Territorial Control & Homicide Rates
Rio de Janeiro, 2006-2016

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Chapter 1: Introduction

1.1 Introduction

Multiple research papers have studied the possible relations between socioeconomic conditions of a region and criminal activity. Other lines of study, however, emphasize the specificities of sociological dynamics in criminal activity in conjunction with public security policies in determining the prevalence of violence. My objective in this senior honors thesis is to show that these two perspectives complement each other: I will analyze the evolution of public safety in the state of Rio de Janeiro, Brazil over the span of a decade (2006-2016), taking into account changes in the Brazilian economic environment, the evolution of sociological phenomena such as paramilitary groups in urban environments, as well as public policies that the Rio de Janeiro government has adopted to address the problem of violent crime.

Before presenting my research question and hypothesis, it is necessary for us to delve into a brief history of crime in Brazil with a particular focus on the state of Rio de Janeiro. For several decades, violence has been a major concern in Brazilian society, especially in urban areas, since the disorderly growth of large cities, combined with unequal opportunities, infrastructure and income have helped construct a scenario of social inequality which still plagues the country today. The urban violence of the state of Rio de Janeiro is intrinsically related to the conflicts arising from drug trafficking gangs, which have increasingly occupied territories over the last decades in major cities throughout the state, especially within the metropolitan area of the city of Rio de Janeiro. This has led to a significant increase in clashes between traffickers and the police, and a high homicide rate in these regions, not only of police officers and drug-traffickers, but also of civilians. The areas most affected by these occupations are the favelas (nowadays commonly referred to as "communities"), areas in which, historically, the state has had a hard time to assert its dominance.

The effects of this so-called "War on Drugs", however, have not been limited to the areas occupied by traffickers. During the 1980s and 1990s, Rio de Janeiro became a city with high homicide rates, which also manifested itself at the state level, besides being the scene of several other crimes, such as armed robberies, in a systematic way, which is a constant source of fear for the common Fluminense[1] citizen. Parallel to the drug-trafficking gangs, in the early 2000s, a new phenomenon began to occur: the rise of *milícias*, or paramilitary groups, acting in areas where state presence has also historically been weak or not present at all. These militia groups expanded a great deal in the "West Zone" of the city of Rio de Janeiro, where new urban developments arose in this time period, as well as in the *Baixada Fluminense*, the poorest region of the Metropolitan Area of Rio. The rise of militia groups added a new dynamic to the crime scene in the Greater Rio area over the past 20 years, being distinguished from regular drug-trafficking groups in its modus operandi.

A major change in terms of public security policy in Rio de Janeiro occurred in 2008, when the government set up the first of the Police Pacification Units (UPPs). This policy, unlike the invasions and seasonal occupations that traditionally marked the favelas of Rio de Janeiro, is distinguished by the invasion and subsequent permanence of the military police in order to assure the stabilization of the area, in an attempt to eliminate nonstate actors. The great differential of the UPPs in relation to the old way of combatting traffic in the communities is the concept of presence of the state where it was not able to act before, thus damaging the impact of trafficking in the communities. On an economic level, in 2012, Brazil began to enter a recession period, with slow economic activity, ultimately culminating with the nominal GDP shrinking 3.9% in 2015. This economic crisis was also likely a determinant factor in the increase in crime rates starting in 2012,

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[1] Demonym for residents of Rio de Janeiro state

which I will include into my analysis of homicide rates by measuring GDP per capita as an independent variable.

Keeping all of these different factors in mind (socioeconomic development, state presence and nonstate control of territory), my central research question to this thesis is to understand what has caused homicide rates to vary in the state of Rio de Janeiro over the past decade through the lens of dispute for territorial control and socioeconomic indicators.

1.2 Hypothesis

In this thesis, I will argue that socioeconomic indicators cannot, alone, explain variations in homicide rates over time. In order to demonstrate this, I have come up with the following hypotheses: (1) State actors' efforts in the UPP program to reclaim territory controlled by criminal groups may have accounted for a temporary decrease in homicide rates, but this form of regaining territory is not sustainable in the long term; and (2) Areas controlled by nonstate actors, specifically militia groups, tend to follow opposite trends, with homicide rates increasing in areas where they act.

I will complement my hypothesis by addressing how economic variables do not act in isolation, but function in direct interaction with socio-demographic factors and with specific circumstances of public security, such as internal dynamics to the world of the crime and types of security policies adopted in each period.

To measure the evolution of different criminal phenomena in the state of Rio de Janeiro, I will use data available from the Institute of Public Security (ISP-RJ) on all forms of homicides, known as *letalidades violentas* or "lethal violences," in the given timeframe. I will analyze this data at a macro level of observation in municipalities of the state of Rio de Janeiro and classify

each region according to the strength of state presence, both in military and non-military ways, and militia presence. The reason that I am not including traditional criminal factions in my analysis is because these groups are present in almost every municipality of the state of Rio de Janeiro and are much harder to quantify than militia groups, which are a more recent and well-studied phenomenon, as well as easier to track.

For socioeconomic variables, I will measure levels of economic activity and human development indicators – average income per capita; participation in conditional cash-transfer programs; and child mortality rates. For this data, I will use information from IBGE. In addition to only taking into account a small amount of independent variables, the data I need will most likely not be available for the entire study period, which may prevent the application of models to statistically verify the causal relations between the economic and criminal conditions. Faced with these and other limitations, my findings should be considered more approximate rather than conclusive. Finding statistical correlations between the different variables, or even no correlations whatsoever, will help better understand what issues drive homicide rates to increase or decrease over a certain period of time.

In the second part of the thesis, I will move into the qualitative analysis of my study and focus on the relation of territorial control by state and nonstate actors in Rio de Janeiro, and how this relates to homicide rates. This will include an analysis of the UPP program and how it impacted homicide rates in areas where it was installed, as well as potential spill-over effects that may have occurred due to the UPP in areas where it didn't occupy. I will also analyze the impact of nonstate actors such as militia groups, and how these may be affecting violent crime rates in the state of Rio de Janeiro, particularly focusing on the metropolitan area.

In my final considerations, I will return to the motivating question of the thesis: how have the socioeconomic context and public policy choices for security and the dispute for control by state and nonstate actors, combined, affected the outcome of crime and violence rates in the state of Rio de Janeiro between 2006 and 2016? Keeping in mind that I would need to control for numerous variables, once again, I do not have the pretension to offer conclusive answers; however, I will highlight the importance of this debate to understand and confront one of the social problems that most compromises the quality of life of the population, both in Rio de Janeiro and in the rest of Brazil.

1.3 Literature Review

In this chapter, I will discuss the research related to the causes of variations in homicides rates. I will discuss two particular themes: socioeconomic explanations for criminality in general, which are featured as independent variables in the regression analysis, and the relation between homicide rates and disputes for territorial control, which will be the central issue of this thesis in the qualitative portion.

The literature on crime and its main causal factors is extensive. From an economic viewpoint, for Becker, engagement in criminal activity stems from a maximizing choice of agent in which one considers the returns and risks of criminal activity, so that incentives for individuals to commit a crime would be determined by the difference between the expected return on legitimate and illegitimate activities (Becker, 1968).

On the question of the relation between crime and poor income distribution there are theoretical divergences. In contrast to the economic theories that argue that the relationship is due to the differential of return between legal and illegal actions, sociological theories suggest that

inequality has a direct effect on crime, independent of the expected return on this activity. While some studies support the first hypothesis by Becker, other researchers such as Coser argue that the relationship between social inequality and violent crime rates can best be understood through the lack of social mobility: if people perceive their poverty situations to be permanent, they may be more likely to act on hostile rather than rational impulses, and thus commit violent crimes (Coser, 1967).

Demombynes and Özler's 2003 survey, which measures the effects of inequality on crime in South Africa, draws conclusions that are consistent with both economic and sociological theories regarding inequality and crime. Among the results found are the relation between property crimes and the return of criminal activity, while violent crimes are more likely to happen in areas where inequality is more accentuated. The analysis is made from a comparison between theories that explain variations in crime rates, dealing with the implications of violent crime and crimes against property separately (Demombynes & Özler, 2003).

Another study that presents a similar theme to the one seen above, focused on the Brazilian situation, is "Crime and Social Inequality in Brazil", where Mendonça, Loureiro and Sachsida attempt to identify the main determinants of crime in the country. Faced with the enormous disparity of characteristic income, the hypothesis that guides this study is that social inequality is of the utmost importance to explain violent crime rates. For this, they define the concept of *referential consumption.* This consumption "tends to follow the level of satisfaction enjoyed" (Mendonça et al, 2003). In this definition, the researchers state that the agent derives their dissatisfaction due to the difference between the referential consumption and the consumption that is within the constraint of its budget. They thus seek to demonstrate that there is greater dissatisfaction regarding the "referential consumption" in areas where the distribution of income

is most accentuated. The study also statistically demonstrates that there is a relationship between this dissatisfaction and remuneration required by agents in order to not engage in illicit activities (Mendonça et al, 2003).

