The price of silence

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Abstract

We develop a theory of criminal self-protection. Without secure property rights, criminals struggle to safely accumulate wealth. We argue that criminals can improve their property rights by bribing witnesses around them. Bribing witnesses is especially convenient when bribing rivals and police is prohibitively costly. However, not all kinds of bribes are equally useful. Thus, we suggest that informal governance can be an especially effective kind of bribe because it is cheap for criminals to supply and it is highly valued by witnesses who receive little formal governance. In this way, subsidizing governance to witnesses acts as a form of "hush money" that makes criminals less vulnerable to robbery. We use our theory of bribery to explain the governance provided by drug traffickers to nearby locals in the favelas of Rio de Janeiro. Evidence there supports the predictions of our theory.

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1 Introduction

Drug trafficking gangs have been among the most important keepers of law and order in the favelas of Rio De Janeiro since the 1980s. They regularly protect residents from theft and assault, resolve disputes, and are known to finance small public works projects and community services. This "informal though highly effective form of social order" is not confined to one or two favelas. In 2005 over 70% of Rio's 965 recognized favelas were under trafficker control, almost 1 million people total at that time (Zaluar 2012; Barcellos and Zaluar 2014).

One interpretation of Rio's system of criminal governance is that the traffickers are altruistic. After all, many traffickers are born in the favelas that they steward. They know and are known by many of their neighbors and residents. Some scholars describe traffickers as pursuing a kind of "patronage relations" with residents (Arias 2009, 34). Residents consider traffickers' provision of protection an obligation (Dowdney 2003).

Such an interpretation is especially tempting because, unlike many mafias, Medellín *combos*, and the nearby militia groups in Rio, the drug traffickers do not rely on extortion as a source of income. As a result, unlike many other criminal groups, Rio's traffickers do not have a direct pecuniary interest in the affairs of the local residents.

Our paper offers a contrasting account of this puzzle. To do so, we develop a model that identifies when the governance of witnesses by criminals can be an effective bribe that secures witnesses' silence. Such a model highlights that, in the right circumstances, selfish people can be incentivized to behave as if they are benevolent. We then test the main predictions of our theory within Rio's favelas. The evidence there supports the applicability of our theory.

Our argument is simple. Criminals cannot rely on the government to define and enforce their property rights. As a result, criminals face a fundamental problem. Their property rights are insecure. Indeed, the property rights of drug traffickers are especially insecure. The ease with which drugs like cocaine can be transported and then resold makes traffickers highly attractive targets. Rival traffickers or petty criminals will rob them. Police have an incentive to raid their homes and seize their drugs. All criminals, but especially drug traffickers, are vulnerable to robbery and raids.

In light of their vulnerability, traffickers have an incentive to invest in creating *de facto* property rights. How they choose to protect themselves depends upon what circumstances they face. Most criminals strengthen their property rights by either hiding or defending themselves with force. Few have the opportunity to trade around this problem (Coase 1960).

In theory, traffickers could bribe both police and rivals to stay away. But where rival criminals and police cannot credibly refrain from robbing, witnesses may be an attractive substitute. This can occur when, for example, witnesses live together in one community. Then, witnesses' can self-supervise and, as a group, credibly keep quiet.

In such circumstances, there may be gains from trade. In exchange for witnesses' silence, traffickers arbitrate disputes for and protect the property

rights of witnesses. Traffickers want to pay such a bribe because it allows them to work in the open without undue exposure to robbery. At the same time, witnesses gain access to cheaper arbitration and policing services. Ergo, bribery can be an effective way to enhance the property rights of traffickers. Loyal witnesses reduce how often traffickers are robbed by other criminals and raided by police.

While traffickers have many ways in which to transfer wealth to witnesses, not all types of bribes are equally useful. For example, it is common for bribes to be made in cash. However, in-kind bribes such as informal governance may be a cheaper alternative as they are simultaneously cheap for traffickers to produce and highly valuable to witnesses living in societies that receive little formal governance. Governance is cheap for traffickers to supply because they have a comparative advantage in using violence to enforce rules. When witnesses live in societies with little formal governance, their demand for informal governance is high. In such circumstances, a dollar spent subsidizing informal governance can earn more loyalty than does a dollar transfer. Counterintuitively, barter gives both parties the best chance to capture the gains from trade.

Our theory predicts that if any of the above conditions are not present, then either traffickers and witnesses will not trade or, if they do, then the bribe will not be in the form of governance. Researchers have lived in favelas and interviewed countless favela traffickers and residents from the mid-20th century until the present.[1] Thanks to the impressive body of primary and secondary sources created by decades of fieldwork in Rio's favelas, these remarkably overlapping and thorough accounts allow us to show that all of the conditions necessary for criminal governance to be an effective bribe are present in Rio's favelas.

Similar kinds of gang rule persist today both in Rio and around the world (Lessing 2021). There is growing interest in the causes and consequences of gang rule. For example, Blattman et al. (2021) argue that gangs in Medellin provide governance to keep police out of the area. Sánchez De La Sierra (2020) argues that roving criminal groups in the Eastern Congo became stationary bandits when the value of coltan mines became sufficiently valuable. Kostelnik and Skarbek (2013) document that, in Mexico, the drug trafficking group *La Familia Michoacana* elicits cooperation from local communities by providing private and public goods.

Our paper contributes to such work by showing that, contra Olson (1993), taxation is not the only way to give criminals an incentive to rule. In each of the above cases, extortion or taxation is that which gives the criminal group an encompassing interest in the affairs of the non-criminals. Absent taxation, criminals would have no reason to rule. Not so in Rio. There, criminal groups govern without a recognized system of taxation in place. As a result, we argue that the ability to withhold key information can make criminals act as if they have an encompassing interest. In Rio, governance is the price of witnesses' silence.

[1] They include, for instance, Gay (1994), Leeds (1996), Penglase (2003), Goldstein (2003), Dowdney (2003), Arias and Rodrigues (2006), Perlman (2010), Larkins (2015), and Barnes (2022).

This paper also offers a useful contrast with Berman et al. (2011). They study competition between formal states and non-state groups for the "hearts and minds" of local communities in Iraq. However, their theory cannot explain why governance, in particular, is the principal means by which hearts and minds are won. Ours can.

Lastly, our analysis contributes to the growing body of work within the economics of crime that examines how criminals organize.[2] Criminal organizations around the world vary in how stealthy or violent they are. Our theory suggests that these common patterns of criminal organization are best understood as methods of self-protection. Both hiding and violence protect criminals from predation. Our evidence suggests that trade is an important and often overlooked alternative. But which criminals choose, however, depends upon the relative costs and benefits of each.

In the next Section, we describe the organization of and security services associated with favela drug trafficking in Rio. Then, we sketch out the key parts of our theory of self-protection. In Section 4, we provide confirmatory evidence of our theory's predictions. We end with Section 5.

2 The context

Favelas are squatter settlements within some of Brazil's largest cities. Often built on vacant plots of private or government-owned land, favelas have existed since the end of the 19th century. However, they began to grow in size and number during the 1940s. Favela residents tend to be quite poor and have weak formal claims to their property. This is because in the past and "[e]ven today, the favelas remain an officially unrecognized and illegal part of [Rio]" (Pino 1997, 111).

Although favelas have an ambiguous legal status, they house around 11 million people. In 1991, about 14% of Rio's population lived in favelas (Gay 1994). Cities like Rio can contain hundreds of such settlements, usually with fewer than a thousand residents. The majority of Rio's favela population lives within a few large settlements such as Rocinha that are divided into neighborhoods (Gay 1994).

The life of a favela resident is largely separate from drug trafficking. Historically, most residents are not customers of or competitors with the traffic. Barnes, for instance, recently "found that most of Maré's 140,000 residents tried to avoid any direct involvement while remaining obedient of their rules" (2022, 801). Many residents have formal employment outside their favela. As a result, a sharp but informal distinction exists within favelas between traffickers and residents. Dowdney stresses that "interviewed faction members demonstrated a profound understanding that although drug traffickers and 'non-involved' resi-

[2] Seminal pieces in the economics of crime include, for example, Becker (1968) and Levitt and Venkatesh (2000). For scholarship that studies the organization of crime, see for instance, Reuter (1983), Dick (1995), Leeson (2007), Leeson and Rogers (2012), Piano (2017), and Thompson (2024).

dents were of the same community and represented the same community, there existed a fundamental difference between them" (2003, 61-62). Favela norms have emerged that carry "a clear distinction between the 'worker' and the 'criminal', the former being worthy of respect and protection due to a perceived moral superiority to the violent but 'necessary' criminal that upheld social order" (Dowdney 2003, 53). Even so, favelas are governed by drug traffickers, to whom we now turn.

2.1 The traffickers

Since the 1980s, there have been four primary drug trafficking factions in Rio de Janeiro. They are *Comando Vermelho*, *Terceiro Comando*, *Comando Vermelho Jovem*, and *Amigos dos Amigos* (Perlman 2010). These factions do not have a single leader but rather tend to be organized as "a group of independent *donos* joined through loose and mutually beneficial alliances" (Dowdney 2003, 43).

Donos are drug gang leaders who control a favela or the area within it. A *dono* is an autonomous position that is responsible for, among other things, purchasing drugs from *atacadistas* (wholesalers), controlling one or more favelas, and maintaining relationships with other *donos*.[3] As the residual claimant to all of a *quadrilha*'s drug trafficking profit, residents often refer to these leaders as *dono do morro* or "owner of the hillside" (Penglase 2009). A *dono* "has final word on any decision within territories ruled" (Dowdney 2003, 47). A *dono's* faction affiliation is not permanent. If the partnership becomes ineffective or becomes a danger to a *dono's* interests, then a *dono* may abandon his faction and proclaim his territory neutral (Dowdney 2003).[4]

Donos oversee *quadrilhas*, the main organizational units that comprise each faction. *Quadrilhas* have little in common with "the loose associations found at the level of *dono*," and are instead defined by "a strictly hierarchical and militarized structure with clearly defined rankings that is repeated almost identically in all favelas regardless of their faction affiliation or neutral status" (Dowdney 2003, 46).[5]

If not for their criminality, a *quadrilha* could be mistaken for a prototypical firm. Members are closer to formal employees than, for example, members of the American Mafia (Thompson 2024). Members in the largest *quadrilhas* are not self-directed. They tend to be assigned specific roles and tasks, each with its own form of remuneration.

Below the *dono* is the *gerente geral* (general manager), who reports directly to the *dono* and oversees the favela drug sales, territorial defense, and attacks on other traffickers. As many as three "under managers" report to the general manager: the *gerente de branco* (cocaine manager), the *gerente de preto*

[3] Some *donos* are responsible for bribing police, although this is not routine (Dowdney 2003; Barnes 2022).

[4] *Donos* do not always live within the favelas they control but do visit their territories when possible. The CV's most powerful *donos*, for example, are in prison and use cellphones to communicate with their employees Dowdney (2003).

[5] The structure of *quadrilhas* "has remained quintessentially unchanged" until at least the early 2000s (Dowdney 2003, 31).

