Credit, Entrepreneurship and Violence in Brazilian Favelas

Felipe Goulart Tomkowski*

Insper

Victor Monteiro

Ministry of Planning

Antonio Daniel Caluz

Insper

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Abstract

This paper studies the role of policies against crime in slum regions as the engine for providing opportunities to their inhabitants, stimulating entrepreneurship, reducing criminality, and allowing access to the credit market. Empirically, we use the installation and the extinction of PeaceMaker Unit (*Unidade de Policia Pacificadora*) policy in the city of Rio de Janeiro as quasi-experiments, running a difference and difference, as in Callaway and Sant'Anna (2021), to estimate their effects in crime rates, surge of entrepreneurs and access to credit. After, we conduct an empirical test on how credit expansion provides a positive spiral to reduce crime rates and increase the number of micro-entrepreneurs living in the pacified slums. We find that pacification decreased crime rates, such as robberies, commerce robberies, and thefts, restoring the local rule of law, which stimulated the creation of 0.45 new formal entrepreneurs per 1000 inhabitants and increased credit per capita by almost 1200 Brazilian Reais. We document that this pattern creates a positive feedback effect, where more credit enhances the number of formal firms within the slums, which increases the level of employment of their inhabitants, mainly the youth, that changes the crime by work now and reduces even more commerce robberies and thefts.

Key-Words: Pacification; Entrepreneurship; Crime, Credit; Slum.

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*Corresponding author: felipetom1@gmail.com

1 Introduction

Historically, violence has been an endemic problem in the process of urbanization of cities across the world, mainly for developing cities with a high concentration of slums, such as the case of the city of Rio de Janeiro, which is one of the notorious examples of how challenging the quest to solve this problem. Even though the empirical literature highlights some effective public policies for public security, such as human capital investment and heavier sentences for criminals,[1] there is no bulletproof to lead with urban violence. In 2008, as a manner to solve the problem of historically high crime rates, the safety state department of Rio de Janeiro implemented a different program called UPP (*Unidade de Policia Pacificadora* - PeaceMaker Unit Police, hereafter, UPP). The idea was to enter some favelas, taking power from the drug dealers to restate the peace and order in dominated slums and recover the Democratic State by installing police unity inside them in the first moment. In the second stage, the State would implement urban plans and social projects to improve the environment of those slums and the welfare of their inhabitants.

In this paper, we study the ability of the UPP policy to mitigate the violence problem within the city of Rio de Janeiro. Several papers studied the effects of this initiative on criminality, such as Coelho and Provenza (2016),[2] however to the best of our knowledge, no one explored the channel of opportunities in this context, in which pacification units increase the levels of opportunities, measured through employment, credit, and entrepreneurship, to the inhabits of the slums due to the greater security. Moreover, this creation of opportunities also brings a positive feedback effect, enhancing the environment as well as reducing even more the crime. Therefore, we test whether UPP policy could generate this virtuous circle, exploring its impact on criminality, the number of formal entrepreneurs and firms within the slums, and the level of credit lines that target the poorer population. Furthermore, we also explore whether the presence of credit in these areas spillovers to reduce crime and increase entrepreneurship even more.

Intuitively, urban violence creates a negative spiral in the business environment, where high crime rates can deter individuals from starting their own businesses as well as investing in regions of slums due to concerns about theft, vandalism, robberies, or personal safety. This pattern results in limited local employment prospects for residents. It reduces the likelihood of finding jobs outside the region since their inhabitants have more significant problems with their frequency of work due to the insecurity of living in a slum. Naturally, areas with high crime rates often face economic decline, decreased investment, limited attention from the government, and a loss of job opportunities.

We use three rich data sources from 2007 to 2020 to study the abovementioned channel. First, the dataset

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[1]For instance, rich countries trailed a successful path to controlling urban criminality through robust educational policies, as depicted by Lochner and Moretti (2004), Machin et al. (2011), Bell et al. (2016) and Bell et al. (2022), and security policies, such as Levitt (1997), Di Tella and Schargrodsky (2004) and Chalfin et al. (2022).

[2]Others references are Bellégo and Drouard (2022), Butelli (2015), Maia and Marinho (2021).

from Instituto de Segurança Pública of Rio de Janeiro, which documents several strands of annual crime rates at the UPP level,[3] which allow us to investigate how was the crime before the installation of the UPP and how it altered across time. Second, the dataset of formalized firms and entrepreneurs from Receita Federal (the Brazilian IRS), provides information about the level of entrepreneurship according to the coordinates of the address. Then we use it to map the entrepreneurs within the slums in Rio de Janeiro. Third, the Credit Information System dataset (hereafter, SCR) from the Brazilian Central Bank, which provides information about different strands of credit at individual level.[4] As for the case of entrepreneurship, we use the coordinates of the localization to identify the credit stemming from individuals within the slums.

We conduct three empirical tests in this paper to investigate a causal relationship. First, we estimate a difference in differences as in Callaway and Sant'Anna (2021) using both the installation and the extinction of UPPs as quasi-experiments to measure the effect of this policy in our criminal rates measures. This estimation depicts that the installation of UPP significantly reduced robberies in more than 60 cases by 100.000 inhabitants, increased drug apprehension in more than 30 cases by 100.000 inhabitants, and reduced commerce robberies in almost 10 cases by 100.000 inhabitants. On the other hand, the extinction of UPP increased several crime rates, such as thefts and cellphone robberies in nearly 40 and 10 cases by 100.000 inhabitants, respectively. Second, we estimate the effects of our quasi-experiments on business and credit outcomes. This estimation describes an increase of 0.45 formal entrepreneurs by 1000 inhabitants, while also observing a massive rise in all credit per capita, almost 1200 reais, which is even higher than the average income of the households at the time. Third, we estimate the feedback effect of credit on the business and crime rates through a panel linear regression with UPP fixed effects. This estimation presents a positive impact of microcredit, as our measure of credit, in new formal entrepreneurs and new enterprises, as well as its ability to reduce commerce robberies and thefts even more.

