed world. For example, verbal abuse in public transport of El Salvador (Natarajan et al., 2015); street drug markets in Brazil (Oliveira et al., 2015); drug cultivation areas and drug trafficking in the Andes (Bagley, 2013). In the Ecuadorian case, the National Police permanently fight against micro-trafficking of drugs, illegal possession

<sup>&</sup>lt;sup>8</sup> The measure of income inequality is defined by the Income Gini index. ECLAC uses Latinobarometer surveys to calculate the proportion of people victimized, in the past year, among the population aged 18 years and older. ECLAC database does not present complete statistics for Argentina and Uruguay.

of weapons, vehicle theft and pickpocketing, among other crime.<sup>9</sup>Unfortunately, the Latinobarometer database does only provide rough data on victimization.<sup>10</sup>

This restriction leads us to rely on another information source, namely the Victimization and Perception of Insecurity Survey (ENVIPI) designed by the Ecuadorian National Institute of Statistics and Census (INEC). ENVIPI collects information of 117,737 households where only one person (aged 16 years and older) is randomly chosen to answer the questions on victimization and insecurity perception.<sup>11</sup> The survey is organized in different modules. The household module collects information regarding the characteristics of all residents (sex, age, education, occupation, ethnicity, average monthly income). Then, the informant module asks the randomly chosen respondent whether or not he was victimized during the past year (year 2010) and the type of crimes (see Appendix A for the classification of crimes). Importantly, the survey collects information regarding the canton and zone<sup>12</sup> where the informant resides, but also whether or not the crimes were perpetrated in the canton of residence.

Table 1 provides the prevalence rates by types of crime and victims. The prevalence rate measures the risk of experiencing at least one crime in a given period.<sup>13</sup> The classification of crimes depends on whether the offenses were perpetrated against the household or against the individual. Crimes against households (burglary, vehicle theft and vehicle accessories theft) all consist in property crimes that are related to economic incentives. In contrast, crimes against individuals consists in robberies, fraud or violent crimes (threat or intimidation, physical violence, kidnapping, others). The statistics reveal that 18.85% of the surveyed population was victimized (any crime) in the past year and 83.7% of them declare that those offenses happened in their own canton (INEC, 2011).<sup>14</sup> Regarding households, 3.76% of families suffered burglary but the number of occurrences represents more than half of crimes against households owning a vehicle experienced accessories theft), and represents 39% of crime events against households. Regarding crimes against individuals, 10.32% of households declared having been victims of robbery, whereas the prevalence rates regarding other types of crime are lower than 3%. Unsurprisingly, the large majority

<sup>&</sup>lt;sup>9</sup> See the official website of the National Police of Ecuador

<sup>(</sup>http://www.policiaecuador.gob.ec/category/comunicamos/noticias/).

<sup>&</sup>lt;sup>10</sup> Latinobarometer is a public perception survey conducted every year in 17 countries of Latin America. Regarding data on crime, it collects three questions about security perception, two questions about drugs use and one question about victimization. Specifically, the question of victimization is: "*Have you or a relative been assaulted, attacked, or the victim of a crime in the last 12 months?*"

<sup>&</sup>lt;sup>11</sup> The precise methodology is described in "Metodología de la Encuesta de Victimización y Percepción de Inseguridad - 2011" (INEC, 2013), available on the website www.ecuadorencifras.gob.ec.

<sup>&</sup>lt;sup>12</sup> The Political Administrative Division organizes the country in 24 provinces, 224 cantons and 1024 parishes. However, only for methodological purpose, INEC created two additional divisions to collect data of housing: zones and sectors. The group of up to fourteen housing forms a *census area*. The *sectors* are the group of fourteen census areas and *zones* refer to the group of 10 sectors (INEC, 2010). Because of software power restrictions, we calculate variables only at zone level.

<sup>&</sup>lt;sup>13</sup> The prevalence is equal to the number of victims of a specific crime, expressed as percentage of the specified population.

<sup>&</sup>lt;sup>14</sup> Note that a person could have been victimized by different types of crime in the same year.