The abovementioned studies are important to understand what causes violent crime especially in the context of Brazil, where social and economic inequality are a harsh reality faced by a great portion of the population. I will now present other papers that I've explored which seek to understand crime through the lens of territorial control, in particular regarding the presence of state and non-state actors.

In a paper studying the relation between control for territory and violent crimes in Rio de Janeiro, Gonçalves defines the idea of "territory" as a spacial-analytical entity, referring to the space delimited by power relations being politically shaped; territory is the product of control processes, domination and appropriation of the physical space, by both state and non-state agents, and should thus not be reduced to its legal-administrative dimension. The territory is therefore the geographic entity whose form and content influence the conformation of violent events, which can become more prevalent within certain territories over others (Gonçalves, 2017). Gonçalves refers to the term "illegal control of the territory" as "the exercise of a directive and repressor power over the territory," which, although not specifically provided for in the penal code, leads to the prevalence of violent crimes and the maintenance of illicit activities (Gonçalves, 2017).

Many recent studies on the space-power relationship are inspired by two main authors: Max Weber and Michael Foucault. They focused their attention on the spatial dimension and defense of modern power systems. Weber considers the state as the "social organism that legitimately exercises coercive force across a specifically delimited territory" (Weber, 1966). This coercive force, in turn, is organized by a bureaucratic administration, which establishes and

imposes the rules of the state. For Foucault, power escapes from formal logical force and penetrates ever deeper into social life (Foucault, 1977). Police power and other operations, according to Weber, rest on the legal norms that exploit, as Foucault suggests, the disciplinary technologies to monitor and control society (Weber, 1966). Thus, the issue of territorial control and population regulation has always been central to governments and the police (Foucault, 1977).

Beato and Zilli center their study of homicide rates in the Brazilian city of Belo Horizonte around the idea that the rapid urbanization of cities creates destitute areas in which the state loses control and violent crimes are more likely to occur. They claim that, in addition to reaching a very specific segment within the population as a whole, homicides in Brazil also demonstrate a rather focused spatial distribution pattern. Within large cities, homicides are extremely concentrated in areas of high social vulnerability, with little or no provision of public services, and intense urban deterioration (Beato & Zilli, 2015).

These studies indicate that criminality is thus more likely to flourish where the state neglects its population, as other groups will naturally come in to appropriate power over the territory. This is what has led large parts of urban areas in Brazil to become dominated by non-state actors.

Chapter 2: Case Selection & Independent Variables

2.1 Case Selection

When looking at the municipality of Rio de Janeiro, homicide rates have consistently been decreasing since 1991, with a few years slightly reversing the trend. Rates increased from 1997 to 2005, decreasing again until 2015, when homicide rates began slowly increasing once more. This progressive decrease in homicide rates has been widely attributed to improving socioeconomic conditions in the region, as well as a decrease in social inequality, returning to the idea of "referential consumption" presented by Mendonça et al.

Fig. 1: Homicide rates in the municipality of Rio de Janeiro, 1991-2017
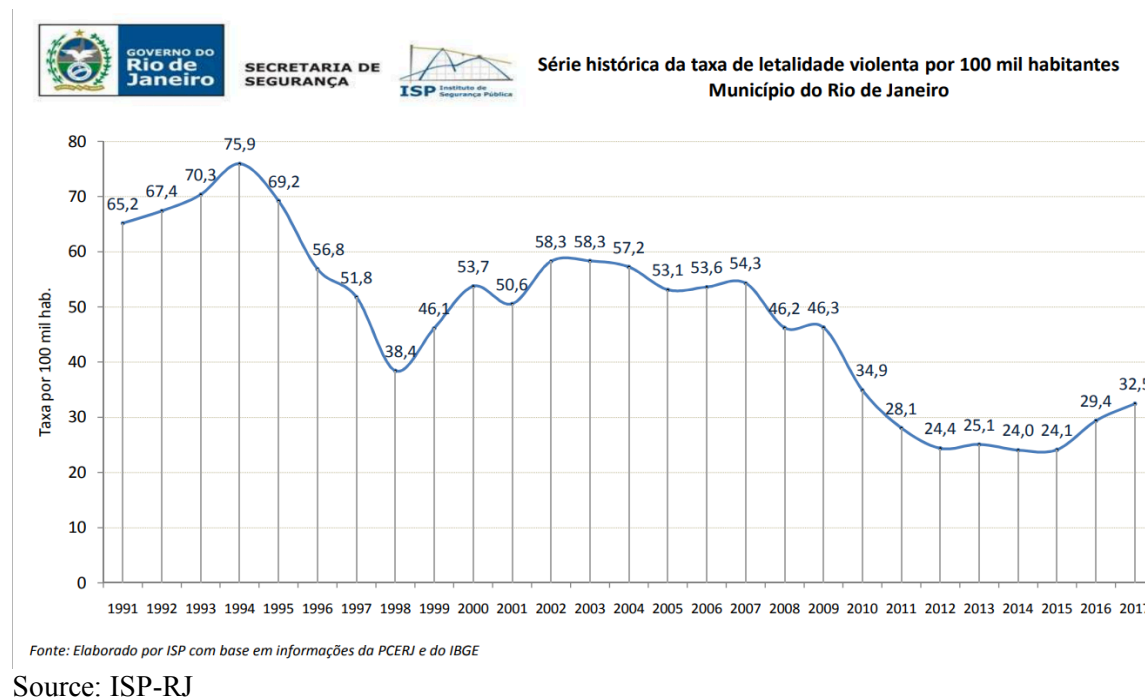
Source: ISP-RJ

Fig. 2: Homicide rates in the state of Rio de Janeiro, 1991-2017
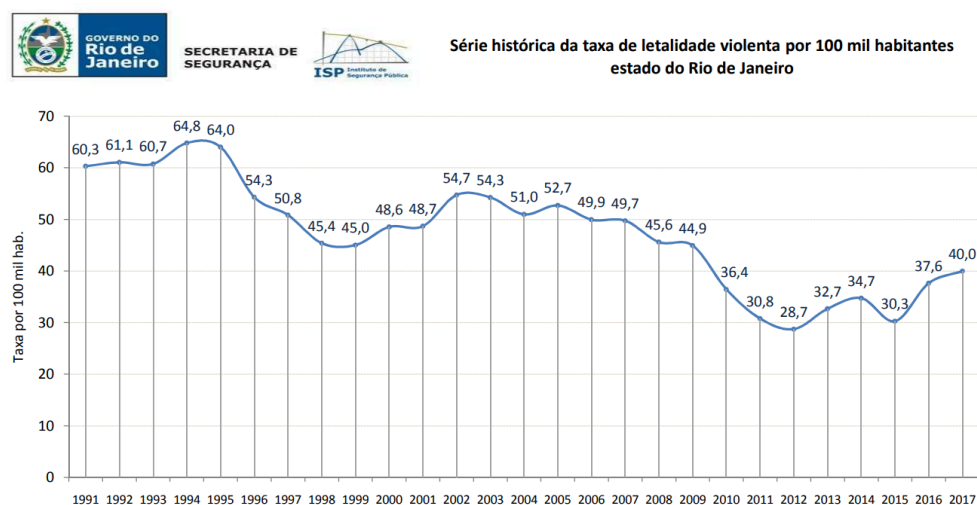
Source: ISP-RJ

We can see a similar but less accentuated trend while observing the state of Rio de Janeiro as a whole, with homicide rates gradually decreasing in the same time period, from 60.3/100,000 in 1991 to 40 in 2017. However, rates have been rising since 2012, when the state reached an all-time low of 28.7 homicides per 100,000 inhabitants.

Fig. 3: Homicide rates in the Baixada Fluminense, area of Metropolitan Rio, 2000-2018

In the Baixada Fluminense, the largest agglomeration of cities in the metropolitan area of Rio de Janeiro, comprising 7 municipalities with a combined population of 2,415,935 as of 2016, however, there is a less accentuated trend regarding homicide rates: their decrease is slower, and the homicide rates are higher than all other areas of the state and the state average as well. This is indicative that this region suffers more from violent crime than the municipality of Rio.

