Gangs of New York: Organized Crime as the Link between Inequality and Corruption

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Abstract

Empirical evidence on the causes and effects of inequality suggests the existence of a vicious circle of mutually reinforcing inequality, corruption, and weak institutions. Despite the broad empirical evidence, there are only a few formal theoretical models on these dynamics. Relying on a game-theoretic approach, we show how inequality and corruption/institutional quality are interconnected via a crime channel. According to our model, collusion between law enforcement agencies and criminal organizations is more likely in societies characterized by high inequality and/or weak security forces. If those actors collude and, thus, eliminate public security, the citizens are exploited to the greatest possible extent and inequality is perpetuated. At the same time, those societies feature high levels of corruption and criminal activity. Surprisingly, our results allow for the interpretation that policies of lowering inequality or increasing the effectiveness of local police forces may be ineffective countermeasures. We instead suggest that those societies should intervene with non-local law enforcement agencies in order to (re-)establish the rule of law. That measure had been successfully utilized in the Colombian "War on Drugs" and, to a lesser extent, in order to contain the influence of the American Mafia in the 1960th.

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1 Introduction

On October 17, 1931, during the peak of his reign, Alphonse "Al" Capone was found guilty of tax evasion and, one weak later, he was sentenced to eleven years in prison. Despite the well-know fact that Capone was not convicted for the many murders he probably ordered but for tax evasion, two other circumstances of his conviction are worth to notice. First, the investigations, which finally led to the verdict, were mainly carried out by federal law enforcement agencies; the local officialdom was bribed on a large scale by Capone (see Richman and Stuntz, 2005, p. 583). Second, Capone's conviction, marking the beginning of his power's decline, was prefaced by the beginnings of the Great Depression, which resulted in an economic downturn but also in a massive reduction of inequality (see Figure 1). Even if it is impossible to determine whether this chronology is merely coincidental it is worth to notice that the decline of the American Mafia as a whole showed similar patterns.

The American Mafia, dominated by the five main New York City Mafia families, gained a major share of its wealth during the era of Prohibition in the USA as a supplier of bootlegged liquor. Relying on the huge revenues from these activities and as this "business" required good connections to local polices forces and politicians, the Mafia bought up whole police departments in many cities and expanded its influence on politicians and unions (see Reuter, 1995, p. 89f.). As a side effect of protecting its "businesses", the Mafia thus achieved significant influence in local and city politics (see Skaperdas, 2001, p. 176) and established the basis for what later becomes its "principal original asset" (see Reuter, 1995, p. 94): a large network of connections to urban political machines.

In the Mid-1950th, the Mafia reached its peak of economic success and political influence (see Boyd, 2015). Along the way, it changed the focus of its activities and, by the 1960s, the Mafia "had mostly shifted from direct provision of illegal services, like bookmak-

Figure 1: Income Share of Top 1% of Total Income 1913–2015 for the USA (including capital gains)

Source: Own illustration with data from Piketty and Saez (2007); series updated by the same authors.

ing and loansharking, to selling services to bookmakers, loansharks, and other criminal entrepreneurs" (see Reuter, 1995, p. 90). It now provided what Skaperdas (2001, p. 174) call the "defining economic activity of organized crime": protection.

With the Mafia's growing success, the problem of organized crime was placed on the political agenda, even though, according to Calder (2009), it never received a high priority for US-Presidents before Lyndon B. Johnson. Nonetheless, the federal US government "had aggressively orchestrated a nationwide attack" on the Mafia since the beginning of 1961, which cumulated in a war on organized crime announced by President John F. Kennedy in 1963 (see Calder, 2009, p. 18). At least at this moment, the decline of the American Mafia began as its symbiosis with corrupt local law enforcement agencies and urban political machines started to dissolve. Besides incompetence on the part of the Mafia's younger generation, Reuter (1995, p. 94ff.) identifies the involvement and the improvement of federal law enforcement agencies as the main factors, which pushed back the Mafia's influence. Due to the intensified federal involvement in local government financing and the novel strong interest of federal agencies in making corruption cases, urban

political machines dissapeared, local corruption shrinks and thus the Mafia's foundation of success eroded (see Reuter, 1995, p. 94).[1] Interestingly, this development again coincided with a period of extremely low inequality (see, again, Figure 1).

Although the previous examples only presented anecdotical evidence,[2] the main argument deserves some attention. As we will show in the next section, the economic literature provides a vast amount of empirical evidence that there probably exists a mutually reinforcing relationship between institutional quality, corruption and inequality on one side and a positive effect of inequality on crime on the other. At the same time, there is no consensus in the literature on the causal effects for the emerging vicious circles. In addition, despite the broad empirical evidence, there are surprisingly few formal theoretical models on these dynamics.

Precisely at this point, our model applies. First, relying on our results, we are able to offer an explanation for an interconnection from inequality to corruption/institutional quality and back via a crime channel. According to our model, such a circle could emerge in (e.g., peripheral) areas, characterized by the absence of the rule of law, if a criminal organization and the corrupt local officialdom form an alliance with the purpose to exploit the local citizens. Our results suggest that such collusion is more likely to emerge if the society is more unequal and/or only has weak local security forces. Second, based on our model, the most promising way of breaking out of this circle is *not* to strenghen the local police forces or to lower inequality but to intervene with external (central government or

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[1]In addition, Reuter (1995, p. 94) cites the "flight of white ethnic communities to the suburbs and the growth of strong urban black political organizations" as reasons for the Mafia's decline. He argued that "the traditional relationship between blacks and the Mafia has not encouraged the development of trust".

[2]Regarding more recent examples, the pattern mentioned above recurs. Focusing on the war on drugs in Mexico, Enamorado et al. (2016) show that Mexican municipalities with a higher inequality have a significant higher homicide rate. Guatemala, one of the Latin/Central American countries with the highest inequality, also suffers from escalating levels of crime, corruption, and violence (International Crisis Group, 2011, 2016).

militarized) law enforcement agencies.