(marijuana manager), and the *gerente de soldados* (soldiers' manager). When present, each under-manager has a specific responsibility. For instance, the *gerente de preto* oversees all favela marijuana sales. The *gerente de branco* oversees all cocaine sales in the favela while the *gerente de soldados* oversees the *soldados* (soldiers) and the security of the favela.

Further down the hierarchy are managers called *gerente de boca*. The *gerente de boca* supervises each *boca*, or salespoint, each manned by *vapores* who are responsible for selling the drugs to customers. *Soldados* are responsible for guarding *bocas* and defending them against rival factions and police. A *dono* may also employ personal guards called *fiel*. The lowest-ranked members of the *quadrilha* are *olheir* and *endolador*. *Olheiros* are lookouts who use fireworks or radios to warn traffickers of invading police or rival traffickers. *Endoladores* are responsible for packaging the drugs for their respective *gerente*, whether cocaine or marijuana.

Remuneration varies with a *quadrilha* member's position. Managerial and sales positions such as *gerente general*, *gerente de preto*, *gerente de branco*, *gerente de boca*, and *vapor* are compensated via commission. By contrast, *gerente de soldados*, *soldados*, *fiel*, *olheiros*, *endolador*, are all paid a fixed, weekly or monthly wage. *Quadrilha* membership is not a life commitment (Dowdney 2003, 215). Consequently, a *quadrilha* offers a kind of "at-will" employment.

Figure 1 illustrates the structure of authority of a typical *quadrilha*, designed to help "sell drugs to clients, defend the *bocas de fumo* from rival faction invasion or a police raid, and invade other faction's territories" (Dowdney 2003, 46).

Donos purchase cocaine from *atacadistas* (wholesalers) who organize the importation of the drug into Brazil. *Matutos* are responsible for transporting cocaine into the favelas. The drugs are finally sold to consumers by the *dono*'s employees at the *bocas de fumo*, retail salespoints within a *dono*-controlled favela. *Bocas* are usually located at favela entryways, but others can be deeper within the favela (Barnes 2022; Perlman 2010; Arias 2009). As a favela may have up to 15 or more such locations, the result is an open-air drug market easily accessible to a *dono*'s non-resident customers (Dowdney 2003).

For revenue, *donos* rely most on the retail sale of cocaine and marijuana. Consider a typical description of a drug market by ethnographer Nicholas Barnes. He spent 18 months conducting fieldwork on drug traffickers in Rio de Janeiro's favelas. He found that "[e]ach gang sold drugs at roughly three dozen open-air markets called *bocas de fumo* (literally, mouths of smoke), which were little more than small plastic tables with bags of different quantities of marijuana, cocaine, and crack" (Barnes 2022, 800). An anthropologist who also conducted fieldwork in Maré, Rio, found that "the drugs trade takes place in the open air, using small tables that are used to place bags filled with small portions of marijuana, cocaine, crack and, less often, ecstasy, *loló* (a psychotropic drug made using chloroform and ether) and hashish, ready to be sold" (Raposo 2014, 25, ft. 36).

Traffickers are vulnerable to robbery. For this reason, unlike mafias, *quadrilhas* have the distinct position of *soldado*. *Soldados* specialize in the production of high levels of violence. Dowdney observes that *soldados* are the "Constant and

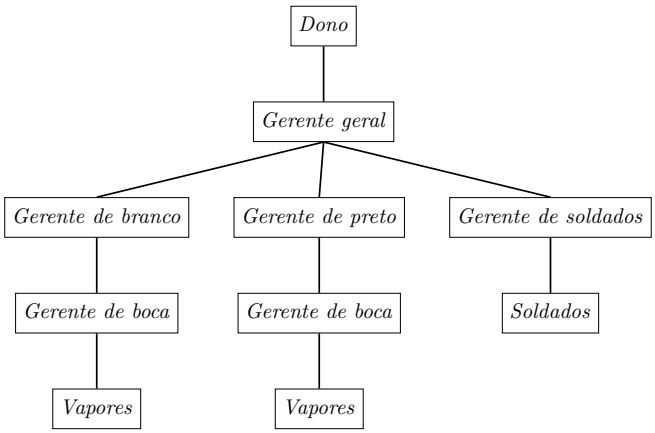

Figure 1: Structure of typical *quadrilha*

Notes: The figure displays the hierarchy of authority in the typical *quadrilha*. The *Dono* oversees the *quadrilha* and sits at the head of the tree. The chain of command proceeds downward. Source is Dowdney (2003).

openly armed presence within the community" who are also "used for invading other territories or manning the *bonde* that leaves the favela to transport drugs or weapons around the city" (2003, 48).[6] Consider, for example, the description of the favela Vidigal provided by Gay (1994). Traffickers had the favela's bocas and entryways "closely watched and heavily guarded, a precautionary measure in the event of a raid by the local police" (1994, 97). Camouflage and secrecy do not protect the favelas' drug traffic. Guards and patrols do.

Visibility is another defining quality of a *quadrilha*'s operations (Zaluar 2001). Not only are open drug markets the norm, but trafficker members do not hide their status, activities, or conflict from residents. *Quadrilha* members openly flaunt their weapons, loudly punish rulebreakers, heavily guard drug shipments within favelas, and often explicitly warn locals of impending raids. Dowdney thus describes *quadrilha* and community members as sharing "public areas in the community on a daily basis" (Dowdney 2003, 123). Traffickers will also place graffiti that includes the names of local traffickers on favela walls to publicly mark their territory (Raposo 2014, 27).

As a result of *quadrilhas*' visibility, residents know a great deal about the local traffic. For example, residents know the locations of *bocas*, the identities of *quadrilha* members (including the *dono*), and where *quadrilha* members live.[7] Moreover, many are related to residents by birth or marriage (Gay 1994; Dowdney 2003). So familiar are locals with members that parents "may request the *gerente geral* to not let their children become involved, and depending on the

[6] *Bonde* can also refer to internal security patrol.

[7] Knowledge about identities and living quarters of *quadrilha* members is particularly significant because robbers can then catch unsuspected traffickers by surprise.

situation, traffickers may agree" (Dowdney 2003, 125). As one resident acknowledged, "people keep pretty much to themselves and everyone knows who is and who isn't a bandido [trafficker] or a bandido's woman" (Gay 2005, 19).

2.2 Trafficker governance

Since the 1980s, most drug traffickers in Rio de Janeiro have enforced criminal law within favelas. As one favela scholar wrote, "the community as a whole benefits from the internal security system provided by the drug group," and "[i]n most favelas and housing projects, robbery, rape, and other kinds of interpersonal violence are often met by equally violent reactions by the [trafficker leader], who may mete out his own form of justice" (Leeds 1996, 61). Traffickers rarely collect taxes from residents for these services.[8] (Leeds 1996)

Traffickers' commitment to providing informal law and order began with their entrance into favelas. The first faction to enter favelas in the 1980s, the *Comando Vermelho*, adopted a policy of *boa vizinhança*, or "neighborliness" with favela residents. This policy committed traffickers to policing community norms. One *vapor* described the obligation as follows: "[the traffickers] are the community, if there's a pervert [in the community] then we kill him because he messed up," and "if there is a theft in the community we resolve it. If there's a family fight we resolve it. Everything here is dealt with by us. The problems of the community are ours" (Dowdney 2003, 66-67).

Rules enforced by traffickers are very similar across favelas, simple, few in number, and entail severe punishments (Dowdney 2003, 64). Locals are typically forbidden from engaging in theft, physically fighting one another, committing rape, sexually abusing children, and wife beating (Dowdney 2003, 64).[9] These rules and their respective punishments are common knowledge within their favela (Arias and Rodrigues 2006; Dowdney 2003). The specific rules that traffickers enforce, according to Arias and Rodrigues, "are based on beliefs and values shared by both residents and traffickers. Stealing, rape, and public disorder are disapproved of not just by the traffickers but also by residents" (2006, 71).

Scholars conducting fieldwork have long recognized the legitimacy of trafficker law (Leeds 1996; Dowdney 2003; Arias and Rodrigues 2006; Penglase 2009).[10] Scholars stress that both traffickers and locals expect traffickers to be responsible for keeping law and order in the favelas (Dowdney 2003; Arias and Rodrigues 2006). As Arias and Rodrigues state, trafficker "governance" is "generally divided into three areas: punishment related to drug trafficking; control

[8] Examples of traffickers collecting taxes from residents do exist, but are rare. See, for example, Perlman (2010) or Arias (2009). Even in those cases, revenue from such fees tends to be low relative to drug revenues (Perlman 2010, 109). Local militias offer a useful comparison because it is well-known that they explicitly "sold security in order to protect the favela areas," by charging "prices that vary from 15 to 30 reais per house" (Alves and Evanson 2011, 94). See also Arias and Barnes (2017).

[9] See also Arias and Rodrigues (2006)

[10] Arias and Rodrigues (2006) is an invaluable source as it draws on data collected from observations and interviews in five favelas from 1997-2001 to study trafficker governance therein.

of other criminal activities, such as theft and rape; and keeping order by, for example, calming domestic violence or breaking up street fighting" (2006, 65). According to residents interviewed by Arias and Rodrigues,

> there was consensus . . . in each of the communities studied that traffickers were either partially or wholly responsible for crime management. As one favela resident put it, 'we live in a state within a state . . . the law that operates is the 'law without law.' That is the law of the other side, that of the traffickers. If people have a problem they go to [the traffickers] (2006, 65).

3 A theory of witness bribery

3.1 Basic Model

To account for Rio's informal system of governance, we develop a model of traffickers' choice of self-protection. By identifying the conditions under which drug traffickers profit from providing informal governance to nearby locals, the model also offers an implicit theory of criminal governance. Notably, our model produces testable implications that we can apply to the defining features of the favela context.

Consider a *dono*, Bruno. Each period, he sells drugs in a well-populated area of Rio de Janeiro to customers from outside his locale. However, Bruno's business is vulnerable to robbery. "Robbers" refers to any party who may impede Bruno's activities through raids or robberies, namely, police, rival traffickers, petty criminals, or militias.

3.1.1 Hiding

Bruno wants to maximize the net present value of his payoffs. He can do so by hiding or using force. Hiding means that in a world of imperfect information, Bruno invests in concealing himself, further increasing the search costs for Robbers. Hiding, which entails activities such as dividing cocaine shipments across many places, disguises, mobility, etc., improves Bruno's property rights by making him more difficult to find. All else equal, a hidden Bruno is robbed less frequently. Bruno's net payoff from hiding in a given period is:

$$V_{h_B} = U_h - \alpha_h C_r. \tag{1}$$

When Bruno chooses to hide, he earns net utility U_h, which consists of the revenues from drug sales less the costs of production and protection.[11] Hiding is not perfect and so Bruno is still partly vulnerable to robbery. Bruno therefore faces the probability α_h that he is robbed, the costs of which are C_r. These costs entail, for example, replacing lost product.

[11] This includes, for example, expenditures on guards and weapons.