Fig. 4: Homicide rates in the interior of Rio de Janeiro, 2000-2018

In the interior of the state of Rio de Janeiro (all municipalities outside of the metropolitan area of the city of Rio de Janeiro), homicide rates are lower overall and follow a similar trend as seen in the city of Rio de Janeiro of decreasing over time. Therefore, we can infer that since 1991, homicide rates have been decreasing, both on the statewide and municipal level, and around 2011, the trend began to reverse, with increasing rates.

Figure 5: Homicide Rates in Brazil, 1996-2016
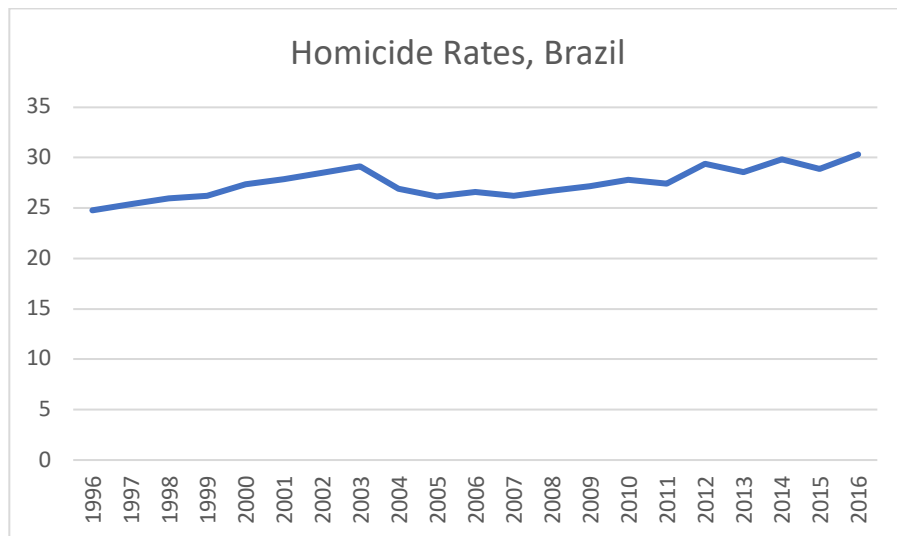
Source: Atlas da Violência

The homicide trends in Rio de Janeiro sit in stark contrast with those of the rest of Brazil as a whole, where homicide rates have been increasing overall, hitting the 30 per 100,000 mark in 2016 for the first time. This inconsistency seems puzzling: if homicide rates are increasing in Brazil as a whole, why are they slowly decreasing in Rio de Janeiro? For this reason, I selected this case to study in depth and better comprehend.

2.2 Dependent & Independent Quantitative Variables

I chose to use state and non-state actors as the main independent variables for my regression analysis. Specifically, these are: the presence of militia groups and the presence of the state both through law enforcement and through government-funded programs. To account for socioeconomic determinants of crime, I used the following two independent variables: municipal GDP per capita and child mortality rate. The dependent variable is homicide rates, as this is the most reliable source to evaluate levels of violent crime within a given territory.

Dependent Variable

Homicide Rates

In Brazil, homicides are known to be the most reliable source of measuring violent crime rates in an area because, when bodies are taken to a morgue, the pathologist performing the autopsy must rule the cause of death, and these statistics are rendered public. All data on homicide rates was collected from Rio de Janeiro's Institute of Public Security (ISP-RJ) and *Atlas da Violência,* a research organization dedicated to studying crime rates in Brazil, which is a part of IPEA.

Independent Variables

Militia Groups

Militia groups account for local dynamics and variations in homicide rates in the state of Rio de Janeiro for a variety of reasons. The term "militia," which began appearing in the early 2000s, refers primarily to ex-law enforcement agents (police officers, firefighters, prison guards) who have received formal training from state-sponsored institutions and take justice into their own hands in exchange for informal taxation on the community they are "serving" (Zaluar & Conceição, 2007).

Ignacio Cano, who studied how a militia's presence can be detected in a given area, gave a definition fitting the following categories for these kinds of groups (Cano, 2008):

1. Control of territory and population that lives in this territory by a group armed in an irregular way
2. The coercive character of this control
3. The mood of individual profit as central motivation
4. A discourse of legitimacy referring to the protection of residents and the establishment of order

5. Active and recognized participation of state agents

Largely gaining notoriety in the late 2000s, militias have expanded significantly throughout the state of Rio de Janeiro since their inception in the West Zone of the city. Since a great amount of militia members are composed of ex-police officers, they have been harder to contain than other criminal groups and are largely attributed for the increase in homicide rates seen in certain localities within the state of Rio.

By using militia groups as an independent variable, I am seeking to understand what their effect has been on violent crime rates throughout different municipalities in the state of Rio de Janeiro. Based on various studies and extensive internet research, I created a scaled variable, going from 0 to 4, on the strength of the militias in each municipality.

In order to assign a number to each municipality, I relied on a few different sources: first, a study created by Ignácio Cano where he gained access to the number of calls made per municipality to *Disque Denúncia*, a whistleblowing agency in Rio de Janeiro, regarding militia activity in a certain area (Cano, 2008). If no calls about militias were made in this time period whatsoever, then it makes sense to presume they had little to no activity in this municipality. Since this study ended in 2011, for the rest of the years, I relied on internet research and published papers to detect the presence of militias in certain municipalities. Within the internet research, I made use of news articles and police operations aimed at detaining *milicianos* (militia members). I also made extensive use of a document called *CPI das Milícias,* presented to Rio de Janeiro Superior Court by city councilman Marcelo Freixo in 2008, containing evidence of local politicians' activities and ties with militias. If politicians serving a certain municipality were implicated in the report, I gave the municipality an extra number, because this is indicative that the presence of militias is engrained there.

- Municipalities receiving a "0" refer to ones that did not receive any complaints on *Disque-Denúncia* between 2006 and 2011 and showed little evidence of containing militia activity in the years thereafter.

- Municipalities receiving a "1" refer to ones that received at least between 1 and 20 anonymous tips through *Disque Denúncia* between 2006 and 2011 or demonstrated a little bit of militia activity through news and police reports.

- Municipalities receiving a "2" refer to ones that received between 20 and 100 anonymous tips in the time frame or demonstrated a substantial amount of militia activity through news and police reports.

- Municipalities receiving a "3" refer to ones that received between 100 and 500 anonymous tips in the time frame or demonstrated a significant amount of militia activity through news and police reports.

- Municipalities receiving a "4" refer to ones that received above 500 anonymous tips in the time frame or demonstrated an alarming amount of militia activity through news and police reports after 2011.

Number of residents served per police battalion

My next independent variable to measure the level of state presence per municipality is the number of residents served by police battalion. The state of Rio de Janeiro is served by 38 different military police administrative units, known as battalions. I initially wanted to calculate the number of police officers for every 1,000 residents per municipality, as this would provide a clearer picture of how well policed different communities are, but this information was not available through any official government sources. An alternative that I found was to calculate the number of residents served per each police battalion. Some police battalions span multiple municipalities, while others

serve specific neighborhoods within municipalities, this being the case in the city of Rio de Janeiro. For the city of Rio, I summed the number of citizens serve by all police battalions in order to calculate the average for the city.

In order to measure the strength of policing in each municipality, I created another a scaled variable, this time from 1 to 5, or weakest police presence to strongest police presence:

- Municipalities receiving a "1" have a population of at least 1 million residents served by one police battalion.

- Municipalities receiving a "2" have a population between 750,000 and 1 million served by one police battalion.

- Municipalities receiving a "3" have a population between 500,000 and 750,000 served by one police battalion.

- Municipalities receiving a "4" have a population between 250,000 and 500,000 served by one police battalion.

- Municipalities receiving a "5" have a population beneath 250,000 served by one police battalion.