Therefore, our work is related to three strands of the literature. First, our paper contributes to the literature on the economics crime,[5] through the provision of a new mechanism to study the ability of UPP policy to reduce criminality within the slums of the city of Rio de Janeiro, under the lens of its effect in the window of opportunities for their inhabitants. This investigation reminds the perspective of costs and benefits of violating the law as in the seminal paper of Becker (1968), where the introduction of the policy increased the cost of entering into the crime as well as the outside option of the inhabitants, through the combative intervention and the creation of opportunities, respectively. Second, our results also dialogue with the literature about the potential of labor market opportunities to reduce crime rates, as depicted by Mustard

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[3]Even though this dataset contains information about diverse types of crime, in the paper, we focus on robberies, commerce robberies, thefts, vehicles thefts, cellphone robberies, and drug apprehension.

[4]Even though this dataset contains information about different strands of credit, in the paper we focus on all credit, microcredit, and working capital credit.

[5]Ehrlich (1996), Levitt (2004).

(2010),[6] in which the creation of new opportunities to the inhabitants came through the surge of employment and entrepreneurship. Third, aware of the evidence of Banerjee et al. (2015) documenting modest positive effects of microcredit on poor households, we contribute to this literature by estimating the impact of credit access within the favelas on the reduction of the local crime rates and the increase of the local opportunities for work outside of criminal activities. Unlike other papers in the literature on credit and the economics of crime, our paper elicits that new opportunities divert poor youth from entering criminal activities by spurring entrepreneurship and job creation.

The paper is organized as follows. In Section 2, we describe the institutional background of the UPP, then in Section 3 we describe our datasets. Next, in Section 4, we provide the empirical strategy and present an empirical discussion about the results. Finally, in the last section, we conclude the paper.

2   Institutional Background

The favelas in Rio de Janeiro are characterized by their substandard infrastructure and low-income households. These urban slums have experienced significant growth since the 1970s, primarily due to the influx of low-income individuals from other parts of Brazil, hoping for an improved quality of life. However, these marginalized communities have become a target for drug gangs due to their susceptibility, lack of government presence, proximity to affluent neighborhoods for drug sales, and strategic defence locations.

Since the 1980s, drug gangs have taken advantage of the void left by the state and gained control over favelas, imposing their own laws and engaging in violence, both internally and against rival groups (Penglase (2008)). Observing this pattern, for several decades, the state of Rio de Janeiro tried to solve this scenario, reestablishing its presence within the favelas and countering the criminal gangs with unsuccessful policies based on police operations.

By 2008, four paramilitary organizations controlled the majority of slums in the city, Comando Vermelho, Amigos dos Amigos, Terceiro Comando Puro, and militias.[7] Then, under this scenario of escalating violence, lack of public security, and the need for enhanced general security, combined with external pressure due to the preparation for the 2014 FIFA World Cup and 2016 Olympic Games, the government visualized the necessity of the implementation of effective measures to address pervasive violence and insecurity (Barcellos and Zaluar (2014)).

From this demand, the state of Rio de Janeiro introduced a new pacification policy known as the Unidade de Polícia Pacificadora (UPP). It is essential to mention how the slums were chosen to receive the intervention. The program started with informal criteria that only in 2011 became formalized in an institutional decree, as

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[6]Other references in this literature are Bushway and Reuter (2011) and Bennett and Ouazad (2020).

[7]The last one is composed of former police officers, prison-guards, and firefighters involved in illegal activities, such as drug trafficking, murder, arms trafficking, robberies, extortion, kidnapping, prostitution, and human trafficking.

depicted by Garau (2017), based on (i) income of their households, (ii) high informality, (iii) high exposure to criminal organizations with heavy weapons and (iv) absence of the rule of law. These criteria illustrate the absence of a selection bias in the choice of the favelas since they broached slums from different regions and criminal organizations around the city, which allows us to estimate its causal effects.

In the following figure, we describe both the city's geography and the favelas chosen to participate in UPP in light red.