Table 1. Victimization by type of crime					
Type of victims	Variables	Type of Crime	Prevalence rate	N° occurrences	
Crimes	Burglary	Burglary	3.76%	4432	
against the	Vehicle	Vehicle Theft	0.37%	438	
household	Theft	Vehicle accessories Theft	2.64%	3109	
Crimes against individuals	Robbery	Robbery	10.32%	12150	
	s Violence	Threat/Intimidation	2.05%	2414	
		Physical Violence	0.46%	539	
		Kidnapping	0.08%	97	
		Others	0.30%	359	

(78%) of crimes toward individuals consisted in robberies, followed by acts of threat/intimidation.

Table 1 Westimization by type of anima

Source: ENVIPI 2011, INEC.

Now, we look at the spatial distribution of victimization in urban cantons. In Ecuador, the victimization follows a similar pattern as Glaeser and Sacerdote (1999) for the US or Gaviria and Pagés (2002) for Latin America countries: the crime rates increase with city size. Figure 2 presents the prevalence rates by city size (panel a) for households and (panel b) for individuals). Most types of victimization tend to be increasing with city size, although we do observe non-linearities for crimes against households. In Ecuador, the risk of experiencing at least one crime is twice higher for individuals living in the three largest cities (Guayaquil, Quito and Cuenca) than for those living in cities populated by 10,000 inhabitants or less.



Source: ENVIPI 2011, INEC

#### 2.3. Inequality and Income

We collect data on income inequalities from the National Survey of Employment-Unemployment (ENEMDU 2011, INEC). ENEMDU is the household survey that collects data on the revenues and the status of individuals on the labor market. This survey is representative at the national and provincial levels, in urban and rural areas. Using information on revenues (wages, rents, assets, remittances, retirement pensions and state pensions), we obtain the average income per person at the canton level. This variable is used to build the measures of income inequality (section 2.3.1) and personal income (section 2.3.2.) that will be used as explanatory variables.

## 2.3.1. Inequality measure

The Gini coefficient measures the deviation (from equality) of the income distribution in a given area  $G = |1 - \sum_{k=1}^{n-1} (X_{k+1} - X_k)(Y_{k+1} - Y_k)|$ , where X is the cumulative proportion of population and Y is the cumulative proportion of individual income. In Ecuador, the national value of Gini coefficient was 0.47 in 2011. At the regional level, Pichincha (a province in the Highlands) and Santa Elena (a province in the Coast) present the lowest values of Gini (around 0.4). By contrast, Bolivar and Imbabura in the Highlands are the most unequal provinces (above 0.53). For the purpose of this study, we compile the Gini coefficient at cantonal level.<sup>15</sup> Results are described in Figure 3. Cities of the Coast (at the left) show the lowest inequality (Gini coefficient below 0.22) while the cities located in the Highlands (at the center) and the Amazon region are the most unequal (above 0.67).

Figure 3. Map of Income Gini by urban cantons



Source: ENEMDU 2011, INEC

#### 2.3.2. Personal Income

The personal income  $I_k$  (k can be either h household or i individual) explains the probability of victimization due to economic incentives. The household module of ENVIPI collects information of the monthly average income of the households  $I_h$ . To approximate the variable of individual income  $I_i$ , we thus divide the household income over the number of household members.

<sup>&</sup>lt;sup>15</sup> ENEMDU provides the Gini coefficient at the province level only. We extend their dataset to obtain the Gini coefficient at the cantons. Our methodology is described in Appendix B.

$$I_i = \frac{I_h}{\text{number of household members}} \tag{1}$$

Figure 4 compares the Gini and the personal income depending on the population of the canton where the respondent lives. As expected, the revenue is higher in larger cantons (Baum-Snow and Pavan, 2013). In Ecuador, the monthly household revenue is \$915 in the most populated cantons. In contrast, households living in small cantons gain, on average, \$436 per month. Regarding the individual income, this trend follows a concave shape. For instance, the lowest individual revenue is achieved in cantons of 10,000-50,000 inhabitants. Meanwhile, people living in small cantons have, on average, the same revenue than those living in cantons of 50,000-100,000 inhabitants. In larger cantons (from 100,000 residents), individual income increases with city size. Interestingly, the Gini coefficient reaches its highest level in cantons with 50,000-100,000 inhabitants but falls in the largest cities.



Source: ENEMDU 2011, INEC

# 3. Empirical Application and Results

Now, we describe the methodology to estimate the impact of inequality on the probability of victimization (section 3.1) and the results obtained (section 3.2).