3.1.2 Using Force

Alternatively, Bruno can invest in establishing property rights by defending himself with force. By taking this aggressive stance, he can openly sell drugs but at the increased risk of being robbed. Bruno's net payoff from defending his property rights with force is:

$$V_{f_B} = U_v - \alpha_f C_r. \tag{2}$$

Bruno earns net utility U_v from being visible to customers, which differs from the utility of hiding. By hiding, Bruno necessarily increases the search costs of his own customers as well as the Robbers. If Bruno hides, customers then must search more for a reliable dealer. Choosing to hide therefore implies a lower realized demand for Bruno's drugs. On the other hand, when Bruno does not hide, customers can more easily find a dealer. This implies a higher realized demand for drugs. As a result, Bruno sells more drugs when he does not hide. Because of returns to scale, $U_v > U_h$. The net utility of being visible exceeds that of hiding.

The tradeoff to increased utility from visibility is an increased probability of robbery. When Bruno chooses to use force rather than hide, he is easier to find. Therefore, without concealment, Bruno faces probability α_f that he is robbed, with $\alpha_f > \alpha_h$. Hiding makes Bruno less likely to be robbed.

3.2 Model with Trade

Bruno may be able to improve his situation through trade. For instance, Bruno could simply pay Robbers to be peaceful. If the Robbers agree to be peaceful, Bruno is less likely to be robbed. This is attractive to Bruno as it allows him to secure the value of impersonal exchange (U_v) with a reduced probability of robbery. As with hiding or using force, Bruno still expends resources on protection since bribery is not perfect.

3.2.1 Bribing Robbers

Consider a scenario in which Bruno bribes Robbers to refrain from robbing his enterprise. In turn, the Robbers can either maintain the bribe or cross Bruno. For a bribe of cost C_b to Bruno, Bruno's net payoff if the bribe is honored is:

$$V_{m_B} = U_v - C_b - \alpha_m C_r. \tag{3}$$

However, if a Robber crosses Bruno, Bruno's net payoff is:

$$V_{c_B} = U_v - C_b - C_r. \tag{4}$$

By making the deal with the Robbers, Bruno reveals information about his location. Therefore, Bruno is robbed with certainty if the Robbers decide to cross him. If the Robbers honor Bruno's offer, Bruno is less likely to be robbed. As a result, the probability that Bruno is robbed is less than the probability of

robbery when he does not make the bribe, $\alpha_m < \alpha_f$. Even so, Bruno is still exposed to other Robbers. As a result, the probability that he is robbed when he bribes Robbers is greater than the probability of robbery if he chooses to hide. Thus, $\alpha_h < \alpha_m$.

Bruno's payoff from having his bribe honored (Equation 3) is strictly greater than the payoff from being crossed (Equation 4). Thus, in the scenario in which Bruno bribes Robbers, Bruno prefers that the Robbers do not cross him. To ensure that he is not crossed, Bruno must consider the payoffs of the Robbers.

An individual Robber's net payoff from honoring the bribe is u_b. However, by crossing Bruno, the individual Robber uses information on Bruno's location to rob him and gain the net utility u_c, which consists of the revenues from the robbed products less the costs of violent robbery, while retaining the bribe u_b.

Thus, a Robber's net payoff from maintaining the bribe is:

$$V_{m_R} = u_b, \tag{5}$$

and crossing Bruno yields a net payoff of:

$$V_{c_R} = u_c + u_b. \tag{6}$$

3.2.2 Bribing Witnesses

Alternatively, Bruno can take advantage of the well-populated area in which he sells drugs. "Witnesses" are a group of local residents who are repeatedly exposed to Bruno's crimes. As they are neither criminals nor customers, Witnesses do not compete with or purchase drugs from Bruno.

The presence of Witnesses gives Bruno a new means by which to protect himself. Because of their proximity, Witnesses cheaply learn compromising information about Bruno. This, in turn, can be given to Robbers, making Bruno much more likely to be robbed. As a result, bribing Witnesses can help Bruno reduce the chance of robbery.

When Bruno bribes a Witness for their loyalty, the Witness can either protect Bruno or snitch to Robbers. As above, the price of protection is C_b. Bruno's net payoff if all the Witnesses protect his location is then:

$$V_{p_B} = U_v - C_b - \alpha_p C_r. \tag{7}$$

If a Witness snitches, Bruno is robbed with certainty, and his net payoff is:

$$V_{s_B} = U_v - C_b - C_r. \tag{8}$$

If the Witnesses protect Bruno, he is less likely to be robbed than if he were to not make the bribe. Thus, $\alpha_p < \alpha_f$. However, Bruno is still exposed to Robbers. Thus, $\alpha_h < \alpha_p$.

As is the case when Bruno trades with Robbers, Bruno strictly prefers the payoff in Equation 7 (and the Witnesses protecting him) to the payoff in Equation 8 (when the Witnesses snitch).

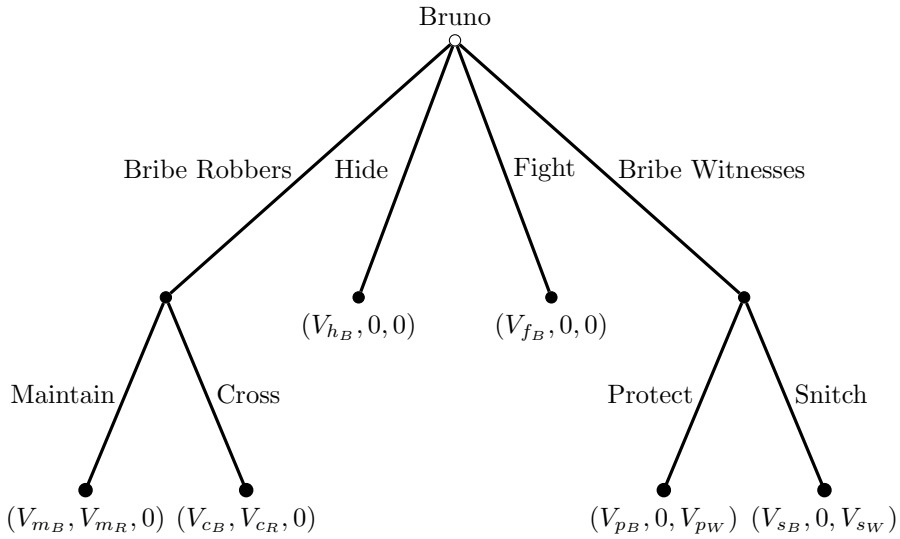

Figure 2: Bruno's decision tree

Notes: The figure shows the sequential stage game. In each period, Bruno moves first with the option to hide, fight, bribe Robbers, or bribe Witnesses. Robbers and Witnesses then can honor the agreement or defect.

A single Witness's net payoff from protecting Bruno is u_b. If the Witness snitches, he gets some benefit for revealing key information about Bruno's whereabouts or activities, the value of which is u_s, while still receiving the bribe u_b. Because the pool of Robbers is sufficiently large and outside Bruno's locale, the probability that Bruno and the Witness deal with the same Robbers is relatively small. Therefore, we assume the utility of snitching is exogenous.

A Witness's net payoff from protecting Bruno's operation is:

$$V_{p_W} = u_b, \tag{9}$$

and snitching provides a net payoff of:

$$V_{s_W} = u_s + u_b. \tag{10}$$

3.3 Equilibrium Conditions

The sequential stage game described in Sections 3.1 and 3.2 and shown in Figure 2 is played repeatedly. Players form pure strategies and seek to maximize the net present value of an infinite stream of stage payoffs. This means that Bruno cannot, for instance, bribe both Robbers and Witnesses simultaneously. We use backward induction in the stage game to find all players' equilibrium choices.

The present discounted value of an option j for player i in the current period is:

$$V^*_{j_i} = V_{j_i} + \delta_i V'_{j_i} \tag{11}$$

where V_{ji} is the stage payoff for choice j and $\delta_i V'_{j_i}$ is the present discounted value of future payoffs with individual i's discount factor $\delta_i \in [0, 1]$, conditional on choice j today.

If bribed by Bruno, Robbers can maintain the agreement (m) or cross Bruno (c). Thus, the Robbers' choice set is $j = \{m, c\}$. Similarly, Witnesses can protect Bruno (p) or snitch to Robbers (s). Therefore, the Witnesses have the choice set $j = \{p, s\}$.

The repeated nature of the game allows Bruno to use the shadow of the future to encourage good behavior from the other players. We assume that Bruno uses a grim trigger strategy. Bruno punishes any defection from the agreement by never bribing the cheater again. This means that for a choice $j = c$ by Robbers or $j = s$ by Witnesses, the present discounted value of future payoffs is zero. Thus, the present discounted value of not cooperating with Bruno simplifies to:

$$V^*_{j_i} = V_{j_i}. \tag{12}$$

By contrast, as a reward for upholding the bribe, Bruno continues the agreement into the next period.[12] This means that for a choice $j = m$ (by Robbers) or $j = p$ (by Witnesses), the present discounted value of Robbers' and Witnesses' payoffs is:

$$V^*_{j_i} = V_{j_i} + \delta_i V^*_{j_i},$$

or

$$V^*_{j_i} = \frac{1}{1 - \delta_i} V_{j_i}. \tag{13}$$

To prevent defection from the agreement, each Robber and Witness must get more utility from cooperating than not. Formally, the payoffs in Equation 13 must be greater than or equal to the payoffs in Equation 12.

For Robbers, defection will not occur when the present discounted utility of cooperating forever (u_b) exceeds the one-time utility of being bribed plus the extra utility they get from robbing Bruno with certainty ($u_c + u_b$):

$$u_{b_R} \geq \frac{1 - \delta_R}{\delta_R} u_c. \tag{14}$$

Likewise, a Witness will protect Bruno as long as the present discounted utility of cooperating forever (u_b) exceeds the one-time utility of being bribed plus the extra utility a Witness gets from having snitched on Bruno ($u_s + u_b$):

$$u_{b_W} \geq \frac{1 - \delta_W}{\delta_W} u_s. \tag{15}$$

[12] We assume payoffs do not change over time. If a bribe maximizes Bruno's present discounted value today, it will remain his best choice in future periods as well.

Bruno knows that there is a price at which both Robbers and Witnesses will cooperate. To find that price, we assume that there is a strictly positive relationship between the amount Bruno spends on bribes and the satisfaction his co-conspirators get from those bribes.[13] Formally, we define this mapping as:

$$u_{b_i} = f_{b_i}(\frac{C_{b_i}}{n_i}) \tag{16}$$

where, for a group of n_i homogeneous co-conspirators of type i, $\frac{C_{b_i}}{n}$ is Bruno's average cost per individual of the bribe, and f_{b_i} is the invertible function that maps costs to utility for a given bribe to individuals of type i.

Recall that Bruno's utility is decreasing in the costs of bribery (Equations 3 and 7). Because the invertible function f_{b_i} is strictly increasing, there exists a unique cost to Bruno that simultaneously minimizes his own utility loss and provides enough utility to his co-conspirators that they will always cooperate (thresholds given by Equations 14 and 15). The total cost or price that assures the cooperation of Bruno's co-conspirators is defined as:

$$C^*_{b_i} = nf^{-1}_{b_i}(u^*_{b_i}) = U^*_{b_i}, \tag{17}$$

where $u^*_{b_i}$ is the minimum utility needed to satisfy Equations 14 and 15 and $U^*_{b_i}$ is the total utility generated by the bribe. Bruno can, therefore, buy protection from either Robbers or Witnesses at some cost $C^*_{b_R}$ or $C^*_{b_W}$, respectively.