Map 1: Military police battalions and the respective municipalities they serve
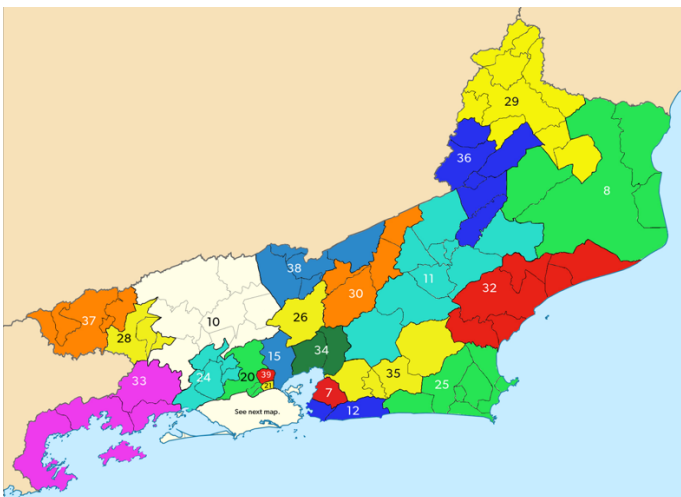
Source: map created by me based on information available on PMERJ website

Map 2: Military police battalions and they neighborhoods they serve in the city of Rio
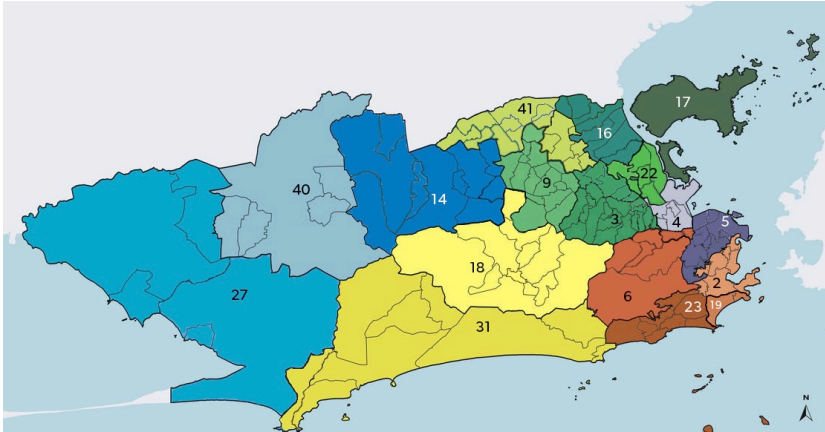
Source: map created by me based on information available on PMERJ website

Municipal participation in cash-transfer programs

Bolsa Família is a federal government program of conditional cash transfer that benefits approximately 11 million families in Brazil living in extreme poverty or poverty. The program defines as "extremely poor families" those who have a per capita monthly income of less than R$ 60, and as "poor" those who survive on less than R$120 (Soares et al, 2007). It was instituted in 2004 as the result of the unification of already existing federal government social programs of redistribution of income, such as *Bolsa Escola* and *Fome Zero.* In its creation, Bolsa Família had two objectives: to reduce poverty and to interrupt its intergenerational cycle. The first would be achieved through income transfer, and the second through monitoring compliance with education and health conditionalities of the program, which consist of regular attendance of children in school and participation in nutritional counseling and care programs related to the health of children and pregnant women. The idea is that these conditionalities would provide access to outbound ports for future generations (Kerstenetzky, 2009).

As an independent variable, Bolsa Família would provide an accurate measure for how many families are living in poverty or extreme poverty per municipality in a given year. A positive

statistical correlation between homicide rates and cash transferred to each municipality/how many families were benefitted by the program could further the hypotheses presented in the literature review stating that localities with stark socioeconomic inequality tend to have higher homicide rates overall.

In order to measure the efficacy of Bolsa Família, I divided the total number of families benefitted per year by the amount of cash transferred to the municipality, giving me the average amount of cash received per family in that municipality within a given year. I chose to use Bolsa Família as an independent variable because it allows me to evaluate the presence of the state in municipalities in ways other than law enforcement. Bolsa Família is an attempt by the Brazilian government to make itself present in the lives of its citizens through welfare, an idea largely spread during the years of Lula's presidency (2002-2009). All data on Bolsa Família was obtained via the Ministry of Social Development (MDS).

Income per Capita

The most basic tool to measure poverty is by seeing how much people in an area earn per year: this is measured by the Gross Domestic Product (GDP) per capita. Numerous studies have suggested that there is a direct correlation between the level of poverty in an area and the number of crimes committed. Data on GDP per capita was obtained via IBGE, being the most easily accessible variable to find information on. IBGE provided GDP information through purchasing power parity (PPP). This proved to be useful, as PPP is a more reliable measure of economic performance within a given community, as it accounts for variations in inflation and the costs of living in different countries over time.

By using GDP per capita as an independent variable, I am seeking to understand if crime can be predicted by this basic socioeconomic variable. While some scholars suggest that higher

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poverty rates increase the probability of violent crimes in an area, others have said the exact opposite. In a study on the economics of crime, Isaac Ehrlich uses per capita income as a central theme, stating that community wealth is a major determinant of the gross payoff in crimes involving material gain (Ehrlich, 1996). Citing Ehrlich, Alison Oliver agrees that individual economic performance has an impact on crime rates. For her, the effect GDP has on employment is higher than increased benefits, thus rendering the effect of increased GDP per capita as negative on the individual's decision to commit a crime (Oliver, 2002).

Child Mortality Rate

Child mortality rate refers to the number of deaths, within one year, of children under the age of 14, for every 1,000 lives birth, and it includes different forms of measurements. Based on what data was available to me through the Ministry of Social Development, I calculated the under-5 mortality rate. I did this by dividing the total number of live births in a given year per municipality, divided it by the number of deaths of children under the age of five, and multiplying it by 1,000.

Child mortality rate is considered an adequate indicator of the level of human development achieved in an area and can be used to measure the ability of governments to promote public health and serve at-risk populations. Including child mortality rates in my analysis complements well the two other socioeconomic variables I used, Bolsa Família and GDP per capita at purchasing-power-parity.

Multiple research studies have explored the relationship between child mortality and violent crime rates. In a study, Pridemore proposed using infant mortality rate as a "proxy" to measure levels of poverty in a given community. Using a sample of homicide rates in 46 countries in the year of 2000, his analysis indicated that infant mortality rates exhibit significant positive

effects on homicide rates (Pridemore, 2008). Although I am using child mortality rate as a variable rather than infant mortality, these two indicators are similar in terms of their structure and significance. Messner, Rafalovich and Sutton further Pridemore's claim: their correlational analysis reveals that infant mortality rates exhibit a moderate positive association with an absolute income-based poverty measure. High levels of infant mortality rates are associated with high homicide rates contemporaneously, whereas high levels of relative poverty predict high homicide rates with a one-year lag. These effects are sustained when both measures are included in the same equations, along with selected controls (Messner et al, 2010).

Chapter 3: Quantitative Analysis

3.1 Statistical Methods

The regressions were evaluated in the time period between 2006 and 2016. The independent variable, homicides per 100,000 residents, was available for all municipalities throughout this period, although it contained a few gaps during some years.

I used the statistical software MATLAB to run the regression analysis. Most of the models are considered linear, and the basic format for running a linear multiple regression analysis in MATLAB is fitglm(x,y), where x represents my independent variables and y is my linear formula, which in this case was: HomicideRate ~ 13.214 + (0.053031 x AverageValue) + (1.3402 x Police) + (4.925 x Militia) + (-0.060531 x ChildMortality) + (9.199e-06 x GDP).

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The variables are abbreviated as such in the models:

(1) The average amount of cash received by family per municipality through the Bolsa Família program is coded as "BolsaFamilia"

(2) The strength of police presence per municipality is coded as "Police"

(3) The strength of militia presence per municipality is coded as "Militia"

(4) Child mortality rate per municipality is coded as "ChildMortality"

(5) Income per capita per municipality is coded as "GDP"

In addition to the multiple linear regression, I ran one other multilevel model in an attempt to find a potential statistical correlation that each variable may have in relation to one another. The two linear models are named Models 1 and 2.

(1) Model 1: Multiple Linear regression

HomicideRate ~ 13.214 + (0.053031 x AverageValue) + (1.3402 x Police) + (4.925 x Militia) + (-0.060531 x ChildMortality) + (9.199e-06 x GDP)

(2) Model 2: Quadratic Linear Regression

Homicide Rate ~ 59.27 + (-0.076355 *BolsaFamilia) + (8.397*Police) + (8.338*Militia)+(0.4444*ChildMortality) + (0.0008144*GDP) + (0.010906*BolsaFamilia:Police) + (0.001219*BolsaFamilia:Militia) + (-0.00029495*BolsaFamilia:ChildMortality) + (-2.341e-07*BolsaFamilia:GDP) + (-1.9149*Police:Militia) + (0.11517*Police:ChildMortality) + (-0.00023258*Police:GDP) + (0.20274*Militia:ChildMortality) + (7.0768e-05*ChildMortality:GDP) + (7.4296e-06*ChildMortality:GDP) + (2.0565e05*BolsaFamilia^2) + (0.91441*Police^2)+(0.1299*Militia^2) + (-0.0016965*ChildMortality^2) + (8.5871e-10*GDP^2)

3.2 Statistical Results for Municipalities

Table 1
Regression Results: homicides per 100,000 inhabitants compared to police presence, militia presence, average amount of money transferred by Bolsa Família, GDP per capita & child mortality rate in Rio de Janeiro's 92 municipalities, 2006 – 2016