Figure 1: City of Rio de Janeiro Map
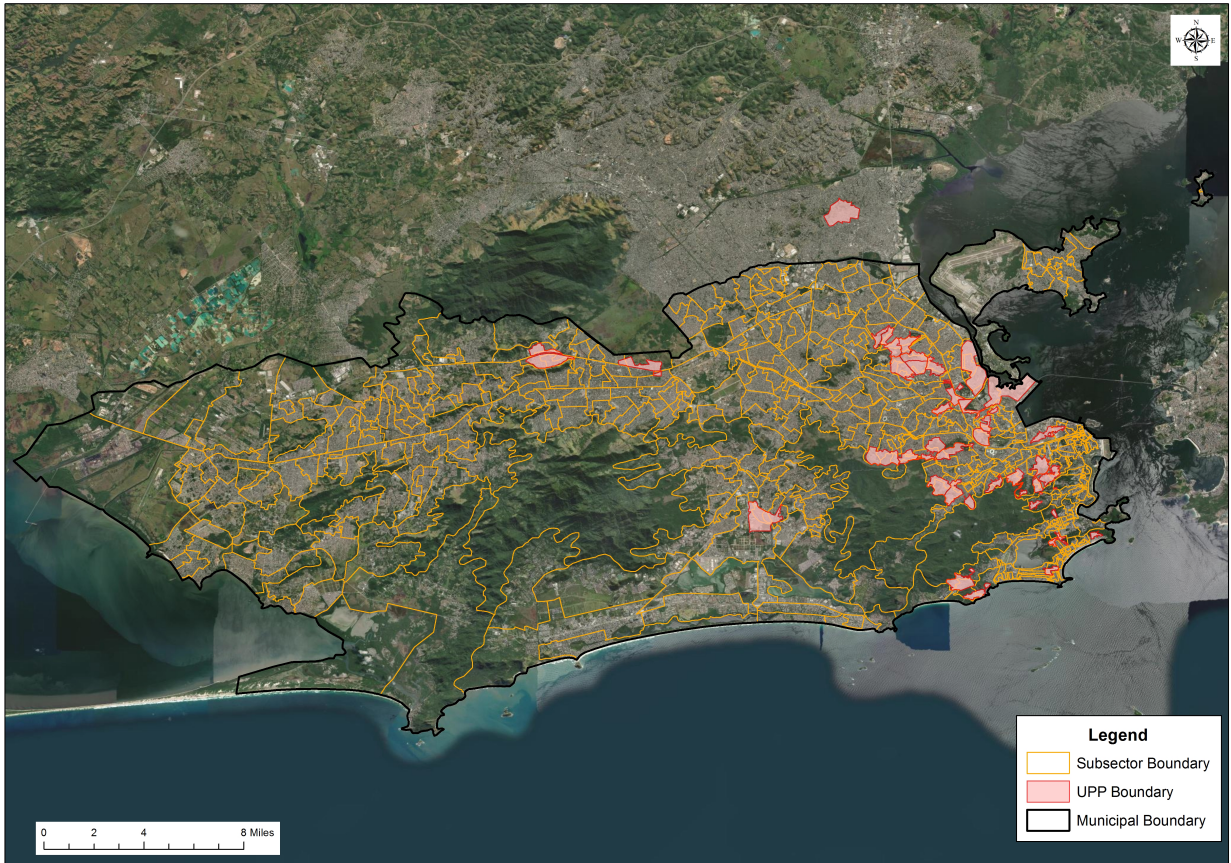
The UPP policy aimed to establish state control and a permanent police presence in some favelas, recognizing that criminal operations relied heavily on territorial control. The implementation of the UPP policy involved several key steps.

First, the State government would announce in advance, without providing an exact date, a group of adjacent favelas to be pacified, serving as a warning to criminals to evacuate the area and reduce potential bloodshed. Subsequently, the special police operations battalion (known as the BOPE), supported by the

military for larger occupations, would invade and occupy the designated favelas. Their operations involved apprehending or eliminating gang members who did not leave and conducting searches for hidden drugs and weapons.

Once the area was secured, a police station was established, and a community-based policing unit composed of newly recruited officers specifically trained in community policing and human rights would be permanently assigned to the pacified group of favelas. In some cases, social-development programs, known as the "Social UPP," were initiated to improve access to essential services such as sanitation, healthcare, education, and the creation of bank branches within these communities. However, implementing these social programs faced challenges and did not fully achieve the intended goals of social inclusion.

The first favela that was pacified was the one called Santa Marta in the neighborhood of Botafogo, one of the wealthiest locations of the city in the south region, and from 2008 to 2014, the city of Rio de Janeiro had 37 UPPs around the zones south, north, west and downtown of the city, as Figure 2 illustrates.[8] This figure describes one important perspective about the program, the absence of selection given to a specific region of the city, as could be expected, where the richest one, the south region, does not govern the majority of UPPs.
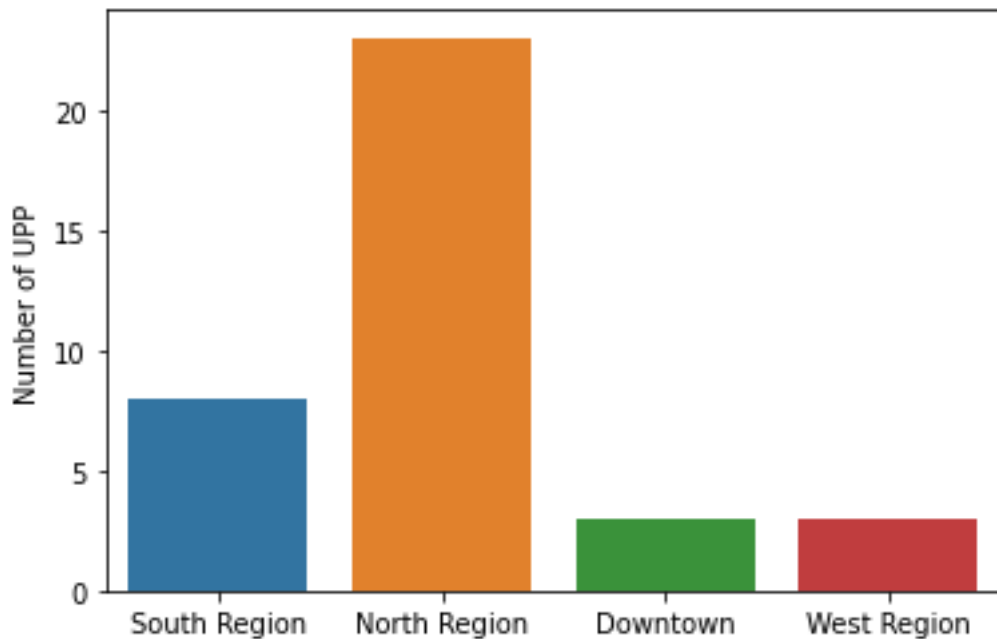

Figure 2: UPP per Region

Finally, regarding the distribution of the installation of the 37 UPPs across the years, the period between

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[8]In the paper, we are focusing only on UPPs within the city of Rio de Janeiro since the majority of them as within the city, only one was outside, and we have credit information for city subsectors.