Given the cost of bribery $C^*_{b_W}$, under what conditions is it best for Bruno to bribe Witnesses?[14] Bruno prefers to bribe Witnesses over hiding if Bruno's payoff $V^*_{p_B}$ is greater than or equal to $V^*_{h_B}$:

$$\frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r) \geq \frac{1}{1-\delta_B}(U_h - \alpha_h C_r)$$

or

$$(U_v - U_h) - (\alpha_p - \alpha_h)C_r \geq C^*_{b_W}. \tag{18}$$

Likewise, for Bruno to choose to bribe Witnesses over using force, his payoff $V^*_{p_B}$ must be greater than or equal to $V^*_{f_B}$. This occurs for Bruno when

$$\frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r) \geq \frac{1}{1-\delta_B}(U_v - \alpha_f C_r)$$

or

$$(\alpha_f - \alpha_p)C_r \geq C^*_{b_W}. \tag{19}$$

Expression 18 says that, for Bruno to choose bribery over hiding, the extra benefits of being visible less the additional expected loss from visibility must be

[13] The function that maps Bruno's bribery costs to the utility of his co-conspirators is strictly increasing and invertible.

[14] We consider a broader set of equilibria in Section 3.4 and the Appendix.

at least as big as the cost of the bribe. If the added benefits of being visible do not outweigh the costs of bribery, Bruno will prefer to hide rather than bribe.

Similarly, Expression 19 states that for Bruno to select bribery over using force, the amount he expects to save from Witnesses' added protection must be at least as big as the cost of the bribe. Otherwise, he will prefer to use force.

The expressions indicate that Bruno's incentive to bribe is increasing in the increased utility from visibility ($U_v - U_h$) and the probability of robbery when hiding (α_h) or using force (α_f). By contrast, Bruno's incentive to bribe is decreasing in the probability of robbery when bribing Witnesses for protection.

Even if Bruno finds bribing Witnesses to be an economical means of protecting himself in general, he still may yet choose to bribe Robbers instead. For Bruno to want to bribe Witnesses over Robbers, $V^*_{p_B}$ must be greater than or equal to $V^*_{m_B}$. This occurs when

$$\frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_R} - \alpha_m C_r)$$

or

$$C^*_{b_R} + (\alpha_m - \alpha_p)C_r \geq C^*_{b_W}. \tag{20}$$

This expression states that Bruno will bribe Witnesses rather than Robbers as long as the Witnesses are relatively cheaper to bribe. Bruno's incentive to bribe Witnesses is increasing in the costs of bribing Robbers $C^*_{b_R}$ and the relative effectiveness of Witness protection ($\alpha_m - \alpha_p$). If Robber protection is less effective than Witness protection ($\alpha_m > \alpha_p$), Bruno's incentive to bribe Witnesses is increasing in the costs of robbery C_r. But if Robber protection is more effective than Witness protection ($\alpha_m < \alpha_p$), Bruno's incentive to bribe Witnesses is decreasing in the costs of robbery C_r. Bruno's incentive to bribe Witnesses instead of Robbers is independent of the costs of robbery if the two are equally effective ($\alpha_m = \alpha_p$).

3.4 Cash vs. In-kind bribes

The forgoing logic suggests that Bruno will choose to bribe Witnesses as long as Witnesses receive their reservation price, the costs of bribery are not prohibitive, and Witnesses are cheaper to bribe than Robbers. However, Bruno need not confine himself to paying bribes with cash.

Bruno can pay a bribe in two ways. Bruno can make bribes with either cash or in-kind goods and services. Let Bruno's choice set for bribery be $b = \{c, k\}$. With a cash bribe (c), Bruno pays each Robber or Witness a flat amount for their cooperation per period. In-kind bribes (k) differ primarily in form. In this case, Bruno secures Robber and Witness cooperation by subsidizing a good or service they desire. Such goods or services may include, for example, informal governance.

It is straightforward to determine when Bruno will use cash or an in-kind good or service to bribe Witnesses. Let $C^*_{c_W}$ be Bruno's cost of securing Witnesses' cooperation via cash. Likewise, let $C^*_{k_W}$ be Bruno's cost of guaranteeing

$\min\{C^*_{c_R}, C^*_{k_R}\}$	$\min\{C^*_{c_W}, C^*_{k_W}\}$	$\max\{V^*_{h_B}, V^*_{f_B}, V^*_{m_B}, V^*_{p_B}\}$	Equilibrium
—	—	$V^*_{h_B}$	Hide
—	—	$V^*_{f_B}$	Use force
$C^*_{c_R}$	—	$V^*_{m_B}$	Bribe Robbers w/ cash
$C^*_{k_R}$	—	$V^*_{m_B}$	Bribe Robbers w/ in-kind
—	$C^*_{c_W}$	$V^*_{p_B}$	Bribe Witnesses w/ cash
—	$C^*_{k_W}$	$V^*_{p_B}$	Bribe Witnesses w/ in-kind

Table 1: Equilibrium choices of Bruno

Notes: The table shows the conditions that yield Bruno's various equilibrium decisions. The first two columns refer to Bruno's bribery cost-minimizing decision, and the third column characterizes Bruno's utility-maximizing decision.

Witnesses' cooperation via an in-kind good or service. Then, Bruno will bribe Witnesses with an in-kind good as long as

$$\frac{1}{1-\delta_B}(U_v - C^*_{k_W} - \alpha_p C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{c_W} - \alpha_p C_r),$$

or

$$C^*_{c_W} \geq C^*_{k_W}. \tag{21}$$

Equation 21 says that Bruno will bribe Witnesses with in-kind bribes when the total cost of doing so is less than the total cost of using a cash bribe. Otherwise, Bruno will use cash.

Bruno's decision to bribe Witnesses with in-kind goods is but one of six possible equilibria. Table 1 includes all six possible equilibria, as well as a few of the key conditions that yield each one.

For any pair of costs that maximize Bruno's utility when bribing Robbers and Witnesses, Bruno will simply hide or use force if $V^*_{h_B}$ or $V^*_{f_B}$ maximize his present discounted utility, respectively. If bribing Robbers maximizes Bruno's present discounted utility ($V^*_{m_B}$), Bruno bribes Robbers with the form of the bribe that minimizes his costs. Similarly, if bribing Witnesses maximizes Bruno's present discounted utility ($V^*_{p_B}$), Bruno bribes Witnesses with the form of the bribe that minimizes his costs.

3.4.1 Who's on first?

Columns 1 and 2 of Table 1 imply that Bruno's choice of bribe depends on the relative costs of cash vs. in-kind bribes ($f_{c_W} \neq f_{k_W}$). To see how, consider Figure 3.

Figure 3 portrays the relationship between the utility Witnesses need for cooperation and Bruno's costs of cash and in-kind bribes. On the Y axis is the total utility of the bribe U_{b_i}. Higher on the Y axis implies higher utility needed to secure cooperation. The costs of bribery C_{b_i} are on the X axis. The costs are increasing to the right. The green and blue dashed lines capture the mapping

between Witness utility and Bruno's costs, for a given δ_W and u_s. Since Bruno knows the mapping for each type of bribe f_{b_W}, he can infer his costs for each type of bribe for any given threshold of Witness utility $U^*_{b_W}$.

The slopes of the lines reflect the different values that Witnesses assign to cash vs. in-kind bribes ($f_{c_W} \neq f_{k_W}$). Thus, a steeper slope (the blue line) implies that Witnesses assign more value to bribes in-kind than in cash. Bruno can then maximize his utility by choosing the least costly option (the C_{b_W} that is furthest to the left on the X axis). Figure 3 indicates that, in this case, when comparing bribes in-kind with bribes in cash, Bruno's best choice is an in-kind bribe.

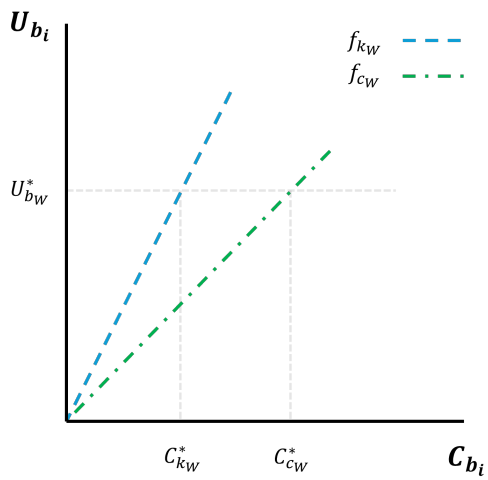

Figure 3: Minimizing the costs of bribery

Notes: The figure illustrates Bruno's cost-minimizing decision. Bruno can bribe Witnesses with cash or in-kind goods, and he chooses the option that provides the necessary utility at the lowest cost. Here, that is $C^*_{k_W}$.

Bruno's best choice also depends on the costs of bribing Robbers. Figure 4 helps find Bruno's best choice when Robbers and Witnesses do not have the same threshold of cooperation. Robbers and Witnesses may not, for example, share the same values of defection ($u_b \neq u_s$), they may discount the future differently ($\delta_R \neq \delta_W$), the groups may have different sizes ($n_R \neq n_W$), and the groups may not assign the same values to different types of bribes ($f_{c_W} \neq f_{k_W}$). As a result, the form of bribe to Robbers that minimizes Bruno's costs may not be the same for Witnesses.

Figure 4 illustrates how asymmetries between Robbers and Witnesses can shape Bruno's choice of bribe. Suppose first that Bruno realizes that Robbers and Witnesses require different levels of total utility ($U^*_{b_R} \neq U^*_{b_W}$) to cooperate. Second, suppose that Robbers and Witnesses assign different values to cash vs. in-kind bribes. Bruno then must compare the costs of each option: $C^*_{c_W}$, $C^*_{k_W}$,

$C^*_{c_R}$, and $C^*_{c_R}$.

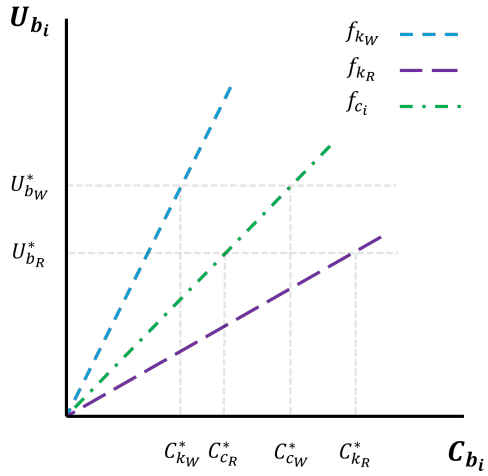

Figure 4: Asymmetries in bribery

Notes: The figure illustrates the asymmetries that exist in bribery. Variation across groups impacts $U^*_{b_i}$ and the mapping between costs and utility.