Independent Variables	Model 1	Model 2
Intercept	13.214	59.27
BolsaFamilia	0.0053031*	-0.076355
Militia	4.925*	8.337
Police	1.3402	-8.3973
GDP	9.199e-06	0.0008144
ChildMortality	-0.060531	0.44441
BolsaFamilia:Police	-	0.010906
BolsaFamilia:ChildMortality	-	-0.00029495
BolsaFamilia:Militia	-	-1.9149
BolsaFamilia:GDP	-	-2.341e-07
Police:Militia	-	-1.9149

Police:ChildMortality	-	-0.11517
Police:GDP	-	-0.00023258
Militia:ChildMortality	-	0.20274
Militia:GDP	-	7.0768e-05
ChildMortality:GDP	-	7.4296e-06
BolsaFamilia^2	-	2.0565e-05
Police^2	-	0.91441
Militia^2	-	0.1299
ChildMortality^2	-	-0.0016965
GDP^2	-	8.5871e-10
Nº of observations	892	892

Significance: *$p > 0.05$
Sources: Bolsa Família: Ministério do Desenvolvimento Social. Militia Presence: Internet research based on information provided by PMERJ and SSP-SSI. Police: PMERJ. Child Mortality Rates: Ministério da Saúde

After examining the two different models, the multiple linear regression (Model 1) seems to be the one that best fits the analysis as it produced two significant p values: BolsaFamilia and Militia. Bolsa Família has a slight negative statistical correlation, with homicide rates decreasing in accordance to the higher the value of average cash received by families in a municipality. Militia presence has a slight positive statistical correlation, with homicide rates increasing in areas with stronger militia presence on the scale I created. On the other hand, the second model, the quadratic regression, did not produce any significant p values whatsoever.

Figure 6: Regression graph
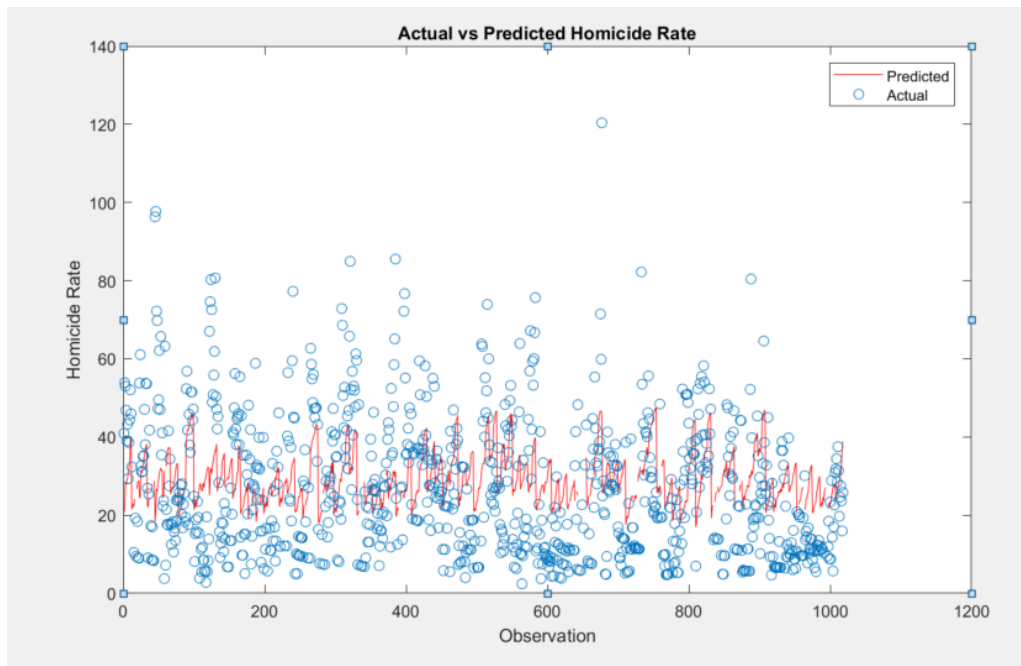
I graphed the linear regression model against the homicide rates and it appears to underfit the data, which makes sense because of the lack of statistically significant p values on the table. Additionally, looking at the various homicide rates, there doesn't appear to be a significant obvious trend between the observations themselves.

All in all, besides Bolsa Família and Militia Presence, no statistical significance was found when running any of the regressions. We will now pay attention to the latter variable as we begin the qualitative discussion of territorial control and its effects on homicide rates throughout the state of Rio de Janeiro.

Chapter 4: Qualitative Analysis

As evidenced by the statistical analysis presented, most socioeconomic variables utilized did not provide any significant correlation with homicide rates; the only two variables with a statistical significance were Militia Presence and Bolsa Família. I will now move into the qualitative portion of this thesis in order to better understand what factors could have accounted for variations in homicide rates in the state of Rio de Janeiro over the past 10 years.

In her study on territorial struggles in Rio's favelas, Alba Zaluar emphasizes the fact that "few studies of violence in Brazil have been conducted at local level using disaggregated data since they have primarily been macrosocial in approach, looking to identify links between socioeconomic indicators" and proposes a more micro level of observation to study homicide rates (Zaluar, 2014). The previous section of this thesis studied homicide rates at the municipal level but, following Zaluar's reasoning, in order to better understand the underlying factors, we need to study homicides at more of a micro level.

For this reason, I will proceed by analyzing homicide rates according to the smallest unit of observation where homicide data is available through ISP-RJ: the Integrated Circumscription of Public Security (CISP) (map 3). This will allow us to focus on where homicides are concentrated rather than looking at the state as a whole. Part of my analysis will also talk about municipalities, but once again, focusing on those where violent crime is more prevalent. This is relevant because, on average, since 2006, around 70% of the homicides in the state of Rio de Janeiro have been concentrated in 21 municipalities located within the metropolitan area of the city of Rio. This makes it more worthwhile to analyze trends in homicide rates within smaller units of observation of the metropolitan area of the rather than focusing on the state as a whole.

Map 3: Division of CISPs in Rio's metropolitan area
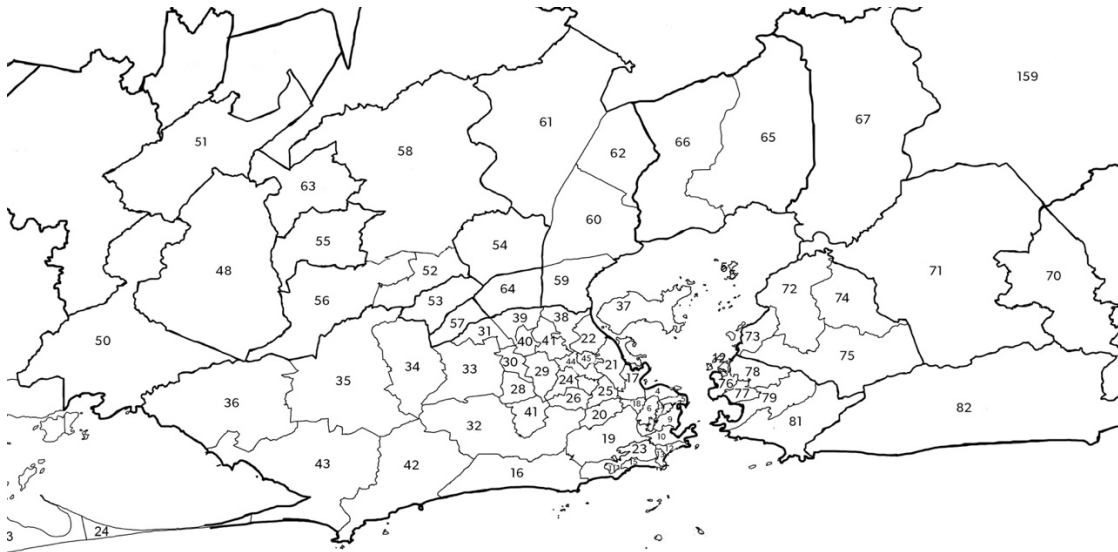
Figure 7: Total Number of Homicides Committed in the State of Rio de Janeiro, 2006-2016
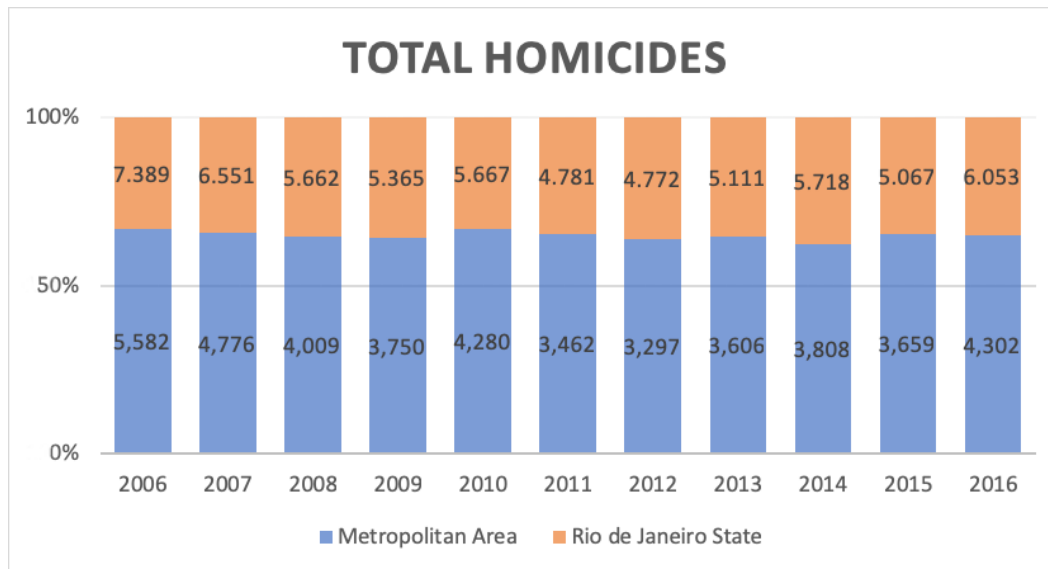
Source: Atlas da Violência