2010 and 2013 was fruitful for this program, concentrating more than half of the installations. As cited at the beginning of this section, the pressure embedded by the organizers of the FIFA World Cup 2014 was one of the engines of the surge of the UPP program, which explains the concentration of installations in the period between 2008 and 2014.
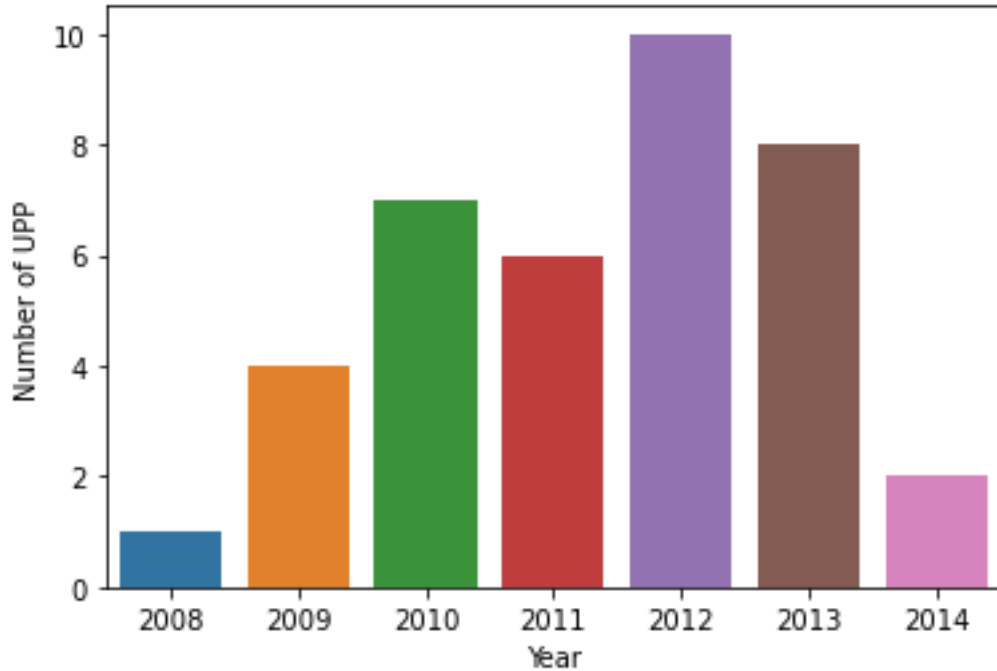

Figure 3: UPP per Year

3 Data

To investigate the impact of the UPP program in the environment within the favelas as well as its ability to stimulate the social-economical development of these locations, we combine three sources of datasets with information on UPP and crime rates, measures of entrepreneurship at the UPP level and credit concessions within the UPP. These datasets allow us to tie the channels through which a program such as UPP creates opportunities within the slums.

The first is a monthly dataset that combines information collected by the Institute of Public Security of Rio de Janeiro on forms of crimes registered for all 37 UPP (Unidade de Policia Pacificadora) from its installation year to the present, population statistics, and the dates each UPP operation started. To study the mechanism at play, we first investigate the effects of increased law enforcement on criminal effects in the favela environment by using the following variables: robberies, thefts, commerce robberies, and drug apprehension. The choice of these specific forms of crimes comes from two reasons. Firstly, these variables

encapsulate the enhanced safety measures that foster a conducive business environment, attracting both existing and aspiring entrepreneurs. Secondly, they reflect the diminished expected gains for criminals, as the increased presence of law enforcement significantly raises the likelihood of punishment due to a higher chance of being caught, which incentivizes the youngest to drop the crime and start to work.

The second dataset comes from The Receita Federal (Internal Revenue Service of Brazil), which arranges the information of every formalized firm in Brazil (CNPJ) and its location through the coordinates. This dataset has information on the total number of firms within the favelas as well as the entry firms, which allows us to monitor the evolution of formalized entrepreneurs at each UPP.

Finally, the last dataset is the Credit Information System[9] organized by the Brazilian Central Bank, which provides the total monthly credit concessions at the subsector level for different strands of credit. A subsector is defined as the municipality region encompassing the first five digits of CEP (the Brazilian Zipcode). It is important to mention two aspects of this dataset. First, in order to find whether the credit was pitched to a slum, we create a shape file that collects the zipcode from the local association of residents[10] and draw a polygon around this address to define the geo-area of the slum.[11] Second, since there are different strands of credit, we need to make a couple of choices, which we consider credit card, financing credit, vehicle financing, microcredit, and working capital credit as our proxies to measure credit. These variables allow us to investigate two channels on how a program such as UPP increases the opportunity within the slums through the direct effect of pacification in the supply of credit in needy regions and the indirect effect of the credit in entrepreneurship.

We combine the three sources to create a final dataset comprising crimes, formalization of microentrepreneurs per hundred thousand inhabitants, and credit operations per capita at the UPP level, aggregating the data at the quarter level. In table 1, we provide a summary of the main statistics for the population in 2010 and the outcomes of interest at the quarter of installation and extinction.

Table 1: Descriptive Statistics - UPP Installation and Extinction Quarters

	Median	Mean	sd	Min	Max	N
Population (2010)	15353	17803	12774.3	2922	70490	37
UPP Installation Quarter						
New Formal Entrepreneurs	1.2	1.4	1.2	0	5.8	37
Median Entrepreneur Social Capital	0.1	0.2	0.2	0	1	37

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[9]*Sistema de Informações de Crédito (SCR)*

[10]In the slums of Rio de Janeiro, the houses do not have a zipcode. All the correspondences that arrive go to the association of residents and, from there, they deliver in the neighborhood.

[11]In the appendix, we provide further details.