Suppose that Robbers assign a high value to cash relative to in-kind goods. In that case, Bruno can generate more utility per dollar for Robbers with a cash bribe. Suppose further that Witnesses prefer in-kind goods to cash. Then, Bruno can generate more utility per dollar for Witnesses via in-kind bribes compared to cash bribes.

In Figure 4, paying off Witnesses with an in-kind bribe is Bruno's best choice. This result may be surprising. How can Bruno's best choice be bribing Witnesses when the total utility Bruno must generate for Witnesses exceeds that of Robbers ($U^*_{b_W} > U^*_{b_R}$)? Witnesses value the in-kind bribe so much that Bruno's costs of bribing Witnesses with an in-kind good are less than the costs of bribing Robbers with cash. As a result, Figure 4 shows that in-kind bribes may be Bruno's best option even when, for example, there may be many more Witnesses than Robbers ($n_W > n_R$).

3.5 Implications

For gang rule in the favelas to be a bribe designed to improve the effectiveness of trafficker property rights, Rio's context ought to display the specific conditions highlighted by our model.

First, following equation 21, traffickers will opt for in-kind bribes when they are cheaper than cash bribes. This could occur for various reasons. For example, traffickers may find that in-kind bribes are cheaper than cash bribes when there is a double coincidence of wants between them and the Witnesses. Witnesses

must then lack a good or service that they value a great deal and traffickers must have a comparative advantage in producing just that kind of good or service that Witnesses value. In that case, the mapping from costs to the utilities of the in-kind bribe and the cash bribe would be different. The invertible function of the in-kind bribe would ensure that a dollar traffickers use to subsidize an in-kind service can earn them more Witness loyalty than does a dollar in cash (i.e. a steeper slope in the above figures).

Traffickers may also find in-kind bribes cheaper than cash bribes when they must bribe a large group of people. As long as the subsidized good or service is less rivalrous than cash, each additional Witness increases the traffickers' costs less quickly relative to cash bribes. This is true because two people cannot simultaneously enjoy a given cash bribe without reducing the amount of the bribe available to the other. The traffickers' average costs will decrease since the costs of such in-kind bribery increase more slowly than the costs of cash bribes. If the bribe is partly non-rivalrous, the traffickers can afford to buy off relatively more witnesses. As a result, goods and services that are less rivalrous than cash may be cheaper to supply at scale.

Second, following equations 18 and 19, for bribery to be an effective means of enhancing traffickers' property rights over hiding or using force, the costs of bribery must be sufficiently low. That is, if the traffickers expect to pay less in bribes than the added value of being visible, less the expected loss from being visible, then they will opt to bribe over hiding.

There are at least two ways in which this may occur. Consider first when protection provided by the locals is effective. Effective protection may greatly limit the expected loss from being visible. Second, consider when, for example, traffickers rely on a large base of anonymous customers. Such a customer base may make the added value of being visible quite high.

For traffickers to use bribery rather than force, the amount they pay in bribery must be less than the amount they expect to save from Witnesses' added protection. This may occur when, for example, the violent interruption of trafficker activities is a common occurrence.

As per equation 20, for bribery to Witnesses to be an effective means of enhancing the property rights of traffickers, Witnesses must be cheaper to bribe than Robbers. If Robbers are far less forward-looking relative to Witnesses ($\delta_W > \delta_R$), Witnesses would be cheaper to bribe.

Robbers might become relatively less forward-looking in the presence of, for example, high social or geographic distance. Recall that Bruno is not trying to solve a problem posed by one Robber or one Witness. Rather, he must contend with a group of people in each case. As a result, from the perspective of the Robbers and Witnesses, the benefits of being bribed are shared by all members of the group. If Bruno pays Robbers, the spoils must be shared amongst all the Robbers. If Bruno pays Witnesses, the spoils must be shared by all the Witnesses.

When social or geographic distance is high, present consumption becomes more valuable than future consumption (δ is low). This is true because high distance inhibits the monitoring and punishing of collectively beneficial behavior

(Leeson 2008). Internal policing of the group is not possible. Without internal policing, a trafficker's bribe becomes a commons. And, like any commons, it is subject to overuse.

The shared nature of the bribe gives an individual Robber or individual Witness an incentive to "overuse" the commons by cheating. This is true because the costs of crossing Bruno or snitching on Bruno are shared by the whole group. The benefit of cheating, by contrast, is not. So when internal policing of the group is not possible, an individual Robber keeps the entire benefit of crossing Bruno u_c, but shares the cost of the forgone u_b with his fellow Robbers.

Since each individual Robber faces the same incentive to cheat, each expects that the resource (i.e., the bribe) will not exist next period. As a result, high social or geographic distance makes each Robber less forward-looking. The value of today's consumption increases in importance. When Robbers are more distant to one another relative to Witnesses, they are more short-sighted, and, in turn, are more expensive for Bruno to bribe.

4 Testing the theory of bribery

If, as we claim, bribing Witnesses with governance can improve the effectiveness of criminal property rights protection, the context of Rio's drug traffickers ought to display all of these specific features. The next section offers evidence from Rio that supports these predictions. Governance is indeed residents' price of silence.

4.1 In-kind bribes are cheaper than cash

There is a double coincidence of wants between the favela traffickers and the local residents. The same tools traffickers use to deter robbers mean traffickers can and do produce governance with little additional effort. For example, large operations may have as many as 500 soldados hired specifically to protect the favela with violence (Dowdney 2003, 48). Soldados are well-armed. It is not uncommon for quadrilhas to use grenades and bazookas in clashes with police either (Dowdney 2003). As Dowdney states, since the early 1980s, "[t]here has been a considerable increase in the firepower employed by traffickers . . . More lethal light arms (such as Kalashnikov AK47, Colt AR-15, H&K G3 and hand grenades) are now employed whereas previously traffickers used primarily handguns, such as caliber .38 pistols" (2003, 42).

Due to the large sums *donos* invest in weapons and guards, traffickers can cheaply supply violent rule enforcement. Such investments allowed traffickers to credibly punish local rulebreakers harshly and publicly. Arias and Rodrigues found that sanctions for robbery, for example, included "beatings with bricks, forcing an accused thief to walk the length of an open sewage canal while being beaten with rocks and sticks, and cutting off of the ears or hands of accused thieves" (2006, 66). The most serious punishment was and is execution. Rapists

could be tortured, shot in the arm or leg, or killed.[15] Warnings were common and so being caught or accused of breaking *lei do trafico* was not immediate grounds for a beating (Dowdney 2003; Arias and Rodrigues 2006). For example, one resident "broke a street light with a sling-shot. A resident complained . . . they called me in and they punished me . . . my hands were hit ten times with a wooden stick," while another resident who robbed a boca was "shot in the hand" (Dowdney 2003, 65, 66).

While generally harsh and at the traffickers' discretion, punishments did vary with the severity of the crime. As one vapor stated, a resident's punishment "[d]epends upon what they do. If you rape a child, it's death. If you steal in the favela it's a punishment or expulsion from the favela" (Dowdney 2003, 67). Less serious punishments include forcible shaving of a woman's head or expulsion from the favela. Offenses such as domestic violence, fighting in public, and harassment could earn a beating or house arrest.

Soldados employed to protect *bocas de fumo* from invading rivals also help monitor rulebreakers within the community (Dowdney 2003, 141). While *soldados* typically gather near *boca*, they also patrol the favela they occupy. *Soldados* also

> make patrols of the community in pairs or larger groups. A larger group of *soldados* that moves through the favela on security patrol is referred to as the *bonde*. Researchers witnessed *bondes* of up to fifty heavily-armed *soldados* patrolling the community in single file at night (Dowdney 2003, 142; see also Larkins 2015, and Gay 2005, 2015).

Such patrols help traffickers protect their territory from robbers and to detect rulebreakers within.

Even though it may be cheap for Bruno to supply governance, witnesses may not value such an in-kind bribe. Many kinds of services are generally valuable to witnesses. If, for example, the Witnesses' reservation value was too high, then a bribe in the form of governance would be prohibitively costly for Bruno to supply. By our theory, he would hide or use force instead.

Favela populations have historically lacked formal and regular access to criminal law. The quasi-stateless status of favelas meant that witnesses assigned a high value to in-kind bribes, specifically in the form of non-state governance. Indeed, the favelas' lack of formal governance is one of their best-known features. Over 20 years ago, Leeds emphasized that the "public service most conspicuously absent from Rio's favelas [. . .] is internal security" (1996, 63). Dowdney also states that "*[f]avelas* have traditionally lacked legitimate state representatives to uphold law and order" (Dowdney 2003, 52). This is, in part, due to the *modus operandi* of law enforcement. Rather than repeated, routine patrols in

[15] For example, according to Dowdney, "Rapists are often dismembered whilst still alive, and recently the practice of encircling victims with rubber tyres and burning them alive after a severe beating has been used for serious rule-breakers" (Dowdney 2003, 66).

favelas, police raids are unpredictable and brief.[16]

Without regular policing, non-state governance has remained quite valuable to favela residents. It is typical for those conducting fieldwork in Mare and other favelas to state that gangs "implemented an informal though highly effective form of social order" (Barnes 2022). Goldstein observes that traffickers are "seen as necessary" by residents (2003, 200) and that, "[f]rom the perspective of residents [. . .] the prospect of being returned to the state is not necessarily any more attractive than remaining under the control of the gangs" (2003, 181).

Locals have a similar refrain. For residents with few options, trafficker governance is sufficiently effective that "many favela residents I spoke with saw the rules instituted by the *Comando Vermelho* as a sharp improvement from the actions of the police, who are widely seen in favela communities as acting arbitrarily and violently" (Penglase 2008, 131). According to Arias and Rodrigues, "residents approve of the low levels of theft and assault created by this enforcement; many mentioned that they 'feel safer here in Rocinha than outside [Rocinha]'" (2006, 71). Arias and Barnes also found that the traffickers' "public order is a significant benefit [to residents] and residents generally express little fear of theft or abuse at the hands of neighbors and family members" and that "gangs are often extremely effective in preventing violence and crime within these communities" (2017, 456).[17] The result was that "traffickers who made a habit of [providing governance] with some regularity would generally maintain a higher level of support among residents" (Arias and Rodrigues 2006, 64). As "[o]ne resident active in community projects commented, 'Here you do not have to lock your door and [you] can hang your clothes on the line without worrying about someone taking anything,'" while another woman "said she never worried about anything happening to her daughters in the favela" (Arias and Rodrigues 2006, 71).

By their own admission and actions, residents rely upon traffickers to resolve disputes (Arias and Rodrigues 2006, 71; Arias and Barnes 2017, 456). Traffickers offer a speedy and enforceable means of dispute resolution relative to formal alternatives. Affecting quality service provision is costly, but also a price that traffickers do pay: "During extended fieldwork in Complexo da Maré, dozens of interviewed gang members revealed that they are frequently engaged in such forms of dispute resolution and are often required to ensure public order" (Arias and Barnes 2017, 456). While traffickers do not resolve all disputes when they do, "they take pains to ensure that their intervention further legitimates their authority by seeming impartial and conforming to local norms" (Arias and Rodrigues 2006, 72).