#### **3.1. Specification of the model**

Let  $V_{k,c}$  be a binary response variable of victimization against either household h or individual i, in canton c. This variable takes the value 1 if a household (or the respondent) was victimized at least once during the past year, and 0 otherwise. The baseline regression is described in the equation (2).

$$V_{k,c} = \alpha + \beta_1 Gini_c + \beta_2 Inc_h + \beta_3 Inc_h^2 + \beta_4 (Gini_{90} * Inc_h) + \beta_5 (Gini_{10} * Inc_h) + \gamma X_k + \varepsilon_{k,c}$$
(2)

where  $Gini_c$  is the Income Gini coefficient in the canton,  $Inc_h$  is the monthly income of the household,  $X_k$  is a vector of victim characteristics and  $\varepsilon_{k,c}$  is the error term. Note that we include the quadratic form of personal income in order to test for the existence of nonlinearities in the relationship between the income and the probability of victimization (see Appendix C). We also test for the specific impact of the income of the victims living in the most and least unequal cities. This effect is captured by the interaction of the income variable with  $Gini_{90}$  and  $Gini_{10}$ , which refer to the 90<sup>th</sup> and 10<sup>th</sup> percentiles of income Gini, respectively.

The vector  $X_k$  refers to social and demographic control variables regarding the characteristics of the victim, such as the gender, age, years of schooling and whether is occupied in any economic activity. These individual variables correspond to the characteristics of the household head (respectively, characteristics of the respondent) when the victim is a household (respectively, the respondent). For crimes against households, we also include the number of occupied people in the household. For crime against individual, we instead include the ethnic characteristics (indigenous, black, mestizo or "montubio").<sup>16</sup> The final dataset comprises 98,649 observations. Appendix D summarizes the description of all these variables, provides descriptive statistics and includes the correlations.

This estimation is tested by considering the total number of crimes, but also for specific types of crime. Regarding victimization against the households, we distinguish between vehicle theft (whether it is the whole vehicle or some of its accessories) and burglary. Regarding victimization against the individuals, we distinguish between robbery and violent crimes. Theoretical explanations above suggest that inequality could exert a positive effect on total crime. Under the intuition of Chiu and Madden (1998), we expect that inequality raises the likelihood of victimization by property crimes (ex: burglary, robberies, and vehicle thefts). In that case, the personal income  $Inc_h$  can be perceived as a return for delinquents and we expect the personal income increases the likelihood of victimization. By contrast, sociological theories predict that inequalities should influence violent crimes, as far as they result from frustration and emotional feelings. Regarding these violent crimes, we also expect that the income of the victim should not be significant since the economic incentives are not at work in that theory.

Whereas equation (2) accounts for local characteristics through income inequality in cantons, it fails to account for other local determinants of crime recently emphasized by the urban economics literature (Verdier and Zenou, 2004; Gaigné and Zenou, 2015). We therefore test the following extended regression:

$$V_{k,c} = \alpha + \beta_1 Gini_c + \beta_2 Inc_h + \beta_3 Inc_h^2 + \beta_4 (Gini_{90} * Inc_h) + \beta_5 (Gini_{10} * Inc_h) + \gamma X_k + \delta Y_g + \varepsilon_{k,c}$$
(3)

where  $Y_g$  stands for a vector of control variables at the canton level (g=c) or at the zone level (g=z) collected from the National Population Census of 2010.<sup>17</sup> The "zone" refers to a statistic geographical unit at the intra-canton level that covers 1960 housing approximately (INEC, 2010). First, the zone variables aim at capturing the spatial heterogeneity that influences crime at the lowest geographical level (for example local segregation by ethnicity). Following Shaw and McKay (1942) and Sampson and Wilson (1995), for a specific analysis in United States, black and white people do not experience similar environmental conditions. Indeed, ethnic segregation differentially exposes black people to

<sup>&</sup>lt;sup>16</sup> In Ecuador, 78% of population is mestizo, 7.03% are indigenous, 7.19% are black, 7.39% are montubio, and the rest corresponds to other ethnicity. National Population Census 2010.