Table 1 continued from previous page

	Median	Mean	sd	Min	Max	N
New Formal Firms	0.8	1357.4	5119.9	0.7	29010.1	32
Microcredit	0	1.3	2.2	0	10.5	37
Credit Card	2.2	10.5	17.2	0	83.3	37
Financing Credit	0	3.9	19.2	0	115.5	37
Vehicle Financing	91	134.2	140.8	0	593	37
Working Capital Credit	173.9	489.6	913.6	0	4421.8	37
Violent Crimes	164.1	166.9	92.4	17.1	401	37
Robberies	22.8	48.1	68.5	0	297.8	37
Commerce Robberies	0	3.8	6.3	0	21	37
Thefts	71.6	92.7	91.7	12.1	536	37
Vehicles Thefts	5.7	7.1	8.8	0	39.7	37
Cellphone Robberies	0	2.8	7.4	0	37.1	37
Intentional Homicides	0	1.7	4.3	0	17	37
Seized Weapons	5.1	13.2	23	0	105	37
Drug Apprehension	65.4	73.1	52	0	199.5	37
Homicide by Police Intervention	0	2.5	8	0	42	37

UPP Extinction Quarter

	Median	Mean	sd	Min	Max	N
New Formal Entrepreneurs	3.7	3.8	1.9	1.6	7.5	8
Median Entrepreneur Social Capital	0.2	0.4	0.6	0	1.7	8
New Formal Firms	477.7	552.6	110.2	473	710.6	8
Microcredit	0.6	0.9	1.1	0.1	3.6	8
Credit Card	20.3	24.1	14.9	7.2	55.6	8
Financing Credit	0	0	0	0	0	8
Vehicle Financing	58.5	73.9	59.2	16.9	212.4	8
Working Capital Credit	92.5	150.6	182.3	5.3	550.9	8
Violent Crimes	94.1	103.3	36.3	68.4	167.3	8
Robberies	69.4	168.2	261.6	20.4	808.1	8
Commerce Robberies	0	2.4	4.7	0	12.4	8
Thefts	38.8	55.8	32.8	30.4	109.4	8
Vehicles Thefts	6.3	7.7	6.5	0	17.4	8

Table 1 continued from previous page

	Median	Mean	sd	Min	Max	N
Cellphone Robberies	12.2	19.7	32.2	0	97	8
Intentional Homicides	0	3.9	5.6	0	13.6	8
Seized Weapons	11	16.7	14.7	0	38	8
Drug Apprehension	45.5	43	25.2	15.2	78.2	8
Homicide by Police Intervention	1.1	4.1	7.8	0	22.8	8

Notes: The table presents the summary statistics for the UPP quarter of installation and extinction. There are 37 UPPs, of which 8 are extinct. Crime variables are per 100 thousand inhabitants, formal entrepreneurs and firms per 1000 inhabitants, and credit per capita. Source: Instituto Pereira Passos, Banco Central do Brazil and Receita Federal.

One can be noted from Table 1 a harsh climate to entrepreneurship and to the provision of credit within the slums, with our measures presenting a small existence of firms and entrepreneurs. Analogously, for the credit card, widely used outside the slums, the mean of credit is only ten reais per capita.

On the other hand, by investigating the measures of crime, we can note potential reasons for this harsh climate to the entry of entrepreneurship and credit in these regions. Violent crimes and thefts present an average of 166.9 and 92.7 per hundred thousand inhabitants. Combined with the high levels of robberies in general and commerce robberies, specifically, it characterizes an environment controlled by a parallel power, renegaded by public security, with high uncertainty, which disincentives entrepreneurship.

It can be observed that there was a higher rate of business formalization during the quarter of extinction as opposed to the installation quarter. Additionally, the crime rates were noticeably lower during the former period.

4 Empirical Investigation

4.1 Identification Strategy

In order to investigate deeply the empirical patterns illustrated in the previous subsection, here we use two methodologies. First, we follow Callaway and Sant'Anna (2021) difference-in-differences to explore the causal relationship between the UPP intervention in some slums in the city of Rio de Janeiro and the increase in the opportunities within the favelas. Our second methodology is a panel regression with fixed effects at the UPP level used to estimate the positive feedback effect of credit in our crime and business outcomes.

4.1.1 The Impact of UPP in Crime, business, and Credit

The first challenge to estimating our difference and difference regression is the definition of a control group since each slum has its idiosyncratic characteristics, such as geographical territory and leadership. However, since the time of installation of UPPs was distinct and sequential, we explore this fact considering the not-yet-treated (not yet UPP installed) UPP as the control group. For the extinction effect estimation, we follow a similar procedure, where we adopt never-treated (UPP that never got extinct up to the end of our sample period) as the control group.

Then, we consider that $Y_{it}(0)$ is UPP i 's untreated potential outcome. This is the outcome that UPP i would experience in period t if they do not participate in the treatment, $Y_{it}(g)$ be UPP i 's potential outcome in time period t if they become treated in period g. G_i is the time period when UPP i becomes treated. C_i is an indicator variable for whether UPP i is in a never-treated group. D_{it} is an indicator variable for whether UPP i has been treated by time t. Y_{it} be UPP i 's observed outcome in time period t. δ is the number of periods in anticipation, which we assume to be equal to zero.

Under the following assumptions, we can identify the effects of the UPP installation and extinction. Note that there is a different parallel trend assumption for the never-treated and not-yet-treated cases.

1. **No treatment anticipation:** Criminals and individuals don't change their behavior in anticipation of the installation or extinction of the UPP

2. **Staggered Treatment Adoption Assumption:** For $t = 1, \ldots, \mathcal{T} - 1, D_{it} = 1 \implies D_{it+1} = 1$, where $D_{it} = 1$ if a unit i has been treated by time t and $D_{it} = 0$ otherwise.