A bit more concisely, our main argument is summarized as follows: Due to low institutional quality (e.g., weak enforcement of property rights) and a widespread willingness to accept bribes in the public administration/security forces, the society's citizens are at the mercy of corrupt public officials and mobsters. If there is no power (e.g., a central government), who is able to provide a minimum level of protection for all citizens, local public officials and uncontested criminal organizations collude in extorting money from the citizens. As both actors are able and willing to extort a maximum of revenues, inequality is perpetuated and, in the extreme, the citizens are forced into poverty.

The remainder of this paper is organized as follows. Section 2 presents a brief summary of the relevant literature for the relation between inequality, corruption, and institutional quality on one hand and between inequality and crime on the other. In Section 3, we introduce our model of a dysfunctional society suffering from widespread corruption and organized crime. Section 4 expands this model in order to analyse the conditions for stable collusion between law enforcement agencies and a criminal organization. In Section 5, we present the implications for fighting or containing organized crime resulting from our model. Section 6 sums up and conclude.

2   Relevant Literature

We are interested in the relation of inequality, corruption, and the quality of institutions regarding their impact on a society's domestic security (i.e., crime) and the emergence of vicious circles. As inequality and corruption are often seen as scourges of humanity, there is a strong interest in the analysis of both and thus a large and steadily growing number

of articles analyzing econometrically as well as theoretically questions from those topics.[3] Hence, it would be beyond the scope of this section to provide a complete survey of the literature and we thus only give a brief summary of the relevant literature.

2.1 Inequality, Corruption, and Institutional Quality

Institutional quality cannot be easily separated from corruption. Measures of institutional quality often include corruption as an indicator for low institutional quality.[4] Hence, significant correlations of inequality and corruption thus often are simultaneously tantamount to a correlation of inequality and low institutional quality, depending on the latter's index.

Regarding the relation of inequality and corruption, the empirical literature more or less agrees on a positive relationship with regional anomalies. Interestingly, there is no consensus on the direction of the effect. Ades and di Tella (1997), Li et al. (2000), Gupta et al. (2002), Rothstein and Uslaner (2005), Gyimah-Brempong and de Gyimah-Brempong (2006), and Dincer and Gunalp (2012) suppose that corruption affects inequality (i.e., that more corruption yields higher inequality). The suggested transmission channels range from the considerations that, due to corruption, the redistribution via spending or tax systems is influenced to the advantages of the rich, to less physical and human investments.

In contrast, Jong-sung and Khagram (2005) and Glaeser and Saks (2006) assume that income inequality breeds corruption. Jong-sung and Khagram (2005, p. 136) argues that inequality increases the level of corruption via material and normative mechanisms as the rich "have both greater motivation and more opportunity to engage in corruption". In addition, Glaeser and Saks (2006, p. 1057) suggest that inequality may "reduce voters' desire to oppose corruption". Bringing together both views, other authors see a more

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[3]This interest underwent an additional boost due to the publication of "Capital in the Twenty-First Century" (2014) by Thomas Piketty, which received a lot of attention inside academia as well as outside.

[4]See e.g., the government indicator by Kaufmann, Kraay, and Mastruzzi (2003).

complex relationship between both factors. According to Chong and Gradstein (2007), Apergis et al. (2010), Uslaner (2010), and Ariely and Uslaner (2016), the existence of large inequality fosters corruption but, at the same time, corruption also perpetuate inequality, creating a vicious circle of mutually reinforcing inequality and corruption via different channels (e.g., social trust).

This clear picture becomes a bit blurry if regional differences are considered. Dobson and Ramlogan-Dobson (2010) and Andres and Ramlogan-Dobson (2011) found evidence that there is a negative relation between income inequality and corruption in Latin American countries. The authors explain these results with the large informal sector in these countries and Dobson and Ramlogan-Dobson (2012b, p. 1534) indeed show that "as the informal sector grows corruption is less harmful to inequality" and "once the informal sector accounts for a little over one-fifth of GDP lower corruption does not reduce inequality" (see Dobson and Ramlogan-Dobson, 2012a, p. 106). Wong (2016) explains these divergent consequences of corruption in Latin America with the competitive democracies in these countries, in which corruption often takes the form of vote buying via governmental spending.[5]

The formal theoretical modeling of the relation of inequality and corruption received less attention compared to empirical studies. Its aim lays on the explanation of the causality between both factors as the state-capture thesis, according to which the rich are generally better able to capture state institutions and thus to be more capable to influence those institutions in their favor, which is typically used in empirical studies, is not self-evident.[6]

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[5]Wong (2016) cites the idea of Nyblade and Reed (2008), who distinguish corruption in the form of "looting" from "cheating". The former reflects the traditional understanding of corruption "as the use of public office illicitly for private material gain" whereas the latter is defined "as the use of illicit means to enhance one's probability of being (re)elected" (see Nyblade and Reed, 2008, p. 927).

[6]Hellman and Kaufmann (2004) points out that this is rather rooted in an inequality of influence and less a direct result of inequality of wealth or income. In addition, according to Dutta and Mishra (2013), this thesis of the state's institutions captured by the rich implies that the rich are more corrupt than the

Here, inequality is mostly seen as the starting point. Relying on a framework, which considers the relationship of entrepreneurs and (corrupt) bureaucrats, Dusha (2014, p. 26) concludes that "[s]ocieties with higher concentrations of wealth end up being more corrupt because inequality induces bureaucrats to charge lower bribes to the higher end of the wealth distribution". Based on a multimarket framework, Dutta and Mishra (2013, p. 607) showed that "the presence of wealth inequality in the credit market prevents the screening of the efficient firms from the inefficient firms, thus allowing inefficient firms to enter the market, bringing corruption in its wake." Alesina and Angeletos (2005) link inequality to corruption via governmental redistribution but their results depend on the assumption that an increase of the size of a government results in higher corruption. However, there is no clear empirical evidence whether that assumption is true or not.[7]

Regarding the relationship of institutional quality and inequality, Easterly (2007) found evidence that inequality predicts low quality institutions.[8] The empirical findings of Chong and Gradstein (2007, p. 463f.) goes beyond that and suggest that there exists a double-causality relationship between both variables but with the causality from inequality to institutions to be the dominate one. In contrast, Carmignani (2009) identifies a negative influence of institutional quality on inequality but also a positive impact of inequality on the implementation of redistributional policy (and thus on inequality) via threats to government's stability.