<sup>&</sup>lt;sup>17</sup> The National Population Census collects complete information on demographic and social characteristics of the population at very local geographic levels. The last census corresponds to the year 2010.

difficult socioeconomic conditions and violence in the community where they live. In the Ecuadorian case, ethnic minorities (indigenous, blacks and montubios) still confront social segregation. For example, on average, ethnic minorities reach less years of formal education than mestizos and white.<sup>18</sup> Second, at an upper level, a large set of environmental variables control for the determinants of crime in the cantons. Regarding the factors reviewed in the literature (see chapter II "Crime Determinants: a Survey of the Literature"), we include the proportion of young men, the population density and the proportion of ethnic minorities. Importantly, we also control for the effect that internal migration flows within the country can exert on crime by measuring the residential mobility of individuals five years ago. Following the sociological approaches that relate deprived social conditions and crime (Merton, 1938), we include the variable *basic\_services<sub>c</sub>* which measures the proportion of households with access to electricity, potable water, sewerage and waste collection. Finally, the variables  $capital_c$  and  $elevation_c$  account for the geographic characteristics of cantons. Controlling for the cantons that are capital of province allows capturing the intrinsic factors of urban locations (Baum-Snow and Pavan, 2013; Duranton and Puga, 2015) while the height of cantons (in meters above sea level) measures the unique location of Ecuadorian cantons.

## 3.2. Results

# 4. Conclusion

This paper provides new evidence on the analysis of inequality as determinant of victimization. Our estimations, at individual level, cover several categories of crime and control for individual, zone and city characteristics. Results show that income inequality has ambiguous effect on the probability of victimization depending on the type of crime. Income inequality exerts a positive effect on the victimization by burglary but a negative effect in the victimization by robbery.

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<sup>&</sup>lt;sup>18</sup> In 2011, indigenous, montubios and black completed on average 5, 6 and 8 years of formal education, respectively; while mestizos and whites achieved at least 10 years of formal education. Official statistics at website: <u>www.sni.gob.ec</u>

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# APPENDIX

#### Appendix A

Table A1. Definitions of Victimization variables

Туре	Description			
Against households				
Household Victimization	Any offense against the household			
Burglary	Breaking and entering in house, department, room, etc.			
Vehicle Theft	Total theft of vehicle, motorcycle, truck.			
Vehicle Accessories Theft	Theft of accessories, tools and vehicle parts.			
Against individuals				
Individual Victimization	Any offense against the individuals.			
Robbery	Robbery against the person, done with the intention to appropriate of			
	personal stuff.			
Threat/ Intimidation	Intimidation of hurting the individual or the family, for a particular reason,			
	without asking for money or any exchange.			
Physical Violence	Hurt by gunshot, cut, hit or push by a person on purpose to cause damage.			
Kidnapping	Unlawfully hold against the will, to ask for money, in exchange of freedom.			

Other	Any other crime as Attempted murder, sexual crimes, betrayal of trust, etc.
Fraud	Trick to get cash in exchange of prizes. It includes credit card cloning.

#### Source: ENVIPI, INEC. Methodology of Victimization Survey in Spanish only.

## **Appendix B**

The National Survey of Employment and Unemployment (ENEMDU 2011) is a household survey specialized in labor market and revenue information. The periodicity ensures a quarterly collection with differentiated coverage. The months of March and September stand on 6,876 households; while the rounds of June and December cover 21,768 households. The representativeness of the survey relies on national and provincial levels, as well as in five principal cities.

To improve the efficiency and precision of estimators, the survey respects a sample design based on primary units, stratification and weighting factor. First, the primary sampling units –psu are geographical limits with 12 housing inside. The ENEMDU has 32,129 psu in total. Second, the stratification is the process of clustering primary sampling units by similar socioeconomic characteristics. Then, the stratified units stay on 11 domain categories. The domains are Quito, Guayaquil, Cuenca, Machala, Ambato, other urban Highlands, other urban Coast, urban Amazon, rural Highlands, rural Coast and rural Amazon. Third, the weighting factor is the instrument used to expand the sample data to the whole population. Basically, a weighting factor of a household is the inverse of the selection probability.

Given those parameters, ENEMDU only provides information at provincial level. However, the specificity of this study claims for identifying the inequality effect in cities. On that purpose, we create a new domain category with 47 domains using the round of December. It combines data of 23 provinces with urban/rural area. The last domain takes information of Non-defined cities. To ensure the representativeness of socioeconomic characteristics in cities, we only validate variables where the confidence level (error/coefficient) stays lower than 0.25 in, at least, 70% of cities.