3. **Parallel Trends:**

   (a) *Based on never-treated units* for all $g = 2, \ldots, \mathcal{T}, t = 2, \ldots, \mathcal{T}$ with $t \geq g$,

$$E\left[Y_t(0) - Y_{t-1}(0) \mid G = g\right] = E\left[Y_t(0) - Y_{t-1}(0) \mid C = 1\right]$$

(b) *Based on not-yet treated units* for all $g = 2, \ldots, \mathcal{T}, s, t = 2, \ldots, \mathcal{T}$ with $t \geq g$ and $s \geq t$

$$E\left[Y_t(0) - Y_{t-1}(0) \mid G = g\right] = E\left[Y_t(0) - Y_{t-1}(0) \mid D_s = 0, G \neq g\right]$$

The average treatment effect estimates considering the "never-treated" (nev) UPPs and "not-yet-treated" (ny) UPPs as controls are, respectively:

$$ATT^{nev}(g, t; \delta) = E\left[Y_t - Y_{g-\delta-1} \mid G_g = 1\right] - E\left[Y_t - Y_{g-\delta-1} \mid C = 1\right],$$

and

$$ATT^{ny}(g, t; \delta) = E\left[Y_t - Y_{g-\delta-1} \mid G_g = 1\right] - E\left[Y_t - Y_{g-\delta-1} \mid D_{t+\delta} = 0\right]$$

Furthermore, we present average effects across different lengths of exposure to the treatment (i.e., the average effect of the treatment across all positive lengths of exposure), which is similar to a traditional event study, and group effect aggregation (i.e., average treatment effects across different groups, which are defined by installation quarter).[12]

4.1.2 The Impact of Microcredit: Exploring its Association with Opportunities and Outcomes

Next, to explore the link of microcredit concessions to the main outcomes linked to opportunities, we run the following panel regression:

$$Y_{it} = \alpha_i + \lambda_t + \beta \cdot log(Microcredit)_{it} + \epsilon_{it} \tag{1}$$

where Y_{it} is the outcome of interest for UPP i at year-quarter t, α_i, and λ_t are UPP and year-quarter fixed effects. β is the coefficient of interest and captures the relation of the given outcome with the log of the total Microcredit balance at the UPP level.

4.2 Results

Our first empirical result is estimating the impact of the UPP program on crime rates, as described by Table 2. After the UPP installation, there was an expressive reduction in several crime rates, such as robberies and commerce robberies, and increased drug apprehension. On the other hand, the discontinuation of the UPP resulted in an increase in thefts and cellphone robberies, which provides evidence of the importance of the presence of police within the favelas to guarantee local security.

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[12]See Callaway and Sant'Anna (2021) for estimation and aggregation details.

Table 2: UPP on Crime Rates

	Installation		Extinction	
	Estimate (dy)	Estimate (gp)	Estimate (dy)	Estimate (gp)
Robberies	-63.1***	-42.31***	0.66	16.47
	(22.22)	(8.88)	(52.49)	(29.17)
Commerce Robberies	-8.95***	-7***	1.08	1.34
	(1.26)	(1.08)	(1.33)	(1.11)
Thefts	-21.76	-8.84	37.54**	39.13**
	(13.65)	(8.73)	(14.27)	(14.36)
Vehicles Thefts	-8.19*	-6.19***	5.38*	4.27
	(3.87)	(1.6)	(2.56)	(2.54)
Cellphone Robberies	-0.54	0.78	8.41*	9.63***
	(3.14)	(0.86)	(3.68)	(2.08)
Drug Apprehension	31.72***	30.99***	-6.84	-5.96
	(10.83)	(9.9)	(13.97)	(15.5)

Notes: The table presents the results for Callaway and Sant'Anna (2021) specifications for the installation and extinction of UPPs, where we respectively use "not-yet-treated" (slums which had not yet a UPP) and "never-treated" (slums which were not extinguished) as the control groups. "Estimate (dy)" columns present the estimates of the average effects across different lengths of exposure (which is similar to the traditional event study);. In contrast, the "Estimate (gp)" columns present the average treatment effects across different groups (defined by installation/extinction quarter). Standard errors are in parenthesis.

These findings describe the role of the UPP program in re-establishing the state of peace within the favelas, which corroborates the idea that police units have strengthened the rule of law. This, in turn, indicates that the potential payoff of committing a crime is lower due to an increased likelihood of punishment as well as the reduction of criminals living in the slums that received the UPP program. Endorsing this idea, the behavior observed through the extinction of the program suggests that the decline in crime rates was dependent on the presence of the new police units.

The aforementioned outcome provides a flavor of how UPP can potentially generate new opportunities for the inhabitants of the favela. The re-establishment of the local rule of law incentivizes the surge of entrepreneurship due to two main channels. First, the reduction of entrepreneurs' expected losses, since after the installation of the UPP, the likelihood of local commerce being robbed was reduced, which stimulates the creation of new facilities and the growth of the old ones. Second, the reduction in the expected payoff of

criminals brings a spillover effect to the local community since it stimulates the youngest to work instead of entering into the criminal life, creating a contingent labor supply.

To test this mechanism, in our subsequent analysis, we will delve deeper into how the UPP program can significantly impact opportunities, with a specific focus on the formal firm, entrepreneur creation, and credit accessibility, including microcredit and working capital credit.

Table 3: UPP on Business and Credit Outcomes

	Installation		Extinction	
	Estimate (dy)	Estimate (gp)	Estimate (dy)	Estimate (gp)
New Formal Firms	0.02	0.02	-0.09***	-0.08*
	(0.02)	(0.02)	(0.03)	(0.04)
New Formal Entrepreneurs	0.45*	0.31***	-0.16	-0.08
	(0.19)	(0.09)	(0.27)	(0.21)
All Credit	1169.77*	450.72*	-68.14	99.68
	(496.13)	(192.96)	(843.58)	(1062.83)
Microcredit	2.22***	1.07***	0.16	0.26
	(0.77)	(0.32)	(0.2)	(0.23)
Working Capital Credit	120.16	156.7**	44.37	93
	(110.86)	(61.07)	(224.67)	(281.54)

Notes: The table presents the results for Callaway and Sant'Anna (2021) specifications for the installation and extinction of UPPs, where we respectively use "not-yet-treated" (slums which had not yet a UPP) and "never-treated" (slums which were not extinguished) as the control groups. "Estimate (dy)" columns present the estimates of the average effects across different lengths of exposure (which is similar to the traditional event study). In contrast, the "Estimate (gp)" columns present the average treatment effects across different groups (defined by installation/extinction quarter). Standard errors are in parenthesis.