Analyzing the relationship between institutional quality and inequality in an analytical framework, Gradstein (2007) modeled the emergence of the enforcement of property rights

poor. A claim only supported by "at best patchy" evidence (see Dutta and Mishra, 2013, p. 607).

[7]As Goel and Nelson (1998) or Arvate et al. (2010) found evidence that support that assumption, Gerring and Thacker (2005) or Glaeser and Saks (2006) do not, and La Porta et al. (1999) or Friedman et al. (2000) found quite the opposite. Meier and Holbrook (1992) found that the size of the bureaucracy is positively correlated with corruption.

[8]He uses an index of institutional quality that includes corruption amongst other indicators.

(i.e., high institutional quality) and democratization and how this is affected by the distribution of wealth and the citizens' political participation or activity. He concludes that democratization and the enforcement of property rights are more likely if the distribution of wealth is more equal and, at the same time, that increasing enforcement of property rights results in decreasing inequality. Relying on a similar framework as Gradstein and modeling agents' choices regarding private security, Sonin (2003) concludes that in societies with a higher inequality the optimal level of institutional quality (i.e., public security of property rights) would be lower.

Chong and Calderón (2000) found evidence that the relation between institutional quality and inequality is U-shaped, whereby it is positive for poor countries and negative for rich ones. Similar to the case of inequality and corruption, the authors explain this pattern with the importance and the size of the informal sectors in poor countries. However, Islam and Montenegro (2002) show that there is no relation between inequality and institutional quality once regional dummies for Latin America und Sub-Saharian Africa are introduced. In addition, according to Engerman and Sokoloff (1994, 2002), Sokoloff and Engerman (2000), or Chong and Gradstein (2007), there may be a feedback relationship between institutional quality and inequality, creating a vicious circle similar to the one of inequality and corruption.

2.2 Inequality & (Organized) Crime

The economics of crime literature generally follows Becker's (1968) well-known paradigm that decisions to engage in crime are as rational as all other decisions and, therefore, are the results of costs-benefits-analyses. People thus become criminals if crime is expected to pay better than the labour market. Based on these considerations, inequality and poverty should have a positive effect on crime as they "make crime more profitable at a given

level of crime deterrence" (see Bourguignon, 2001, p. 182). The theoretical literature on crime and inequality focuses on that relationship. Using more sophisticated frameworks than Becker, for example Chiu and Madden (1998) or İmrohoroğlu et al. (2000) provide microfoundations for the explanation of aggregated crime rates. Both show theoretically that higher inequality should result in higher property crime.

The empirical work also focused on proving Becker's (1968) theoretical findings and has carved out some interesting results. In an early paper, Ehrlich (1973) found evidence, which seems to confirm that inequality has a positive effect on peoples' willingness to participate in illegitimate activities regarding property. Since his pioneering work, these empirical results were confirmed many times for different kinds of crime using cross-section and panel data from different countries and/or minor administrative units and for different measures of inequality (see e.g., Kelly, 2000; Fajnzylber et al., 2002a,b; Bourguignon et al., 2003; Choe, 2008; Scorzafave and Soares, 2009). Only Chintrakarn and Herzer (2012) found evidence for the reverse relation.

However, this relationship is not as clear as it seems first. Using solely time-series data instead of cross-section or panel data, Allen (1996) found no evidence that changes in crime rates were correlated with changes in inequality. Saridakis (2004) found evidence for a positive short-term relation between violent crime and inequality but not for a long-term. Similarly, Brush (2007) identifies a positive effect using a cross-sectional approach but a negative relation using a time-series analysis. The most likely explanation for this discrepancy are biased coefficient estimates and, thus, it is possible (although it is unknown) that the "biases offset each other, resulting in a null hypothesis" (see Brush, 2007, p. 268). Kim (2015) indeed found that "prison admissions had a significant long-term equilibrium relationship with economic inequality" using time-series data but he also concludes from

the existing literature that crime rates do not explain changes in prison admission rates.[9]

In contrast to these partly positive findings, Neumayer (2003, 2005) found no evidence for such a relation and argued that the opposing findings of other authors resulted from methodological shortcomings. To be more concise, Neumayer (2005, p. 101) explained the cross-section analyses with positive results by untested country-specific fixed effects and, in particular, the results by Fajnzylber et al. (2002a,b) by a sample, which was "artificially restricted to a small number of countries".

To summarize, the findings of the existing literature accounts for an interesting discrepancy: As cross-country data revealed rich evidence that suggests a positive relationship between crime and inequality, it seem that there is no such a relation over time. Bourguignon (2001, p. 182) explained this inconsistency by suggesting a spurious relationship between inequality and crime but he gave no evidence for this claim. Our model's results allow for another more sophisticated explanation. According to our model, the relationship between inequality, corruption, and crime is a kind of a tipping-point phenomenon. In other words, gradual changes of inequality do not significantly affect the level of crime or corruption but if the tipping point is crossed, it will cause a perceptible change.