As a result, residents tend to condone punishments meted out by traffickers, severe as they may be. Locals

> universally consider the gang's behavior—of intervening on behalf

[16] On occasion, large-scale occupations do happen. Even these, however, do not last long (Barnes 2022).

[17] During fieldwork, Goldstein described Felicidade Eterna during the early 1990s as "a remarkably safe place" (Goldstein 2003, 176).

> of an innocent woman being raped—as perfectly justifiable. In this case, it was the same gang that initiated the punishment of a case of adultery. It did not, from the local perspective, 'take sides' in the two cases: it simply pursued a sense of justice, just as the police are supposed to do (Goldstein 2003, 192).

Thus, for example, when traffickers discovered a man abusing children, "gang members went to his home and severely beat him, eventually expelling him from the favela and finally threatening him with death if he returned" (Goldstein 2003, 191). Far from admonishing traffickers for their vigilante approach, "In the community there was a general consensus supporting the gang's actions" (Goldstein 2003, 191).

Traffickers do enough to offset the external costs of violence. Although innocent favela residents can be killed during invasions, interviews with locals and revealed preference shows that traffickers are sufficiently generous with their bribes. Residents often consider police "violent, dangerous and abusive" and they "have little or no respect for the police, who traditionally have treated favela residents with disdain and violence" (Dowdney 2003, 81; Leeds 1996, 61).[18] Consider also the testimony of a teacher who stated that

> The *bandido* ends up getting more respect from the community than the police, because the police arrive, speak in this way, and treat residents in this manner, and the trafficker doesn't. If you don't cross him, he doesn't do anything against the community. For him, it's a good thing that the community might be on his side. The *bandido* is never going to shoot anyone in the community unless he has a problem with that person (Alves and Evanson 2011, 43).[19]

Even when police do formally occupy favelas, their help is not always welcome. Barnes reports that, during the military's year-long occupation of Marè, the military was "less effective in resolving interpersonal disputes and lower-level crimes" and that a "gang member reported that a lot of boys and adolescents were using the opportunity of occupation to steal and break laws because they knew the gang was not going to punish them" (2022, 808).

While favela residents uniformly expect traffickers to provide criminal law, they do not expect traffickers to supply social assistance as well. Despite having no obligation, traffickers occasionally do anyway. Such provisions help offset the external costs of violence. As discussed above, trafficker social assistance ranges from "money for an ambulance or taxi to the hospital, to money for medicines, soup kitchens, daycare centers, parties for children on special occasions, and other emergency funds in cases of extreme hardship" (Leeds 1996, 61), in addition to, for example, "financing small public works projects . . . and making the occasional donation of a truckload of food and provisions to the more needy

[18] Law enforcement in Brazil is notoriously violent. It has a rate of police lethality that exceeds the overall homicide rates of most Western European countries (Flom 2022).

[19] Resident dislike of police is also well documented. See Alves and Evanson (2011), Zaluar (2000), Larkins (2015), Leeds (1996), Perlman (2010).

families of the community" (Gay 1994, 97), and housing (Goldstein 2003, 181).[20] Since locals do not uniformly expect these social services, their provision often varies and the "types and extent of the services have depended heavily on the particular drug traffickers who led the gangs" (Arias and Rodrigues 2006, 62). Such occasional generosity helps to ensure that traffickers sufficiently offset the external costs of fighting.

4.2 The costs of bribery are comparatively low

The double coincidence of wants between favela traffickers and the residents suggests that the costs of bribery in the form of informal governance are low in general. Three more features of the favelas' environment suggest that the costs of in-kind bribery are low enough to make bribing economical relative to either hiding or using force. First, the locals' protection is effective. Second, traffickers rely on customers who largely live outside of the favelas. Third, the costs of robbery are modest.

Traffickers rely upon the cooperation of locals to sell drugs to strangers. The threat of permanent, resident non-cooperation is a serious one. Maintaining community loyalty is of the utmost importance because, according to Arias and Rodrigues, a trafficker's assault "on one resident can create antipathy toward traffickers from the victim's friends, family, and neighbors," and so "[t]raffickers must be sensitive to residents' concerns and create a sense of order without alienating the population" (2009, 62). This has led favela scholars to consistently conclude that "the drug dealers must be careful not to alienate the residents of the neighborhood to such an extent that they might risk turning on the bandidos" (Penglase 2003, 229).[21]

As Arias and Rodrigues state, when traffickers abuse their authority, "residents may respond with public protests that provoke a police response or, more often, efforts by some residents to help a rival group of traffickers take power in the community" (2006, 74). Consider one example, as described by Arias and Rodrigues (2006, 75):

> In 1986, a drug trafficker operating in the favela of Tubarao became paranoid and began to threaten and expel residents from the community. Eventually his paranoia grew so deep that he expelled the president and vice president of the local AM. The angry vice president brokered an agreement with a powerful, expanding drug gang and, with the support of other residents, facilitated their takeover of the community, forcing out the original trafficker.

Traffickers themselves stress how important the local community is for drug trafficking success. Consider, for example, the following description from a former *soldado* (Dowdney 2003, 75):

[20] See also Barnes (2022), Arias and Rodrigues (2006).

[21] Leeds' has a similar conclusion: "It clearly matters that the drug groups have the 'support' of the community, which must not cooperate with the police" (1996, 61), as does Gay (2005, 56).

> Today, crime's biggest weapon isn't called a rifle or a grenade, it's called knowledge and the community. If you fail to treat your community well, it doesn't matter if you have 100 rifles in a favela, you still won't manage to stay. If you come from outside you won't be able to stay. [If the community has good relations with the local faction] there's no way. There's no point in saying 'let's invade that community and stay.' There's no way to stay.

As one *Fiel do gerente geral* stated, traffickers "have to respect [residents] back. Because we need them too, so we can run and hide in their houses, so if we don't support the residents, they won't support us" and "there has to be a union, everyone of us must treat the residents well" (Dowdney 2003, 56). The traffickers take a genuine interest in the welfare of the favela community.[22] Even anthropologists acknowledge that the relationship between residents and traffickers is one predicated on exchange:

> Echoing the idea that trafficker rule is based upon a system of reciprocal exchange, residents of Caxambú would often state that because the traffickers "protected" them, they respected the drug traffickers. A central component of this relationship of "respect" is the "law of silence": residents would not inform the police about drug-dealing in their neighborhood.

Traffickers' chief concern, according to Arias and Rodrigues, are locals with "a large amount of information about criminal activity" who "could prove threatening to traffickers should they decide to pass that information to police or criminal rivals" (2006, 74). As one *soldado* stated "you have to keep an eye on things. We don't know who is by our side, don't know if it's a [informant] . . . We have to always keep an eye out" (Dowdney 2003, 140). During fieldwork, Penglase (2003) found that there were constant rumors of and preoccupation with the presence of informants within Caxambú. The costs of uncooperative locals are quite high for traffickers.

The vast majority of a *dono*'s customers are not residents. Traffickers' main customers are historically recognized as strangers who come from outside the favela a trafficker controls (Dowdney 2003; Penglase 2008; Zaluar 2001). As Perlman states, "rich 'playboys' make up a significant segment of the market for these drugs, and they come to the *bocas* in the favelas to buy their supplies" (2010, 178).[23] The high price of cocaine has historically precluded favela residents from becoming routine customers (Penglase 2008). As one dealer admitted, "the guys who live in a favela don't have any money, understand? Because the market's not in the favelas" (Gay 2015, 38). The importance of this customer base for traffickers, alongside the effectiveness of locals' protection, makes hiding uneconomical relative to bribery.

[22] See also, for example, Dowdney (2003, 57, 58), Alves and Evanson (2011), Leeds (1996), Arias and Rodrigues (2006).

[23] See also, for example, Perlman (2010, 198), Gay (2005, 2015), Zaluar (2000).

Violent conflict with police and rival traffickers is common. Such a violent and unpredictable atmosphere of the favelas ensures that traffickers cannot risk using force instead of bribery. The costs of robbery are too high. For example, when police raids do occur, they are widely recognized as being extremely violent and short-lived. Elizabeth Leeds interviewed government officials and community leaders across 25 favelas as well as prison inmates in Rio periodically from 1987-1995. Leeds reported that

> it has become common practice in Brazil for the police, on the pretext of searching for criminals, to carry out "blitzes" in favelas, routinely knocking down residents' doors, arresting residents for vagrancy who happened to be without identity cards when stopped, flying helicopters so low that roofs are blown off, indiscriminately firing weapons, and extorting cash and drugs from residents under threat of arrest (Leeds 1996, 64; see also Dowdney 2003, 80).

While traffickers may not shoot first, according to Dowdney, "there are regular armed confrontations between the police and drug factions within favela communities" (2003, 103). Traffickers are quite willing and able to defend themselves violently. Dowdney reports that when a drug trafficker is the direct target of a police incursion, "drug traffickers will open fire on advancing police officers. In this situation, an *olheiro*, *vapor*, or *soldado* may be told to shoot at the police, or in their general direction, on first sight in order to give his superiors time to escape" (Dowdney 2003, 86). Police and traffickers may also fight outside favelas when "a motorcade of armed traffickers usually in stolen cars that transport drugs or guns between favelas, [come] into contact with a police patrol or road block, or passing a police post or station en route" (Dowdney 2003, 103).[24]

Violence occurs regularly amongst rival *quadrilhas*. *Bocas de fumo* are often subject to raids by rival factions (Dowdney 2003).[25] Invasions also occur when rivals learn about the delivery or location of a drug or weapon shipment, at which point they attempt to plunder their rivals (Dowdney 2003, 76). For example, one informant stated that when "a faction finds out that a cargo is arriving in another favela," the traffickers will then "go there to steal the truck in the favela" (Dowdney 2003, 76). The result is that "[i]nter-faction armed disputes are a daily occurrence within the city of Rio de Janeiro and communities dominated by rival factions may remain in a state of 'war' (continued armed invasions) for a prolonged period of weeks or months" (Dowdney 2003, 101). Consider the particularly detailed example from Barnes' recent fieldwork (2022):

> In early June of 2009, [*Terceiro Comando Puro* (TCP)], which at the time only controlled four of Maré's neighborhoods . . . mounted an

[24] With enough advance warning, traffickers may also hide during an incursion. However, as Barnes (2022) shows, traffickers who rely on evasion alone risk losing control of their territory to rivals.

[25] It is for this reason that *donos* employ *soldados*. As Barnes states, "[s]everal heavily armed *soldados* (soldiers) were always located around the *bocas*, providing security" (2022, 800).

> all-out invasion of their *Amigos dos Amigos* (ADA) rival's turf, managing to gain a small foothold in the area. Over the course of the next several weeks, in extremely violent gun battles, TCP slowly—block by block—conquered the rest of ADA's territory. While some low-level members were absorbed into TCP, ADA's leaders and more senior members fled and found refuge in Complexo do Caju, another set of favelas located less than a mile from Maré, from which they would mount several unsuccessful attempts to retake their former turf in the subsequent years. Immediately following TCP's conquest, they installed more than a dozen new bocas and the gang's weekly revenue ballooned to an estimated R$3 million. With these expanded drug profits, TCP purchased more weapons and hired more than 100 local youth to defend their territory, effectively tripling the size of the gang to an estimated 250 members.