In this analysis, I am going to discuss two specific cases where disputes for territorial control between state and non-state actors have presented varying outcomes in different areas. This will include analyzing the UPP program, which has seen a temporary decrease in homicide rates

in the favelas (and CISPs) where it was able to gain power, and militia groups, which I speculate lead to increased homicide rates in the areas where they act.

4.1 Police Pacifying Units (UPP Program)

I will now discuss the UPP program, the state's attempt to reclaim territory from criminal control in favelas, and its effect on homicide rates in Rio de Janeiro. The police pacifying unit, known under the acronym UPP, is a project initiated in the state of Rio in 2008 and implemented in 38 favelas up to date (Table 2). The UPP is based on the idea of "policing by proximity," explained as a strategy of policing based on partnerships between civilians and police officers, seeking a construction shared by local public security[2]. The UPP program, today regulated under state law 45.186/2015, stipulates the following goals: to reclaim territories under criminal control, to reduce armed violence, to recover the trust of favela inhabitants in the police, and to contribute to a "culture of peace."[3]

Over the 10 years that the UPP has existed, multiple studies have been made about this program in order to analyze its impact on reducing criminal activity and violent crime rates in favelas where the UPPs were installed.

The first three favelas to receive UPPs (Cidade de Deus, Santa Marta and Batan) in 2008, initially were intervened by BOPE (the military police's elite squad for special tasks in favelas), in order to begin the transition period between non-state and state rule within these communities. In 2009, when more favelas began to get occupied, the new "policing by proximity" strategy began to consolidate. Since then, each occupation of favelas by the UPPs has happened in four specific steps: (1) Intervention tactic; (2) Stabilization; (3) UPP Implementation; (4) Consolidation, the

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[2] UPP's official website: http://www.upprj.com/index.php/faq
[3] Sistema de Legislação Pessoal: http://www.silep.planejamento.rj.gov.br/decreto_45_186_-_17032015_-_re.htm

latter serving to monitor each unit's efficacy at combatting violent crime. In the first phase, BOPE realized the occupations and, after the consolidation of reclaimed territory, would transfer the power over to the *Batalhão de Polícia de Choque* (BPChoque), in order for them to monitor the program[4]. This indicates that the favelas were thus taken over by force in violent ways in order for the state to consolidate power.

Table 2: List of UPPs

Favela	Code	Occupation	Consolidation	Population 2010
Santa Marta	1	11/19/2008	12/19/2008	4,760
Cidade de Deus	2	11/11/2008	2/16/2009	44,046
Batam	3	7/12/2008	2/18/2009	18,904
Chapéu	4	5/11/2009	6/10/2009	3,928
Mangueira/Babilônia	5	11/30/2009	12/23/2009	13,340
Pavão-Pavãozinho	6	12/26/2009	1/14/2010	8,480
Tabajaras	7	3/22/2010	4/26/2010	15,354
Providência	8	4/28/2010	6/7/2010	18,032
Borel	9	4/28/2010	7/1/2010	6,057
Formiga	10	6/11/2010	7/28/2010	14,625
Andaraí	11	7/30//2010	9/17/2010	5,038
Salgueiro	12	8/10/2010	10/30/2010	14,249
Turano	13	1/6/2011	1/31/2011	11,048
São João/Matriz/Queto	14	1/6/2011	2/25/2011	13,154
Coroa/Fallet/Fogueteiro	15	1/6/2011	2/25/2011	8,353
Escondidinho/Prazeres	16	1/6/2011	5/17/2011	19,589
São Carlos	17	6/19/2011	11/3/2011	17,774
Mangueira	18	10/14/2010	2/25/2011	22,553
Macacos	19	12/13/2011	2/25/2011	12,237
Vidigal	20	11/28/2010	5/17/2011	33,084
Nova Brasília	21	11/28/2010	11/3/2011	21,950
Fazendinha	22	11/28/2010	11/30/2011	11,744
Adeus/Baiana	23	11/28/2010	1/18/2012	16,462
Alemão	24	6/27/2012	4/18/2012	11,831
Chatuba	25	6/27/2012	4/18/2012	5,391
Fé/Sereno	26	11/28/2010	5/11/2012	17,573
Parque Proletário	27	11/28/2010	5/30/2012	20,112
Vila Cruzeiro	28	12/13/2011	6/27/2012	70,491
Rocinha	29	10/14/2012	6/27/2012	28,437
Jacarezinho	30	10/14/2012	8/28/2012	

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[4] Rio de Janeiro government document: Da origem do programa à política de pacificação

Manguinhos	31	3/3/2013	8/28/2012	24,766
Barreira do Vasco/Tuiuti	32	3/3/2013	9/20/2012	16,331
Caju	33	4/29/2013	1/16/2013	16,694
Cerro-Corá	34	10/13/2012	1/16/2013	2,922
Arará/Mandela	35	10/6/2013	4/12/2013	19,711
Lins	36	10/6/2013	4/12/2013	14,148
Camarista Méier	37	8/5/2013	6/3/2013	15,337
Mangueirinha	38	3/13/2014	9/6/2013	28,442
Vila Kennedy	39		12/2/2013	40,218

Source: ISP-RJ

The following map shows where the UPPs are set up in the metropolitan area of Rio de Janeiro. While 37 UPPs are located within the municipality of Rio de Janeiro, only one is located in a different municipality, Duque de Caxias.

Map 3: UPPs installed since 2008 in Rio de Janeiro
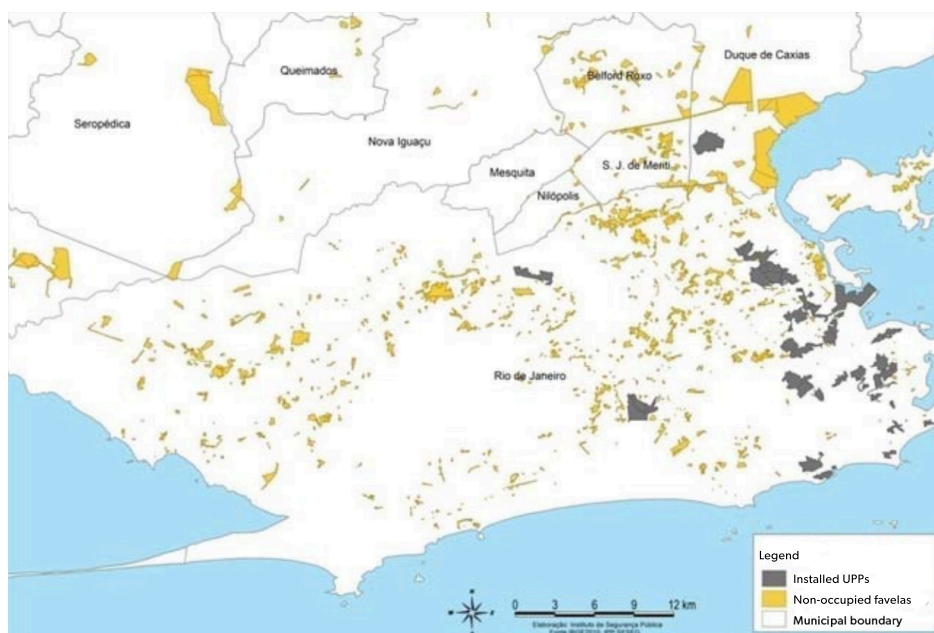
Source: ISP-RJ

The directors of the UPP program, in a report released in 2015[5], claim that the UPPs were able to drastically reduce homicide rates in the favelas where they are located (figure 8). When

[5] ISP-RJ. Balanço de Indicadores da Política de Pacificação. 2016.

looking at data on homicides, we can see that this reduction did in fact occur. This graph shows that, since the installation of UPPs in 2008, homicide rates have decreased more dramatically in areas served by this program than in the municipality of Rio de Janeiro between 2007 and 2013. In 2014, homicide rates began rising in the UPP areas, and reached similar levels to that of the rest of the municipality.