In addition, the existing literature suggests that there exists a complex backlashed relationship between inequality, corruption, and institutional quality, in which all factors breed each other in a vicious circle. In the extreme, these developments could result in unequal societies with bad, corrupt institutions without any prospects of breaking out of the vicious trap. At the same time, these societies suffer from violent as well as from property

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[9]Whether the latter is true or not, is not clear, yet. Kim justified his argument with the trends' disparity and "the inconsistent results of prior research" (see Kim, 2015, p. 4). He indeed stated that, according to Ouimet and Tremblay (1996), "[c]ross-sectional studies revealed significant evidence for the positive relationship but time-series studies produced weak evidence". Ouimet and Tremblay (1996, p. 110) themself concluded that the existing literature revealed "inconsistent and counterintuitive findings" as "the crime and punishment linkage found in cross-sectional analyses seems to disappear over time" or, at best, only found "mixed" evidence regarding time-series data.

crime. Our model extended the existing theoretical literature by proposing an additional transmission channel from inequality and low institutional quality to corruption and back via crime, explaining the emergence of a vicious circle. In the following section, we develop a model, which shows that collusion (i.e., corruption) between criminal organizations and the police with the aim of exploiting the citizens is more likely in unequal societies. At the same time, due to the elimination of public security, those societies undergo a huge crime wave. In the end, those societies are trapped in perpetuated inequality, crime, and poverty, as the criminal syndicate of police forces and organized crime would extort all potential growth.[10] In this regard, inequality fosters the cooperation between police forces and organized crime, what result in both, more crime and more corruption. Finally, the extortion redistributes money from the citizens to the criminals and the public employes (police forces) and, thus, perpetuates inequality and poverty.

3 Model

3.1 Corruption, Inequality, and Institutional Quality

With the help of our model, we analyze a relatively simple situation: Consider a small city in a peripheral region of a country. Due to external reasons,[11] the central government has only a weak impact on local events and is not able to provide sufficient public security in the outlying areas. Such an environment has probably two effects in the periphery: (i) it fosters the abuse of public power by public employers for their own benefits (i.e., corruption) and (ii) the existing power vacuum could be filled by a criminal organization

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[10]Mehlum et al. (2005) also show that crime can trap societies in poverty.
[11]According to Skaperdas (2001, p. 180), such external reasons could be geographic as well as ethnic or social distance.

providing security, primarily against itself.[12] This creates a dilemma for the local citizens regarding their security: T they can either bribe the local police forces to receive imperfect protection against the criminal organization or they can directly pay protection money to mobsters in order to be not harassed by them. However, it is not quite far fetched to expect that the police and the criminals would team up in such a situation and extort money from the citizens together. If this kind of collusion happens no public security is provided, the mobsters share their loot with the police, and the citizens can only choose between paying the mobsters and remaining unprotected.

Our model's aim is to analyze the conditions under which such collusion occurs and which countermeasures exist. Hence, we made two main assumptions in order to create the environment described above: (i) the citizens' property rights are not enforced and the former are not able to secure their belongings on their own and (ii) no objections regarding corruption exist in the public administration. To be more concise, we assume that only the police forces may able to prevent the mobsters from appropriating the citizens' belongings but the police does not have any professional ethics. The police will thus only protect the interests of the best paying and if the mobsters are able to buy out the police the citizens are unprotected. Of course, it is obvious that such a situation is not common in all countries over the world and that rather less developed countries suffer from these problems.

As we will show in the following, inequality as well as the distribution of power between

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[12]The situation and the consequences described above are absolutely realistic: see e.g., Oppenheimer (1996) for contemporary Mexico, Reuter (1995) for the United States at the beginning of the 20th century or Handelman (1994) for Russia in the 1990th. See also Skaperdas (2001) for a short summary. A similar situation can be observed in many Latin or Central American countries today: For example, according to the Economist (2016), studies from the Salvadorian central bank and the UN Development Programme estimate that local gangs extort about 3% of GDP from the Salvadorian citizens every year and total costs due to gangs sum up to nearly 16% of GDP. The situation become worst in those countries as Mexican drug cartels extend their influence to Central/Latin America (Dyer and Sachs, 2013).

the local police and the criminal organization are the main parameters for explaining the stability of their collusion. Generally spoken, according to our model, more unequal societies with less powerful police forces are more likely to be caught in the collusion trap of the alliance between the police and the mobsters. It is worth noticing that, at the same time, this kind of collusion also facilitates both the abuse of public power and an unequal distribution as public security disappears and public servants turn into criminals, accumulating the citizens' wealth.

Based on these results, we argue that the collusion trap of our paper is part of the vicious circles, as identified in the empirical litarature, channeling inequality into corruption and back via the empowering of organized crime. This trap is thus not only the result of a dysfunctional institutional environment but, to a certain degree, also the latter's cause. In addition, our results account for the interpretation that the countries, not suffering from corruption and organized crime, are not in their position due to their better institutional quality. To a certain degree, they are in their position *because they were able to escape the collusion trap*[13] *and were thus able to develop better institutions.*

3.2 Structure of the Model

In our model, we consider a society with a large population of *ex ante* heterogeneous citizens (C). The citizens differ with respect to their income $G \in \mathbb{R}^+$ and, for simplification, their mass is normalized to one. Let $f(\cdot)$ denotes the probability density function of income in the population and $F(\cdot)$ the cumulative distribution function of income in the population.[14] We assume that income is log normal distributed in the population. Hence, $\ln(G)$ is normal

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[13]The decline of the American Mafia, as described in this paper's introduction, may serve as an example. According to Reuter (1995, p. 94ff.), one reason for the decline was the stronger involvement of federal law enforcement agencies, which made local corruption less attractive.

[14]For simplification, $F\left(\cdot, \overline{G}\right)$ denotes the cumulative distribution of citizen with an income of $\overline{G}$ or less and $F\left(\cdot, \neg\overline{G}\right)$ denotes the cumulative distribution of citizen with an income of more than $\overline{G}$.

distributed with a standard deviation σ and a mean μ. Using a log normal distribution allows us to calculate the Gini coefficient of the current income distribution. According to Shimizu and Crow (1987, p. 11), the Gini coefficient I of a log normal distribution is

$$I = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1, \tag{1}$$

with $\Phi(\cdot)$ as the cumulative distribution function of the standard normal distribution. Obviously, a higher σ is associated with higher Gini coefficients (i.e., higher inequality).