Despite the ostensibly important costs of being robbed, the dearth of formal policing in the favelas means that the costs of robbery are not prohibitive.

The contrasting organization of traffickers just outside of Rio's favelas further suggests that the costs of robbery within the favelas are modest. Outside the favelas, formal state protection is far more effective. Given the higher quality of formal governance, traffickers face a much higher cost of being robbed (C_r). Our theory predicts that if the costs of robbery become sufficiently high, expression 18 does not hold and traffickers will choose to hide rather than bribe or use force. That is precisely what we find.

Drug trafficking outside the favelas contrasts sharply with the drug trafficking that occurs within. Unable to bribe witnesses, trafficking outside the favelas is surreptitious and unorganized. Drug traffickers protect themselves with secrecy rather than with force. Outside favelas, traffickers disguise their activities by bundling them with primarily legal ventures:

> Outside the favela, drug-selling activities involve many actors that have long worked on the streets in other sectors of the shadow economy: prostitutes, doormen, taxi drivers, small shopkeepers, bar tenders, and the *camelôs*, or street vendors—the foot soldiers of the informal market" (Zaluar 2000, 664).[26]

These low-profile traffickers comprise the vast drug market outside the favelas. The result is that the pattern of trafficking in districts such as Tijuca and Madureira "diverges with the one predominant in Copacabana, i.e., a discreet style where the dealers assume they are clandestine and cannot control territories" (Zaluar 2001, 375). For example, *vapors* that do sell drugs in Copacabana "are in constant movement, never stopping for a long time in the same place, 'evaporating' when necessary as a consequence of police control" and "are much more discreet than at the one near the accesses of *favelas* or nearby streets in the districts of Tijuca and Madureira" (Zaluar 2001, 374).

[26] Factions within favelas may also employ their own low profile *aviões* or "airplanes" to deliver drugs to clients outside the favelas (Arias 2009).

Evidence from the organization of drug traffickers within favelas, albeit over time, is also consistent with the costs of robbery being modest. Our theory predicts that traffickers within Rio's favelas would hide rather than bribe Witnesses if the costs of robbery suddenly became immodest.

That is precisely what occurred during the military police occupation of the Maré favela in 2014. For 15 months starting in 2014, Brazil's military suddenly occupied the entire Maré complex. During the period, the military police provided "formal" law and order to Maré's 140,000 locals, causing traffickers' costs of being robbed to become prohibitive. Barnes (2022) reports that, during Maré's occupation, all trafficking became less visible. *Bocas de fumo* disappeared. The few that remained became mobile retailers selling drugs out of backpacks:

> If and when a military truck or foot patrol came by, the [young traffickers] would scatter, quickly ducking into a side street or turning down one of the many alleys which crisscross Maré's neighborhoods. In most cases, the mobile *bocas* went unnoticed by the troops but on several occasions I watched soldiers pursue these young men. (Barnes 2022, 809).

While some groups in the occupied Maré hid more than others, all became less conspicuous. For example, one group "initially went into hiding," but later emerged and openly guarded their mobile *bocas* but were described by Barnes as "not as ostentatious as before occupation" (2022, 810). Another group invested even more heavily in hiding. Its members rarely openly carried weapons and Barnes reported that senior members explicitly maintained "low profiles" during the occupation (2022, 815). Regardless, Barnes found that all factions quickly reestablished territorial control and their visible *bocas de fumo* within hours of the occupation's end in 2015.

Once the costs of being robbed became prohibitive, traffickers protected themselves by hiding rather than by using force. But as soon as the occupation ended, traffickers immediately returned (Barnes 2022). Ergo, the means of trafficker self-protection varied directly with the costs of robbery (C_r).

The evidence here refutes a competing explanation as well. The activities of unaffiliated criminals may be bad for business, as suggested by Blattman et al. (2021). Thus, drug traffickers may subsidize governance not to keep locals loyal, but instead to keep petty criminals from attracting law enforcement attention. By that logic, more aggressive policing ought to lead to greater governance efforts from traffickers. The evidence above indicates that precisely the opposite occurs. When policing becomes more aggressive either within a favela or outside the favelas, traffickers govern less, not more.

Matutos are another useful comparison as to the relative modesty of the costs of robbery in the favelas. *Matutos* are responsible for transporting and delivering drugs to favela retailers. The service they provide, transportation across long distances, means that any potential bribees would not be sufficiently forward-looking to make trade worthwhile (Expressions 14 and 15) and it makes

bribes in the form of governance infeasible. Our theory predicts that, in such circumstances, traffickers will choose to hide rather than use force or bribe.

That is what we find. Without access to bribing, *Matutos* adopt sharply different methods of protection relative to favela traffickers. Unable to enforce a bribe contract with that potential community, smugglers invest in a substitute: avoiding attention altogether. *Matutos* are independent distributors and have no formal affiliation with their customers; they are not formal members of drug trafficking groups. Notably, who is a *matuto* is a secret, *matutos* do not sell in open-air drug markets and are not bound by territory. Rather, they acquire customers through a closed system of referrals and contacts. So successful are they that, "[l]ittle is known about the shadowy upper levels of Rio narcotics dealing" (Arias 2009). What is certain, however, is that *matutos* rely upon secrecy rather than weapons for protection.[27]

One *matuto* stressed the importance of secrecy during transportation: "And everything has to be done in secret. I mean, you can't tell anyone where you're going or what you're doing" (Gay 2015, 21). Not only must few people know the purpose of the trip, but also building hidden compartments for the journey becomes essential. For example, Bruno bought a car and made a *cafofo* which is "a secret hiding place for drugs." It entails taking "out the engine, and then you cut open a hole, and then you hide the drugs. Then you solder the car back together again, and you paint it, and off you go" (Gay 2015, 20).

Trafficking outside the favelas, trafficking inside the favelas during occupation, and the organization of *matutos* all confirm that the costs of robber within the favelas are neither too high nor too low. Just as our theory requires, they are modest.

4.3 Witnesses are cheaper to bribe

In theory, traffickers could bribe robbers to stay away. In practice, the decentralized character of Rio's robbers make such bribes an ineffective means of protecting traffickers' property rights. Two aspects of Rio's context show imply that favela residents' are more forward-looking than police or rival traffickers ($\delta_W \geq \delta_R$).

First, social and geographic distance is high among robbers. Rio's "robbers" have been too decentralized, formally and geographically, to make regular bribes effective. Police and rival traffickers are not only two autonomous groups. Each group of robbers is also further subdivided into groups with considerable autonomy. For example, drug-related law enforcement had two branches with independent authority to enter Rio's favelas: the Military Police and the Civil Police. Moreover, both branches have multiple, specialized divisions within each branch responsible for regulating some part of drug trafficking. The Military Police had *Batalhão de Choque* unit designed to deal with civil disturbances, and both the *Batalhão de Operações Policias Especias* (known as BOPE) and

[27] One account of a man who became a *matuto* for a short period of time suggests that *matutos* are rarely armed (Gay 2015)

Grupamento Especial Tático-Móvel were specialized for fighting traffickers. The Civil Police, in turn, had a specialized division for investigating drug trafficking called *Delagacia de Repressão à Entorpecente* (Dowdney 2003). As two independent groups of robbers, there is no formal means by which each can punish the free riding of the other and give "not robbing" meaningful private benefits.

Rio's robbers are not forward-looking for another reason. Repeated interactions between traffickers and law enforcement are rare. This is because "a regular and uncompromised policing presence is not a reality within favelas in Rio de Janeiro" (Dowdney 2003, 79). Relative to other areas of Rio, police rarely enter favelas (Gay 1994; Dowdney 2003). Moreover, when police do enter a favela, they do not stay for long periods of time. Rather, police entry into favelas is akin to a military raid or blitz. As a former Military Police officer admitted

> [...the police] go into the favela with a specific objective and then leave [...] It is an operation of war, it's a commando force [...] that goes in with a tactical objective and only up to a certain point: destroy a pile of firearms, a drug-packaging location, arrest someone, and then leave (Dowdney 2003, 79).

Rival traffickers, like the police, are quite decentralized. Recall that there are four separate factions, each comprised of a loose assortment of largely autonomous *donos* spread across Rio. Recall also that *donos* can be independent if they so choose. Such decentralization undermines the credibility of promises by robbers to "not rob." It is hard for police and rival gangs to effectively supervise one another's behavior. As a result, long-lasting arrangements amongst *quadrilhas* are rare.

Second, the low social and physical distance among favela residents allows residents to be comparatively more forward-looking. Norms and hierarchy keep residents and traffickers from having an incentive to cheat the other. Residents' geographic concentration and cultural homogeneity meant that they could better limit free riding through norms and so more credibly commit to not cheating traffickers. Favela populations are "tightly knit, closed, and closely related communities" where many people are often related to one another (Arias and Rodrigues 2006, 62; Arias 2009). The result is that "many people in Caxambú were related, in one way or another, to someone who was a drug trafficker" (Penglase 2014, ch. 4).

The so-called *lei do silencio*, or "law of silence" was the specific norm that discouraged residents from free riding. Because of their geographic and cultural closeness, residents could commit to helping traffickers enforce *lei do silencio*. Arias and Rodrigues describe the *lei do silencio* as "[a]t the heart of today's favela norms," which "forbids residents from publicly discussing crimes or acts of violence that take place in the favela that can be linked to traffickers" (2006, 62). So serious is this rule that such informants have earned the detestable title of "X-9." Additionally, within a *quadrilha*, being an informer "brings enormous shame and the risk of being killed" since traffickers killed those who broke the *lei do silencio* (Zaluar 2000, 665).

Residents had little incentive to break the norm because those who did risk being snitched on. Traffickers rely on other residents to identify snitches. There is a network of people always "watching to see if you're X-9" (Alves and Evanson 2011, 64).[28] For example, during his fieldwork, when several locals accused of being informants were killed by traffickers, Barnes "asked how [the traffickers] knew who was an informant. 'the other residents denounced them,' [a trafficker] told me" (2022, 802). According to Suska (2018, 80), the network helps traffickers "gather intel about any and every incident in the favela and perform 'justice' quickly and efficiently." As a result, "the most dangerous accusation that could be leveled at someone in the favela was to accuse that person of being an 'X-9,' or informant," an accusation "would sometimes surface as a threat in local disputes between residents" (Penglase 2009, 51).

The fact that both residents and traffickers have many opportunities for repeated interactions further promotes their incentive to cooperate. For example, Arias reports that in Santa Ana, "[t]raffickers have grown up in the favela and have many long-standing personal and familial relationships" with locals there, whereas police "never come from the favela" (2009, 102). The familial and close-knit relationships in Santa Ana are the norm. Barnes (2022), Dowdney (2003), Goldstein (2003), and Penglase (2003) all find the same pattern of relationships in other favelas. Barnes, for instance, states that all "three of Maré's gangs had significant familial and associational networks within these communities. Most gang members were born and raised in these neighborhoods and many of the more senior members have several girlfriends with whom they had multiple children" (2022, 800). Consider also the testimony of a *soldado* who emphasizes how long-term relationships facilitate entry into the drug trade: "You start by watching...and there's a trafficker ... where you live. You've known that kid since his birth, and so you know him and he asks you to look after a gun, look after something for him, and you do it" in Dowdney (2003, 124). The fact that *quadrilha* employment is at-will means also that an important fraction of traffickers, at some point, give up their weapons and authority and return to lawful employment. Thus some traffickers face the prospect of future dealings with locals.