# Appendix C

				51.		
Variable	Description	Source	Mean	Dev	Min - Max	Observ
Inequality and Income variables						
Gini	Income inequality in canton	ENEMDU	0.44	0.09	[0.21, 0.67]	165
Inc <sub>h</sub>	Household Income (1000 usd)	ENVIPI	0.49	0.59	[0.01, 20]	101536
Household Head Characteristics						
Gender	Gender of household head. Man=1, woman=0	ENVIPI	0.75	0.43	[0, 1]	117737
Age	Age of household head in years	ENVIPI	47.76	15.75	[15, 97]	117737
Schooling	Years of schooling approved by household	ENVIPI	9.84	4.99	[0, 23]	117513
	head					
Occupancy	Whether household head occupied in any	ENVIPI	0.84	0.36	[0, 1]	117737
	economic activity. Occupied=1, Not					
	occupied=0					

C+

## **Appendix D**

Table D1. Variables: description and statistics

Figures D1. Scatter plots victimization and personal income. Estimations include quadratic term of Income Panel (a) Household Panel (b) Individual

hh	economic activity	EINVIPI	1.07	1.01	[0, 11]	11//5/
	Respondent Characte	eristics				
Gender	Gender of respondent. Man=1. woman=0	ENVIPI	0.43	0.50	[0, 1]	117737
Age	Age of respondent in years	ENVIPI	40.42	17.09	[16, 97]	117737
Schooling	Years of schooling approved by respondent	ENVIPI	10.49	4.79	[0, 23]	117639
Occupancy	Whether respondent occupied in any economic activity. Occupied=1, Not occupied=0	ENVIPI	0.64	0.48	[0, 1]	117737
Ethnicity	Ethnicity identified by the respondent him/herself. Mestizo is the baseline	ENVIPI				
	-Indigenous	ENVIPI	0.03			3646
	-Black	ENVIPI	0.07			7999
	-Montubio	ENVIPI	0.07			7829
	-Mestizo	ENVIPI	0.83			97657
	Zone Characteris	tics				
Young men	Proportion of men aged 15-24 years old over total men	CPV 2010	0.19	0.02	[0.07, 0.54]	1917
Indigenous	Proportion of indigenous living in the zone	CPV 2010	0.27	0.07	[0, 0.97]	1917
Black	Proportion of black people living in the zone	CPV 2010	0.08	0.10	[0, 0.98]	1917
Montubio	Proportion of montubio living in the zone	CPV 2010	0.06	0.09	[0, 0.77]	1917
Schooling	Average years of schooling approved by the population of 24 years old and over	CPV 2010	10.23	2.23	[3.07, 17.04]	1917
Occupancy	Proportion of people occupied in any economic activity (either employed or underemployed)	CPV 2010	0.40	2.23	[0.21, 0.57]	1917
Basic Services	Proportion of household with access to electricity, potable water, sewage and waste collection and disposal.	CPV 2010	0.48	0.32	[0, 0.94]	1917
	Cantonal Character	ristics				
Young men	Proportion of men aged 15-24 years old over total men	CPV 2010	0.19	0.01	[0.16, 0.25]	177
Density	Number of residents per square kilometer (1000 population)	CPV 2010	0.14	0.34	[0.0024, 4.04]	177
Indigenous	Proportion of indigenous living in the canton	CPV 2010	0.09	0.17	[0, 0.94]	177
Black	Proportion of black people living in the canton	CPV 2010	0.06	0.10	[0, 0.72]	177
Montubio	Proportion of montubio living in the canton	CPV 2010	0.11	0.17	[0, 0.80]	177
Migration rate	Internal migratory balance between cities	CPV 2010	-0.17	7.87	[-0.17, 27,31]	177
Basic Services	Proportion of household with access to electricity, potable water, sewage and waste collection and disposal	CPV 2010	0.30	0.21	[0, 0.89]	177
Capital	Whether the canton is also the capital of the province	DPA 2010	0.14	0.34	[0, 1]	177
Elevation	Elevation in meters above sea level (1000 m.a.s.l)		1.06	1.13	[0.003, 3.2]	177