As we already stated, we consider a dysfunctional society in our model. The citizens' property rights regarding their income are not well enforced as the society is characterized by a powerful criminal organization (the "Mob" – M) as well as a corrupt police force (the "Police" – P). The provision of public security for a citizen thus requires bribing the police with a lump-sum bribe $T \in \mathbb{R}^+$. As the Police has to secure the citizens' property against the Mob, public security can only be imperfect. Here, $\omega \in [0, 1]$ is the Mob's probability of being able to capture a citizen's wealth against the Police's protection. For example, we can assume that the Police and the Mob fight for the citizens' wealth and, based on this assumption, ω would also represent the distribution of power between both actors. Thus, the expected payoff of a citizen with income G is

$$E\left(\pi_C^T\right) = (1 - \omega) G - T \tag{2}$$

if he or she bribes the Police. However, the citizens do not only have the opportunity to rely their security on the Police. Instead of bribing the Police, the citizens could also pay protection money to the Mob and their property would thereby be perfectly secured. In order to be not harassed by the Mob, a citizen with income G has to pay an income-related

Figure 2: Simplified game tree
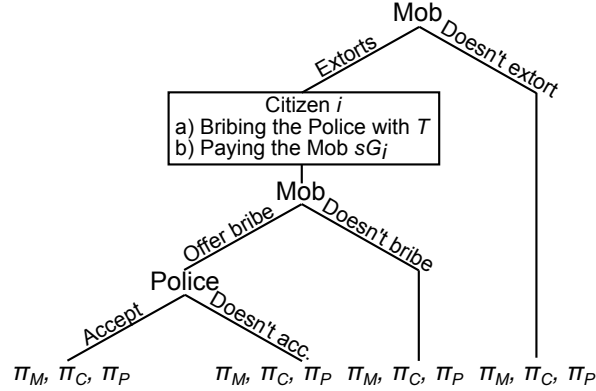
Source: Own illustration.

extortion rate $s \in [0, 1]$ and his or her payoff thus is

$$\pi_C^S = (1 - s)G. \tag{3}$$

Though every citizen is able to choose neither to pay the Mob nor to bribe the police, this is not a realistic option. Without any security (i.e., $\omega = 1$) the Mob definitively appropriates the citizen's wealth and the latter's payoff thus is $\pi_C^{\neg T \neg S} = 0 \leq \pi_C^S$.[15]

To complete the situation, the Mob is also able to cooperate with the Police. If the Mob offers a bribe $B \in \mathbb{R}^+$ to the Police and, of course, if the Police accepts this bribe, no public security is provided (i.e., again $\omega = 1$). Although all citizens are free to choose not to pay the Mob, they are all willing to pay protection money in that case. With $\omega = 1$, the Mob would be able to appropriate the wealth of all citizens and, here, $\pi_C^S \geq \pi_C^{\neg T \neg S} \geq E\left(\pi_C^T\right)$ always holds true.[16] For the sake of completeness, we also not explicitly rule out that a

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[15] Accordingly, "Paying the Mob" weakly dominates "Paying none".

[16] In that case, "Paying the Mob" weakly dominates "Paying none", what weakly dominates "Bribing the Police".

citizen pays the Mob and bribes the Police. However, because

$$\pi_C^{T\,S} = (1-s)G - T < (1-s)G = \pi_C^S \tag{4}$$

holds true, a rational citizen would never choose both options.[17] Accordingly, a citizen only has to decide between either "Paying the Mob" or "Bribing the Police"; rational actors would never choose other actions. Figure 2 illustrates the simplified tree of the game.

3.3 Obtaining Security . . .

Although this game has to be solved by using backward induction, we will continue with the analysis of the citizens' behavior because their optimal strategies are easy to detect,[18] and they are important to better understand the following strategies of the Police and the Mob.

A citizen with income G takes the policy parameters $\omega, s, B,$ and T and the behavior of all other citizens as given and pays protection money if

$$\pi_C^S = (1-s)G \geq (1-\omega)\,G - T = E\left(\pi_C^T\right) \tag{5}$$

holds true.[19] Otherwise, the citizen bribes the Police. According to inequality (5), all citizens decide to pay protection money if $s \leq \omega$. In that case, the society would appear as peaceful, at least on the surface but the absence of conflict does *not* result from the

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[17]Finally, "Paying the Mob" always strictly dominates "Paying both".

[18]As explained in the prevision section, a rational citizen only chooses between "Bribing the Police" and "Paying the Mob" if the Police accept bribes from the citizens at all. In addition, he or she always pays the Mob if the Polices does not accept any bribes from the citizens. Obviously, these considerations significantly reduce the Police's and the Mob's set of strategies, which are reachable for both players.

[19]We assume that an indifferent citizen pays the Mob. That could be justified by the self-evident assumption that a (risk-neutral) indifferent actor would favor a secure payoff over an equal expected one.

provision of public security or from the enforcement of the citizens' property rights. In fact, the citizens are not harassed because they compensate the Mob for not plundering them. In other words, the citizens pay the Mob for respecting their property rights and they are willing to pay that compensation because the payment is lower than the expected opportunity costs of enforcing their property rights.

At the same time, the Mob has to restrict itself not to extremely plunder the citizens in order to give the latter no incentive to pay for public security. Interestingly, this result is in accordance with the observation from International Relations that conflict "*is least likely when the existing distribution of benefits reflects the underlying distribution of power*" (see Powell, 1999, p. 85, original emphasis). The same is true in our case: As long as the Mob does not demand a higher share of the citizens' income for respecting the latter's property rights as the former is expected to appropriate by force, the citizens are not willing to bear the costs of enforcing their property right and no conflict occurs.