Figure 8: Homicide Rates in UPPs compared to the municipality of Rio de Janeiro
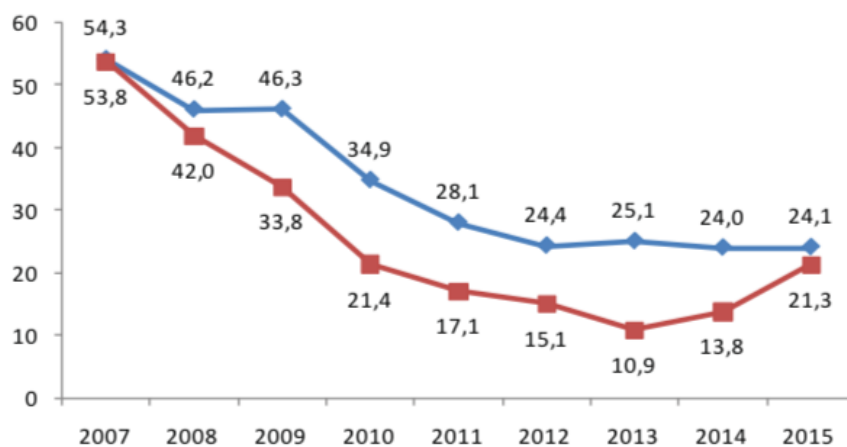
Red: Areas occupied by UPPs
Blue: Municipality of Rio de Janeiro
Source: ISP-RJ

However, it is important to keep in mind that, while homicide rates were decreasing in the UPP-served favelas, the rest of the city of Rio de Janeiro was following the same trend. This raises questions as to whether UPPs should be given credit to reducing violence in their respective favelas, or if this reduction was simply happening alongside a trend with the rest of Rio de Janeiro. Some have in fact attributed the decrease of homicide rates in the UPP areas to another program created by the Secretariat of Public Security in 2009 and implemented in 2010, the "Integrated

Goal System," known under the Portuguese acronym SIM. This program's goal is to reward police units that are able to decrease homicide rates within their respective territories with bonuses[6].

Indeed, when looking at these numbers, it can be understood that the UPP program managed to reduce, albeit temporarily, homicide rates, in favelas that it occupied. However, critics of the program have denounced it for being politically motivated, focusing on favelas in the richer areas of the city. There are over 700 favelas in the city of Rio de Janeiro alone, accounting for a population of up to 1.4 million people. This number jumps up to 1.7 million when considering favelas in the entire metropolitan area. Out of the 21 CISPs that host favelas with UPPs, 9 are located in the "South Zone" of the city, considered the wealthier and more tourist-friendly area. For this reason, the UPP has widely been perceived as an attempt to mask the reality of favelas and "clean the favelas up" in time for the World Cup in 2014 and the Olympic Games in 2016, both events hosted by Rio de Janeiro and putting the city, especially its South Zone, in the international spotlight.

The following table was created with information from ISP-RJ to shed a light on the discrepancy between CISPs with favelas that received UPPs, and those that did not.

Table 3: CISPs that have received an UPP since 2007

CISP	Zona Sul	Homicide Rate out of 100,000 residents								
		2007	2008	2009	2010	2011	2012	2013	2014	2015
6	No	91	79	80	46	21	18	17	20	38
7	Yes	17	10	29	9	9	7	2	10	15
9	Yes	17	15	35	13	14	7	12	6	6
10	Yes	25	13	14	4	4	2	6	6	5
11	Yes	-	-	-	-	-	-	-	12	11
12	Yes	11	14	15	5	3	3	8	6	5
13	Yes	10	6	10	3	1	3	3	4	2
15	Yes	25	37	13	23	11	24	10	7	4
17	No	49	35	30	28	32	14	28	24	35

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[6] SIM Website: http://www.sistemademetas.seguranca.rj.gov.br/

18	No	22	19	21	11	3	6	4	7	8
19	Yes	31	35	46	16	15	5	12	10	10
20	No	93	60	45	16	15	5	12	10	10
21	No	150	145	175	121	112	86	71	77	57
23	Yes	15	24	31	23	19	13	11	8	4
25	No	87	75	73	61	35	53	25	29	32
26	No	56	43	40	25	26	24	20	12	22
32	No	109	112	84	49	49	45	64	86	97
33	No	163	160	166	78	116	87	74	62	66
34	No	246	196	193	171	168	125	143	129	133
38	No	145	92	112	88	40	61	55	39	54
59	No	277	294	314	245	229	149	159	149	117

Source: ISP-RJ

Table 4: Examples of CISPs that have not received any UPPs since 2007

| CISP	Homicide Rate out of 100,000 residents								
	2007	2008	2009	2010	2011	2012	2013	2014	2015
55	79	72	58	55	46	58	55	105	107
56	156	170	213	201	154	171	240	211	160
58	198	191	220	187	159	175	232	290	205
60	198	224	173	108	147	148	171	196	120
64	235	217	207	179	148	136	165	237	183
71	162	162	114	102	108	63	76	82	88

Source: ISP-RJ

When comparing these two tables that include CISPs within the metropolitan area of Rio de Janeiro, we can see that homicide rates did decrease overall within CISPs where UPPs were present. On the other hand, homicide rates seem to be increasing in CISPs that did not receive an UPP, and these happen to be located outside of the city center with attractions for tourists.

We can conclude that the program was successful in lowering homicide rates in areas where it was installed, but it is important that policy makers remain alert to discrepancies of the result of the program for other regions of the metropolitan area. The UPP served its initial purpose of reducing homicide rates within specific favelas, but this is not effective when looking at the

metropolitan area of Rio de Janeiro as a whole. This becomes evident when observing the following map that I created by overlapping the areas touched by the UPPs and those controlled by militias. In almost no instances are the UPPs installed anywhere close to militia-dominated territories. Besides this, the UPPs do not serve the most violent favelas, where homicide rates were already higher than the ones the UPPs chose to install themselves in. This will lead us into the next part of our discussion which deals with the presence of militia groups and their effects on homicide rates.

Map 4: UPP-controlled areas vs. militia-controlled areas
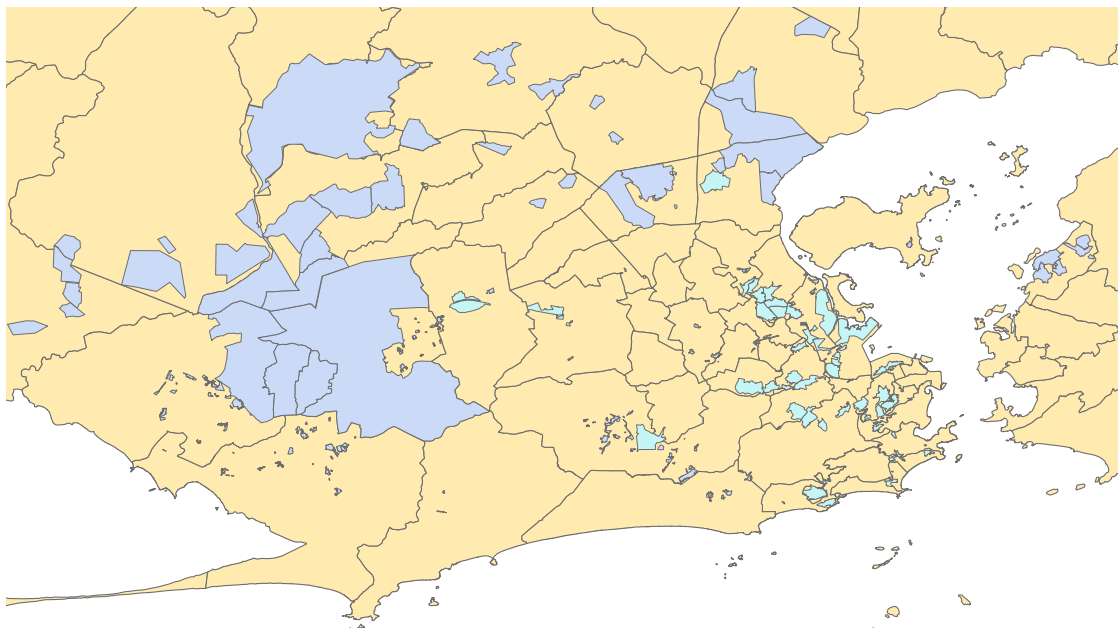
4.2 The Expansion of Militias in the Metropolitan Area of Rio de Janeiro