The hierarchical structure of the *quadrilhas* helps to ensure that low-ranking traffickers, most of whom are paid a wage, do not have an incentive to cheat residents either.[29] Such a structure meant that high-ranking members could credibly punish lower-ranking members for opportunistic behavior. For example, when asked what happens if traffickers "fail to respect a member of the community," a *gerente de maconha* described the rule as follows:

> Oh, that doesn't go down well. Here it's like this . . . if all of a sudden you physically abuse a person or a resident . . . only because

[28] Larkins (2015, 186) observed that "[i]n order for the law of the traffic to work, traffickers must also rely on residents to denounce other residents for crimes." See also Alves and Evanson (2011, 64).

[29] Trafficker governance is effective but, like any agent empowered to use violence, can and is abused. Examples are well-documented. See Penglase (2008), Barnes (2022), Alves and Evanson (2011), Arias and Rodrigues (2006).

> maybe you asked that person that's not involved [in drug trafficking] to do you a favour, and the person then says they're not going to do it, and you go and beat them, tell them you're going to shoot them . . . then you'd be in the wrong because it's a resident and residents are not obliged to do anything, and then I might be sent away from the boca [sales point] because I disrespected a resident. Or for something more serious, you know . . . if you go into a resident's house [without permission] . . . not that that happens here, but there are cases of this . . . you get a beating . . . if you get to the point of really physically abusing a resident, shooting a resident, the punishment is serious (Dowdney 2003, 69).

There even have been cases in which locals send "letters signed by all residents to imprisoned *donos* of the *Comando Vermelho* in order to complain about an individual trafficker not respecting 'honest' residents." The result? "In such cases, traffickers may be moved to another community or disciplined" (Dowdney 2003, 70). The same holds for murder. Traffickers are forbidden from killing residents without justification.

5 Conclusion

Bribes to police do happen (Penglase 2008; Arias 2009; Dowdney 2003; Gay 2005). However, there is ample evidence showing that such payments are poor substitutes for bribing favela locals.

First, it is important to acknowledge that many such bribes do not qualify as conventional bribes. Many transfers from traffickers to police are ransom payments, not bribes. Arias found that in Santa Ana "[m]ost police do not directly take bribes from the gang. Rather, they arrest traffickers, confiscate contraband, and then ransom the jailed traffickers' freedom and sell the drugs and weapons to other gangs" (2009, 114). According to Penglase, this practice of informal kidnapping and ransoming is so common that it has earned its own nickname: *polícia mineira* (Penglase 2003, 143; see also Dowdney 2003, 87-88; Gay 2005, 86). Either the gang or the member's family pays the ransom. Indeed, Dowdney acknowledges that it is

> common practice amongst police officers of all policing corporations (Military, Civil and Federal) that are involved in corrupt practices to kidnap important drug traffickers for ransom. If the ransom is not paid by the kidnapped trafficker's *dono* or *gerente geral*, the kidnap victim is either killed by the police or 'officially' taken into custody and charged. (Dowdney 2003)87-88; Arias 2009, 103).

Second, the use of bribes that do not involve kidnapping is highly uneven because the arrangements often break down and are quite disorganized. Penglase describes the relationship between police and traffickers as "one that is

fragile and fraught with tension" (2003, 298) and elsewhere as "highly unstable, conflictual, and constantly subject to renegotiation" (2008, 137). Similarly, Arias states that in Santa Ana "[r]elations between police and traffickers are both violent and disorganized" (2009, 114). Relationships between police and traffickers are highly varied (Arias 2009, 78, 114; Penglase 2003). For example, "[l]ike police in Tubarão," relationships between police and traffickers in Santa Ana, "depend on the group of police that is on duty at a particular time. Some police take money directly from traffickers and leave them alone, while others conduct raids and then ransom traffickers' freedom" (Arias 2009, 126).

Frequent interruptions are an important impediment to repeated dealings between police and traffickers. Penglase notes that "arrangements between the police and the drug dealers are often made between the drug gang and particular policemen" (Penglase 2003, 301). Cooperative arrangements are, therefore, very fragile. Penglase found that in Caxambú there was an extended period of "tension and violence" because "a new commander was appointed to head the local battalion of the military police, and he reassigned policemen to patrol new areas," and that meant "that all of the prior arrangements between the police and the drug dealers were disrupted and had to be 're-negotiated'" (Penglase 2003, 301). Indeed, "Each new set of police transferred into the favela must establish its own relationship with the dealers. A resident noted that when a new group of police came into the community, things became quite tense as the police got the lay of the land and made contact with traffickers" (Arias 2009, 77). Even if police are not formally replaced, they may be informally replaced through internal violence. For example, in Santa Ana, Arias states that his contacts "reported that the gunfight had actually involved two factions of the police who disagreed about how a corruption scheme should work. One group of police led another group into a wooded area of the hill and opened fire" (Arias 2009, 98).[30]

Of the bribes that do not involve kidnapping and that do not immediately break down, they offer a useful contrast to the bribes to favela residents. Our theory can account for the situations in which bribes to police do happen and why such bribes are cash and not in-kind.

As our theory predicts, they will involve police who are relatively more forward-looking. That is what we find. For example, some favelas have Military Police posts called *Destacamento de Policiamento Comunitário* (DPO) overseen by four officers or fewer. The DPO's locations within a favela allow officers stationed there to have many, repeated interactions with traffickers alike. Unsurprisingly, according to Dowdney, "military police officers within DPOs are usually in the pay of local traffickers" (2003, 78). Indeed, a resident of Vigário Geral told Arias that "The police have an arrangement [arrego] with the traffickers from [Parada]. They pay R$5,000 to the police post so that they won't do anything" (in Arias 2009, 209).[31]

[30] Penglase similarly reports that "[s]tories about violent conflicts between corrupt policemen and honest ones, or about corrupt policemen battling against each other in favelas, are not uncommon" (Penglase 2003, 300).

[31] Our theory predicts that when traffickers can bribe police effectively, they have little

As our theory predicts, bribes paid to police are made in cash because, unlike residents, the vast majority of police are not from the favelas and so have little demand for informal security services. Furthermore, there are only a handful of police who must be bribed at one time. As a result, non-rivalrous services like governance lose their chief advantages relative to cash. In such cases, cash bribes are superior to in-kind bribes.

While unlikely, trafficker-provided governance may serve another purpose. Governance may be a commitment device to uninformed buyers of drugs. Drug customers may not be able to accurately assess drug quality prior to purchase. Since trafficker investments in governance are specific to a particular location and their costs can only be recouped over time, governance could be hostage capital that commits traffickers to not selling inferior drugs. Drug customers who are aware of such investments can be sure that traffickers will not cheat them with low-quality drugs.

This argument faces at least one problem. Hostage capital is effective if and only if customers can cheaply assess its existence and level. If customers cannot cheaply evaluate the existence and level of hostage capital, then it fails to be an effective commitment device. This condition does not hold in Rio. Since the arrival of cocaine in the 1980s, most trafficker customers have not lived in the favelas and so cannot cheaply assess investments traffickers make in good governance. As a result, providing governance to locals cannot perform the function of a credible commitment to ill-informed drug customers.

reason to bribe residents or treat them well. This is precisely what happened in Vigário Geral, twice. In 2003 and 2004 the favela was invaded by rival traffickers who had bought police support. Each time, trafficker abuse of locals was so severe that residents "fled for their lives" to a nearby park. The second invasion ended only when the exasperated residents burned a city bus outside the favela, thereby attracting enough attention that BOPE had to retake the community (Arias 2009, 208).

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6 Appendix

Here, we consider a few equilibria not discussed in the text.

6.1 Equilibrium: hiding

To find when Bruno's best choice is to hide, we must compare the payoffs of hiding to bribing Witnesses, hiding to bribing Robbers, and hiding to using force. Bruno will hide rather than bribe Witnesses when

$$\frac{1}{1-\delta_B}(U_h - \alpha_h C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r)$$

or

$$C^*_{b_W} \geq (U_v - U_h) - (\alpha_p - \alpha_h)C_r. \tag{22}$$

Bruno will hide rather than bribe Robbers when

$$\frac{1}{1-\delta_B}(U_h - \alpha_h C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_R} - \alpha_m C_r)$$

or

$$C^*_{b_R} \geq (U_v - U_h) - (\alpha_m - \alpha_h)C_r. \tag{23}$$

Bruno will hide over using force when

$$\frac{1}{1-\delta_B}(U_h - \alpha_h C_r) \geq \frac{1}{1-\delta_B}(U_v - \alpha_f C_r)$$

or

$$(\alpha_f - \alpha_h)C_r \geq U_v - U_h. \tag{24}$$

When those three equations hold, Bruno's best choice is to hide.

6.2 Equilibrium: fighting

To find when Bruno's best choice is to use force, we must compare the payoffs of using force with bribery, and then compare the payoffs to using force with that of hiding. Bruno will use force rather than bribe Robbers or Witnesses when

Bruno will use force over bribing Witnesses when

$$\frac{1}{1-\delta_B}(U_v - \alpha_f C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r)$$

or

$$C^*_{b_W} \geq (\alpha_f - \alpha_p)C_r. \tag{25}$$

Bruno will use force over bribing Robbers when

$$\frac{1}{1-\delta_B}(U_v - \alpha_f C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_R} - \alpha_m C_r)$$

or

$$C^*_{b_R} \geq (\alpha_f - \alpha_m)C_r. \tag{26}$$

Bruno will use force over hiding when

$$\frac{1}{1-\delta_B}(U_v - \alpha_f C_r) \geq \frac{1}{1-\delta_B}(U_h - \alpha_h C_r)$$

or

$$U_v - U_h \geq (\alpha_f - \alpha_h)C_r. \tag{27}$$

In this case, when those three equations hold, Bruno's best choice is to use force.

6.3 Equilibrium: bribing Robbers

To find when Bruno's best choice is to bribe Robbers rather than Witnesses, we compare the relative payoffs to each. Bruno will bribe Robbers rather than Witnesses when

$$\frac{1}{1-\delta_B}(U_v - C^*_{b_R} - \alpha_m C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{b_W} - \alpha_p C_r)$$

or

$$C^*_{b_W} \geq C^*_{b_R} + (\alpha_m - \alpha_p)C_r. \tag{28}$$

6.4 Equilibrium: bribing with cash

In theory, Bruno could make a cash bribe to either Robbers or Witnesses. Bruno will choose to use cash rather than in-kind transfers when

$$\frac{1}{1-\delta_B}(U_v - C^*_{c_i} - \alpha_j C_r) \geq \frac{1}{1-\delta_B}(U_v - C^*_{k_i} - \alpha_j C_r),$$

or

$$C^*_{k_i} \geq C^*_{c_i}. \tag{29}$$