In the opposite case, if $s > \omega$, some citizens are willing to pay for public security and the enforcement of their property rights by force. Now, an threshold $\overline{G}$ exists and only citizens with an income

$$G \leq \overline{G} = \frac{T}{s - \omega} \tag{6}$$

pay the Mob. All other citizens bribe the Police, who tries to protect the formers' property. It is worth to notice that the criminal organization rather extorts protection money from the poor, as only citizens with a higher income are able to afford the Police's security. The threshold's level is determined by the bribe T and the difference $s - \omega$. If (i) the citizens have to pay a higher bribe, (ii) the Mob demands a lesser extortion rate or (iii) gains more power ($\omega \uparrow$), more citizens are willing to pay the Mob *et vice versa*.

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3.4   . . . and Eliminating Security

At this point of the analysis, we return to backward induction and analyze the decision of the Police in the last node of the game. We can significantly reduce the Police's strategies by taking into account that the Mob would only offer a bribe B if, at least, some citizens are willing to bribe the Police. For $s \leq \omega$, the Police would thus not have to decide whether to accept the Mob's bribe because the latter would not offer any. In addition, we rule out any opportunistic behavior by the Police. To be more concise, the Police is not able to get bribed by the Mob *and* by citizens. For that purpose, we assume that the citizens pay the protection money/the bribes after all decision are made. Taking these considerations into account, the Police can only choose between being bribed by the Mob or by some of the citizens, if this decision node is reached at all.

At this last node of the game, the Police also takes the policy parameters $\omega, s, B,$ and T as given. If the Police does not accept the Mob's bribe B and it instead receives a bribe T from every citizen with an income higher than $\overline{G}$ its payoff is

$$\pi_P^{\neg B} = F\left(\cdot, \neg \overline{G}\right) T. \tag{7}$$

Otherwise, the Police realizes a payoff

$$\pi_P^{B} = B \tag{8}$$

if it accepts the Mob's bribe. Based on those payoffs, a rational police would accept the

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Mob's bribe if $\pi_P^B \geq \pi_P^{\neg B}$.[20] This is true for

$$B \geq B^{\text{Min}} = F\left(\cdot, \neg\overline{G}\right) T \tag{9}$$

what is, at the same time, the minimum bribe, which have to be paid in order to prevent the provision of public security.

The Mob also takes the policy parameters $\omega, s, B,$ and T as given. It has to decide whether it is willing to bribe the Police with B in order to prevent the provision of public security or whether it accepts some protection money and fights for the remainder. The Mob's decision depends on the number of citizens (and on their wealth), who are "voluntarily" willing to pay protection money. In addition, the wealth of the citizens, who decide to bribe the Police, represents the prize the Mob and the Police are fighting for. Hence, we need the cumulative distribution of total income for the analysis. For simplification,

$$R\left(\cdot, \overline{G}\right) = \int_0^{\overline{G}} f\left(\cdot\right) G \; dG \tag{10}$$

is the total amount of income hold by citizens with an income of $\overline{G}$ or lower and

$$R\left(\cdot, \neg\overline{G}\right) = \int_{\overline{G}}^{+\infty} f\left(\cdot\right) G \; dG \tag{11}$$

the total amount of income hold by citizens with an income higher than $\overline{G}$, respectively.

As already mentioned above, all citizens would pay protection money, if the Mob bribes the Police. Hence, the Mob's payoff is

$$\pi_M^B = sR\left(\cdot, \infty\right) - B \tag{12}$$

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[20]We assume that the Police would accept the Mob's bribe if the former is indifferent because accepting does avoid a confrontation with the Mob.

in that case. Whether the Mob bribes the Police depends on the extortion rate s. Trivially, the Mob would never bribe the Police if $s \leq \omega$ as, then, all citizens "voluntarily" pay protection money and the Mob payoff is

$$\pi_M^{\neg B} = sR\left(\cdot, \infty\right). \tag{13}$$

If $s > \omega$, the Mob's decision also depends on the threshold $\overline{G}$. Here, all citizens with an income smaller than $\overline{G}$ pay protection money and the Mob tries to appropriate the remaining wealth of the other citizens. The Mob's expected payoff thus is

$$E\left(\pi_M^{\neg B}\right) = sR\left(\cdot, \overline{G}\right) + \omega R\left(\cdot, \neg\overline{G}\right) \tag{14}$$

and it bribes the Police if $\pi_M^B \geq E\left(\pi_M^{\neg B}\right)$.[21] That is true for all

$$B \leq B^{\mathrm{Max}} = \left(s - \omega\right)R\left(\cdot, \neg\overline{G}\right), \tag{15}$$

what is, at the same time, the maximum bribe. Accordingly, the Mob would offer the actual bribe B to the Police (and, of course, the Police would accept) if $B^{\mathrm{Max}} \geq B \geq B^{\mathrm{Min}}$ holds true. Interestingly, there is always the potential for eliminating the provision of public security.

Proposition 1. *For $s > \omega$, $B^{Max} > B^{Min}$ holds true for all possible combinations of the policy parameters.*

Proof. According to equation (6), $T = \left(s - \omega\right)\overline{G}$ holds true. Inserting equation (6) into equation (9) implies $B^{\mathrm{Min}} = \left(s - \omega\right)F\left(\cdot, \neg\overline{G}\right)\overline{G}$. Hence, $B^{\mathrm{Max}} > B^{\mathrm{Min}}$ is true if $R\left(\cdot, \neg\overline{G}\right) > F\left(\cdot, \neg\overline{G}\right)\overline{G}$ is true. As the aggregated income of the citizens with an income

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[21] Again, we assume that an actor prefers the certain payoff without fighting if he or she is indifferent.

of $\overline{G}$ *or higher* is always higher than the aggregated income of the same number of citizens, who all own only an income of $\overline{G}$, this is always true. □

Under these circumstances, it is very likely that collusion between the corrupt police and the criminal organization should tend to be the rule rather than the exception (i.e., the Mob offers a bribe and the Police accepts it). Without the provision of public security, the citizens are subject to joint extortion by the Police and the Mob. However, as we will show in the following sections, there is, nevertheless, a lot of potential for conflict between the Mob and the Police if we assume that both have to negotiate first how to split the negotiation range $N = B^{\mathrm{Max}} - B^{\mathrm{Min}}$ and that T and s are not exogenous.