The next aspect of territorial control we are going to discuss is the growing phenomenon in Rio's metropolitan area called militia groups. Over the past decade, militia groups have gained prominence in the state of Rio de Janeiro, expanding from their birthplace in the Rio das Pedras

favela in the West Zone of the city into multiple areas of the state. As of 2016, their main presence is concentrated in 11 municipalities of the metropolitan area of Rio, totaling an area of 348 km^2. Within this area live roughly 2 million people, or the equivalent of almost one out of 10 inhabitants of the metropolitan area[7].

The main reason behind the expansion of militias can be attributed to government neglect: wherever the state does not assert its presence, by providing basic goods such as transportation, electricity, and water, these areas become vulnerable for non-state actors to come in and assume the roles of the state. This phenomenon is often described as "parallel power" being exerted by non-state actors. In order to gain control over neglected territories, militia groups initially used an anti-drug trafficking discourse, giving them an appearance of legitimacy. The line between militias and criminal factions was, at first, clear-cut, but more and more, militia groups are beginning to operate like traditional criminal factions, often taking over their illicit drug activities. Their characteristics of ex-law enforcement agents are beginning to dwindle and, more and more, militias are recruiting drug trafficking criminals themselves to join their ranks. As a result, their activity has been much more deadly over the course of this expansion.

With data obtained by the *Delegacia de Homicídios da Baixada Fluminense* (DHBF), classified documents from the Public Ministry, and investigations by the Civil Police, the anthropologist José Claudio Alves predicted that militias are now present in 13 municipalities of the metropolitan area of Rio de Janeiro[8]. This same article states one of the founders of the *Justice League* agreed to share information with the police in exchange for a reduced sentence. According to him, the *Justice League* started out in the neighborhoods of Santa Cruz (CISP 36), and Campo

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[7] News report by O Globo: https://g1.globo.com/rj/rio-de-janeiro/noticia/franquia-do-crime-2-milhoes-de-pessoas-no-rj-estao-em-areas-sob-influencia-de-milicias.ghtml
[8] News report by O Globo: https://g1.globo.com/rj/rio-de-janeiro/noticia/franquia-do-crime-2-milhoes-de-pessoas-no-rj-estao-em-areas-sob-influencia-de-milicias.ghtml

Grande (CISP 35) into other municipalities, especially Nova Iguaçu (CISPs 52, 56 and 58), Seropédica (CISP 48) and Itaguaí (CISP 50). This is shown in these areas high homicide rates, a reflection of increased militia activity over the past decade

Map 6: Militia groups present in metropolitan Rio de Janeiro

Source: Exclusive survey made by *Globo* newspaper, based on data from the Civil Police, Secretariat of Security, State Public Prosecutor's Office, prefectures of Rio de Janeiro and IBGE. Map created by me interposing militia groups and CISPs.

Looking at this map, militias clearly exert dominance over large portions of the metropolitan area, in particular in the West Zone of the municipality of Rio, and in other municipalities of the Baixada Fluminense. I created the following table to show that homicide rates have increased in recent years within CISPs that have a strong militia presence. CISPS such as number 55, which contains the entire municipality of Queimados, are especially alarming, with a homicide rate reaching 135/100,000 residents in 2016.

Table 5: Homicide rates according to militia presence in CISPs

CISP	Corresponding Municipality or Neighborhood	Verified Militia Presence	Homicide Rates (out of 100,000)					
			2006	2008	2010	2012	2014	2016
9	Catete, Cosme Velho, Flamengo, Glória, Laranjeiras	No	21	11	10	5	4	4
12	Copacabana & Leme	No	16	15	5	3	6	22
16	Barra da Tijuca, Joá, Itanganhgá	Yes, weak	18	17	15	6	17	13
23	Lagoa, J. Botânico, Gávea, São Conrado	No	31	26	25	14	8	17
32	Anil, Cidade de Deus, Curicica, G. Azul, Jacarepaguá, Taquara	Yes, medium	35	31	13	12	23	26
33	Campos dos Afonsos, Deodoro, J. Sulacap, Magalhães Bastos, Realengo, V. Militar	Yes, weak	63	67	32	35	25	29
35	Campo Grande, Cosmos, Inhoaíba, S. Vasconcelos, Santíssimo	Yes, strong	56	44	43	20	11	18
36	Santa Cruz, Paciência	Yes, strong	88	81	67	46	48	44
42	Recreio, B. Guaratiba	Yes, weak	- -	13	13	18	23	
48	Seropédica	Yes, medium	47	46	22	32	85	42
50	Itaguaí	Yes, medium	77	74	72	60	72	73
51	Paracambi	Yes, medium	14	9	13	10	35	68
52	Duque de Caxias	Yes, medium	30	29	14	21	23	27
53	Mesquita	Yes, medium	51	46	54	29	38	47
54	Belford Roxo	Yes, medium	53	63	52	41	62	53
55	Queimados	Yes, strong	61	53	40	41	74	135
56	Nova Iguaçu	Yes, medium	63	64	76	64	78	61
57	Nilópolis	No	45	43	39	18	42	36
58	Nova Iguaçu	Yes, medium	66	55	53	49	81	62
59	Duque de Caxias	Yes, strong	76	85	69	42	41	42
60	Duque de Caxias	Yes, strong	70	81	38	51	67	58
64	São João de Meriti	Yes, strong	52	48	39	30	51	47
73	São Gonçalo	Yes, strong	68	61	58	44	53	62
78	Niterói	No	47	67	45	42	35	73

Sources: ISP-RJ, Civil Police, Public Ministry

While much has been done by the government in order to combat criminal factions in favelas with programs such as the UPP and the Integrated Goals system, the state does not seem to be doing much about the militias. This may be due to the fact that militias hold onto a claim of legitimacy, having initially been formed by ex-law enforcement agents under the pretext of taking crime into their own hands. However, looking at the statistics, it is clear that this group of non-state actors has some role to play in the extremely high homicide rates which have been increasing over the past decade in areas where they are present.

Chapter 5: Conclusion

5.1 Limitations of Findings

One of the biggest challenges for me in this thesis was the large amount of missing data, as well as the reliability of the data provided. I initially wanted to include literacy rates and human development indexes as independent variables for the regression. Unfortunately, the former was not available in any of the databases, while the latter was only calculated every 10 years, making it too sparse to include in the regression analysis.

Regarding militias, data on their activity and where they act is extremely difficult to quantify. These groups are dynamic and their control over territory tends to change rapidly between rival militias, criminal factions, and other non-state actors. The data regarding militias was collected from a series of news reports made by the newspaper *O Globo,* which relied on extensive classified information from the military police, the Secretariat of Public Security, and the Public State Ministry. The population of each area was mapped through IBGE's statistical software. I also used the study from Ignácio Cano, who also mentions that most of his findings on where militia groups act are to be considered approximate rather than definitive due to the volatile nature of the militia groups' activities.

5.2 Final Considerations

From the reflections presented in this thesis, we can observe that the relationship between macroeconomic conditions and crime rates is difficult to be calculated in a simple and linear way. Besides Bolsa Família and Militia Presence, there were no significant statistical relations that could account for varying homicide rates on the municipal level. When looking at homicide rates at more of a local level, however, things begin to make more sense. Areas where the control for territory

is disputed by state and non-state actors tend to have higher homicide rates. In the case of favelas that were invaded by the police to implement the UPP program, the insertion of state actors temporarily reduced homicide rates in these communities. On the other hand, where militia groups are present, homicide rates continue to increase, indicating they are probably still in a consolidation of power phase. Since the UPP program is considered to no longer be sustainable, perhaps the Brazilian government should consider making itself more present in neglected communities through non-violent means. Bolsa Família is a great example of this, as conditional cash transfers increase the quality of life of impoverished citizens and, through my analysis, seem to have a negative correlation with homicide rates.

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