Table 3 shows that the introduction of UPPs positively impacted the entrepreneurial landscape in the favelas. Specifically, the number of new entrepreneurs has increased, and access to credit, especially microcredit, for impoverished households increased. On the other hand, the termination of UPPs had a negative effect, leading to a decrease in establishing new businesses. These findings suggest that UPPs play a crucial role in promoting economic growth and development in favelas, and their continuation is essential for sustaining this progress.

Now, to understand whether the effects previously found were temporary or sustainable as well as characterize their behavior over time, Figure 5 depicts their magnitude according to the length of exposure to

UPP, in terms of the number of quarters since the UPP installation occurred. This figure sheds light on the complex mechanisms behind the improved opportunities made possible through implementing UPPs in favelas.

In terms of formal businesses, one can note a different pattern from the one observed in the criminal counterpart. Here, right after the installation of UPP, we see a jump in the coefficient estimate, enhancing almost 10% in a single quarter, followed by a positive trend of increment in its magnitude. This behavior illustrates the positive expectations around the success of UPP as well as the implicit desire to endeavor new business in the local regions.

In addition, the statistical evidence clearly indicates a substantial reduction in instances of commercial robberies, attaining a reduction of almost 30% after five years after the implementation of UPPs. Indeed, this chart describes that effects on commerce robberies started gradually right after the program's implementation; however, quarter after quarter, its magnitude increased, which corroborates our hypothesis on the gradual reestablishment of the rule of law within the favelas.

Moreover, there has been a positive trend in the concession of microcredit, which increased almost 10% after four years of the program's implementation. The behavior observed in this chart is very suggestive of the entering of credit within the pacified favelas since it came in the program's second stage, in the so-called "UPP Social", which justifies the slow growth for the first year. After the consolidation of the rule of law in the region, some UPPs received the creation of local bank branches and increased the number of agents of credit.

(a) New Formal Entrepreneurs

(b) Commerce Robberies
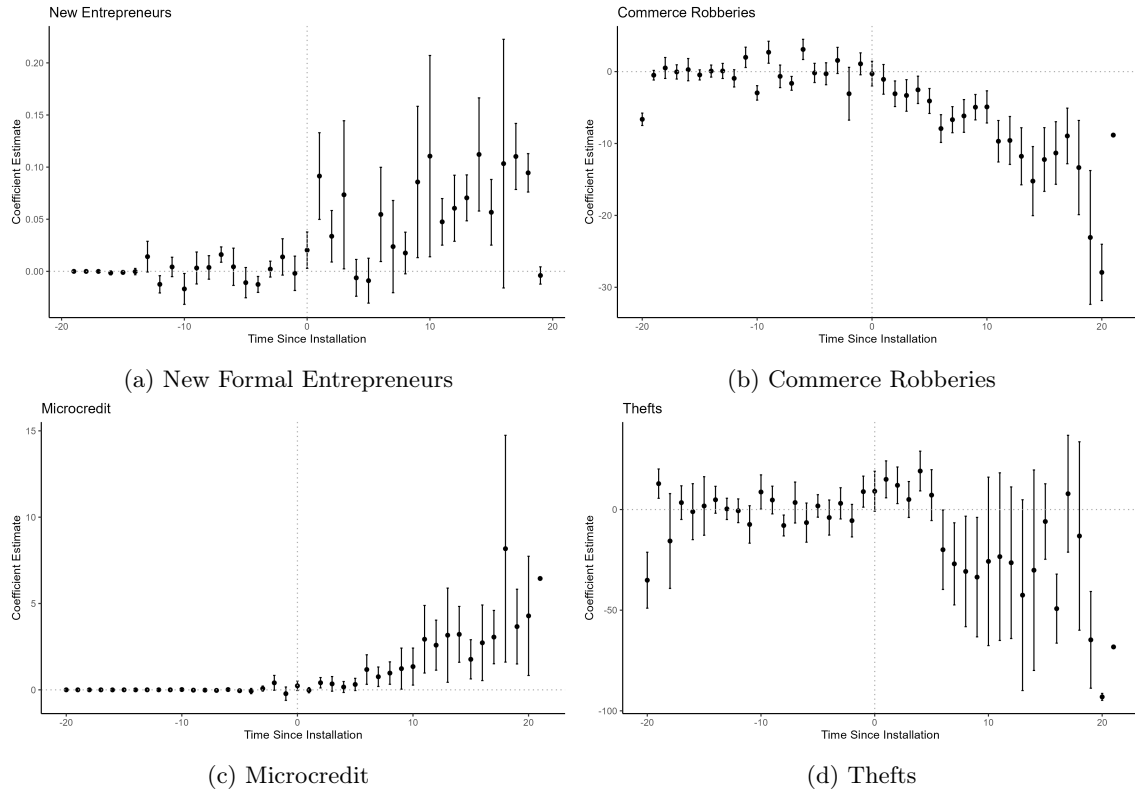
(c) Microcredit

(d) Thefts

Figure 4: UPP on Formal Entrepreneurship, Microcredit per Capita, Commerce Robberies, and Thefts

Notes: The graphs present the average effects of the installation of UPPs across different lengths of exposure - similar to an "event study" - based on Callaway and Sant'Anna (2021).