Finally, it is obvious that the Mob always tries to extort money from the citizens, regardless of whether the Mob bribes the Police or not. We assume that the Mob's payoffs $\left(\pi_M^{\neg E} \right)$ is zero if it does not try to extort money. With extortion, the Mob always has a payoff $\left(\pi_M^E \right)$ higher than that and

$$\pi_M^E = \mathrm{Max}\left[\pi_M^B, E\left(\pi_M^{\neg B} \right) \right] > 0 = \pi_M^{\neg E} \tag{16}$$

holds true. Hence, extorting money strictly dominates not extorting money.

The results of the model illustrate two points. First, a dysfunctional society, characterized by a large willingness to be corrupt and weak property rights, always runs the risk of being captured by a criminal organization. Second, due to a more efficient way of collecting "taxes", the criminal organization is always able to achieve higher revenues and is thus able to "buy out" the Police. The situation of the citizens is thus depressed.

The purpose of the remainder of this paper is twofold: first, in the next section, we slightly modify the game und assume that the Mob and the Police have to reach an agreement on the division of the negotiation range rather than to analyze a "take-it-or-leave-it"

Figure 3: Illustration of the players' payoffs depending on s (left) and T (right).
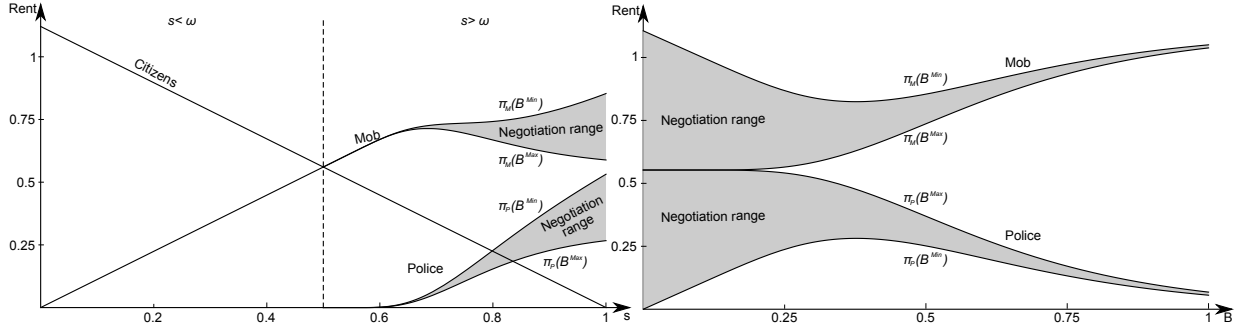
Source: Own illustration with $\sigma = 0.4346$, $\mu = 0$, $\omega = 0.5$, $s = 1$ (right side), and $T = 0.2959$ (left side).

offer by the Mob. Second, we will soften the assumption that the bribe T as well as the extortion rate s are exogenous and analyze how both actors should set those parameters.

4   Revised Model

In the previous section of this paper, we assume, for a better understanding, an exogenous bribe B and exogenous parameters s and T. As we now soften these assuptions, the game has to be modified. In the present form of the game, the Mob offers the bribe and would be able to set its amount as a dictator. With B being endogenous, this should result in the well-known outcome of the dicator game,[22] which is neither quite realistic nor of interest for this analysis. The process of dividing the negatiation range N between the actors, furthermore, deserves some attention as the distribution of N is cruicial for the game's results. Figure 3 illustrates that N accounts for a significant part of the actors' total payoffs, especially for the Police. Even more important, as illustrated by Figure 3, too, the shares both receive also affect their optimal decisions of the policy parameters s

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[22]A rational Mob would offer a bribe $B^{Min} + \epsilon$ with $\epsilon \to 0$ and a rational Police would accept it. If, instead, the Police could make the offer, it would demand the bribe $B^{Max} - \epsilon$ with $\epsilon \to 0$ and the Mob would be willing to accept.

Figure 4: Simplified modified game tree
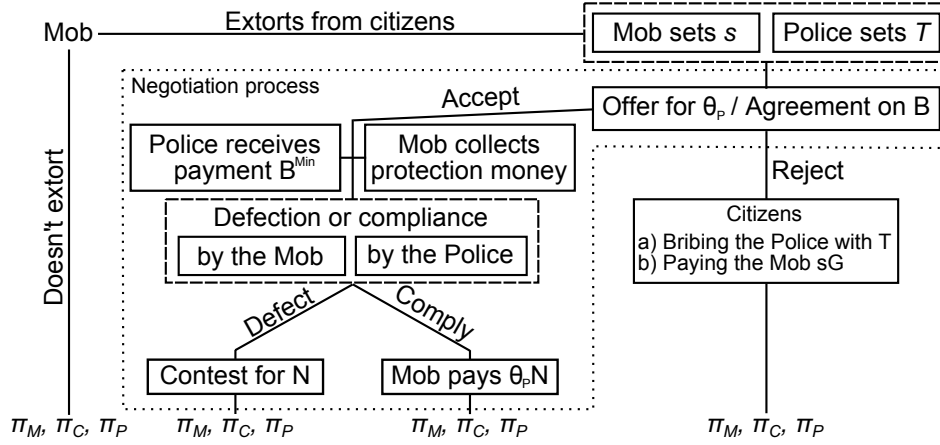
Source: Own illustration. Dashed boxes represent information sets. Solid boxes are decision nodes. Dotted box indicates the negotiation process.

and T. For example, Figure 3 shows that the Mob would set a low extortion rate s if the Police receives a high share of N (left graph) whereas the Police would set a higher bribe T if the Mob would receive a high share of N (right graph). Moreover, both actors are able to affect the amount of N by setting s and T strategically. As we will see in the following, these strategic options may complicate collusion between the Mob and the Police.