Since credit utilization can have a ripple effect on diverse aspects like employment, entrepreneurship, and criminality, creating a feedback effect,[13] our last empirical result investigates the relationship between microcredit and our main variables of opportunities in the favelas. Table 4 shows that there is a positive correlation between the per capita microcredit in the subsector region and the emergence of new formal entrepreneurs and enterprises, along with a decrease in commerce robberies and thefts in the UPP region. Therefore, public policies that improve the state of peace in poor regions could amplify even more their effects raising the local credit.

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[13]See Chodorow-Reich (2014), Kuzilwa (2005) and Banerjee et al. (2017).

Table 4: Microcredit on New Entrepreneurs, Firms and Crime Rates

	New Formal Entrepreneurs	New Enterprises	Commerce Robberies	Thefts
	(1)	(2)	(3)	(4)
log(Microcredit)	0.060***	0.008*	−0.242*	−8.002***
	(0.023)	(0.004)	(0.133)	(2.054)
UPP FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	1,998	1,998	1,998	1,998
R^2	0.004	0.002	0.002	0.008

Note: *p<0.1; **p<0.05; ***p<0.01

Notes: The table presents the results for the panel linear regression of Microcredit on crime rates per 100.000 inhabitants and new formalized entrepreneurs and enterprises per 1000 inhabitants. Robust standard errors are in parenthesis. Source: Instituto Pereira Passos, Banco Central do Brazil and Receita Federal.

5 Conclusion

In this paper, we document the existence of a new channel in the literature on the economics of crime, where the fight against crime can increase the opportunity of inhabitants in poor regions through indirect effects on credit and entrepreneurialism. To do that, we investigate the capacity of UPP policy to increase the chances within the slums of Rio de Janeiro city by estimating its effect on crime, business, and credit. Using the difference in difference regressions as in Callaway and Sant'Anna (2021), we find that UPP installation reduced substantively commerce robberies, thefts, and robberies, in general, at the same that incentivized the creation of new firms as well as allowed the entry of new entrepreneurs in the favelas. This policy also enhanced the credit for their inhabitants, which brought a positive feedback spiral, where combined with the restoration of the state of law and peace, it stimulated even more the creation of new formal entrepreneurs and new enterprises and reduced commerce robberies and thefts.

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6   Appendix

(a) Formal Entrepreneurs

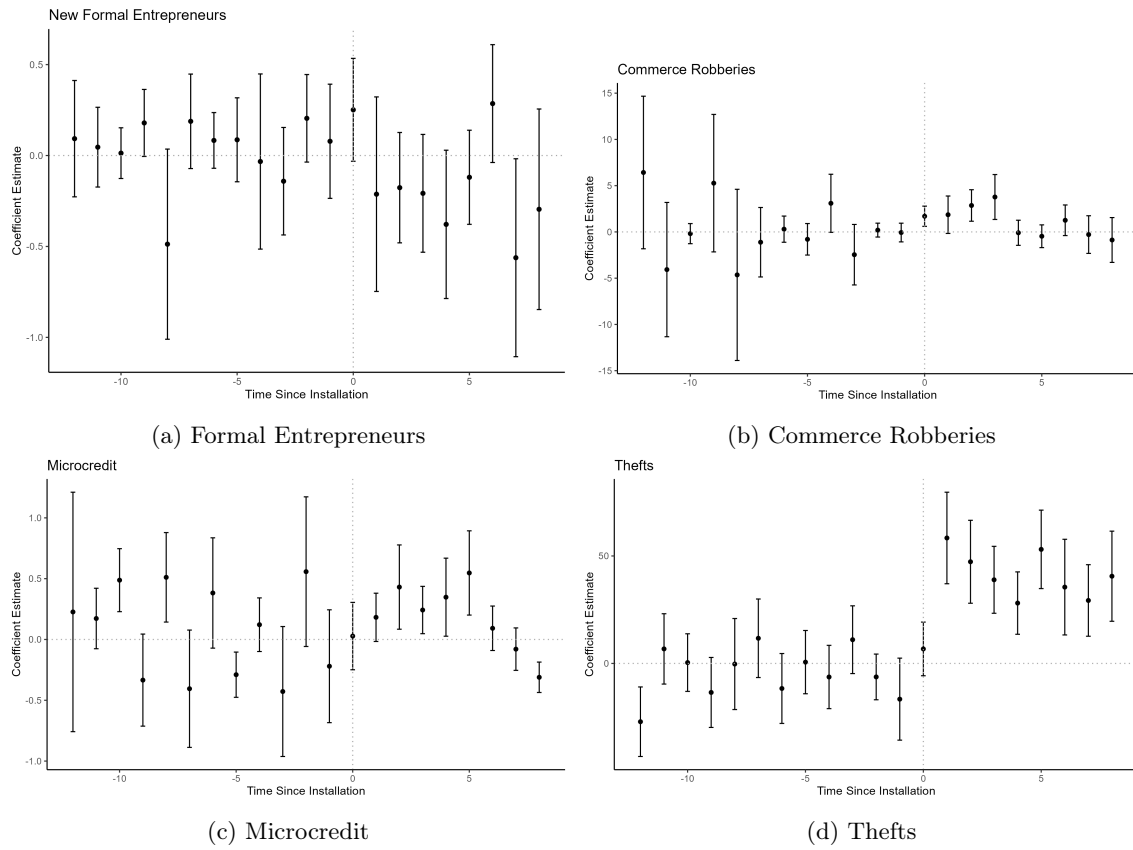(b) Commerce Robberies

(c) Microcredit

(d) Thefts

Figure 5: UPP on Formal Entrepreneurship, Microcredit per Capita, Commerce Robberies, and Thefts

Notes: The graphs present the average effects of the installation of UPPs across different lengths of exposure - similar to an "event study" - based on Callaway and Sant'Anna (2021).