In order to implement these considerations into our approach, we modify the game as illustrated by Figure 4. After the Mob decides to extort money, both actors have to set simultaneously s and T, respectively. With s and T given, both start to negotiate on N in the game's next stage. We decided to model the negotiation as a modified mixture of an Ultimatum and a Pirate game.[23] Now, one player makes an offer for the distribution of N. If the other player rejects this offer, the negotiations end and both do not cooperate. Without an agreement, both collect protection money and bribes, respectively, from the citizens. Otherwise, the Police does not accept bribes from the citizens, all citizens thus pay protection money to the Mob and the Mob ought to pay the agreed bribe to the Police.

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[23]See Gueth et al. (1982) for the Ultimatum and Stewart (1999) for the Pirate game.

However, to prevent the player offering the bribe from acting as a dicator, we allow both actors to defect from the agreement and fight for the negotiation range N *after* the Mob has collected the protection money. Here, for simplification, fighting is costless, the chances on the battlefield are distributed according to the distribution of power (ω) and both have to decide simultaneously on defection. If at least one of them chooses to defect, both have to fight. To ensure that both players only fight for the negotiation range N,[24] we also assume that the Police receives a prize in the amount of B^{Min} directly after it agrees to the agreement and that the Mob is able to secure an amount of $\pi_M^{\neg B}$ of the collected protection money.

4.1 Dividing the Loot

For the negotiation, we assume a rather simple structure: One player has to make one (and only one) offer and the other could accept it or not. Even if the offer is accepted, both could defect from it. In order to make an optimal offer, the first player thus has to anticipate whether his/her offer could be rejected and whether the other player could defect. Interestingly, here, both actors would always prefer an agreement over no agreement if $N > 0$ and, thus, if $s > \omega$ and $T > 0$ hold true.

Proposition 2. *With $s > \omega$ and $T > 0$, both players would accept all positive offers.*

Proof. If both actors are not able to compromise, they have no agreement and their payoffs are $\pi_P^{\neg B}$ and $E\left(\pi_M^{\neg B}\right)$. In other words, without an agreement, both have the same payoffs as if they have a share of zero of N. Hence, an agreement on the distribution of N with positive shares always enhances the payoffs of both and, thus, "Accept the offer" dominates "Reject the offer" for both players. □

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[24]Otherwise, the Police would always be better of by raiding the Mob $E\left(\pi_p^{\neg N}\right) = (1 - \omega)\, s\, R\left(\cdot, \infty\right) > \pi_P^{\neg B}$.

Hence, the actors' decisions on the offer are only affected by the question whether one party will defect or not from that agreement.

Proposition 3. *The actors' only stable Nash equilibrium[25] offer for the distribution of N is $\theta_M = \omega$ and $\theta_P = 1 - \omega$ regardless of who makes the offer.*

Proof. We assume that the Mob can make the offer for the distribution of N with θ_M as the Mob's and θ_P as the Police's share. If we, furthermore, assume that both players prefer a secure payoff to equal expected payoffs than the Mob knows that (i) the Police accepts all offers with $\theta_P = 1 - \theta_M \geq 0$ but (ii) would defect for all offers $\theta_P < 1 - \omega$. At the same time, the Mob would only make offers with $\theta_M \geq 0$ and would always defect if $\theta_M < \omega$. Hence, the only stable offer without defection is $\theta_M = \omega$ with $\theta_P = 1 - \omega$. This result would remain the same if the Police could make the offer, because the Police would decide on symmetric considerations. $\square$

To summarize, given $s > \omega$ and $T > 0$ and thus $N > 0$, both players are always able to reach a stable agreement in which they divide N according to the distribution of power (ω). In that cases, the Mob realizes a payoff amounting to
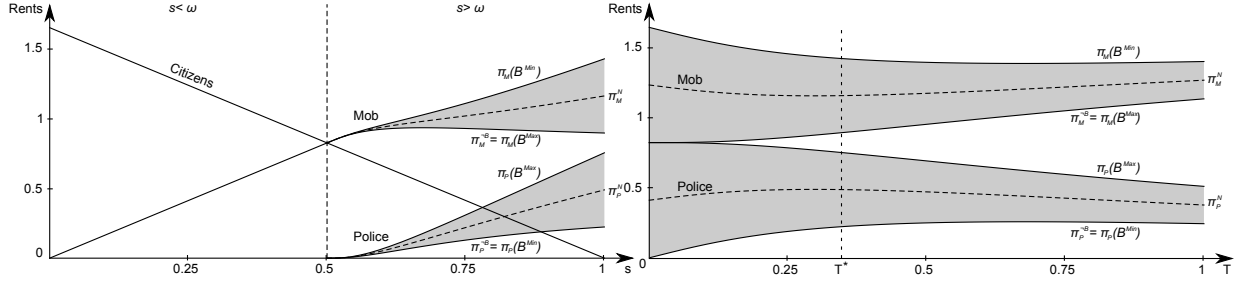
$$\pi_M^N = E\left(\pi_M^{\neg B}\right) + \omega N = sR\left(\cdot, \overline{G}\right) + \omega \left[(1 + s - \omega) R\left(\cdot, \neg \overline{G}\right) - F\left(\cdot, \neg \overline{G}\right) T\right] \qquad (17)$$

and the Police's payoff is

$$\pi_P^N = \pi_P^{\neg B} + (1 - \omega) N = (1 - \omega)(s - \omega) R\left(\cdot, \neg \overline{G}\right) + \omega F\left(\cdot, \neg \overline{G}\right) T. \qquad (18)$$

[25]This is the only subgame-perfect equilibrium of the game. "Stable" means without defection or rejection.

Figure 5: Illustration of the distribution of absolute rents splitted by power I.
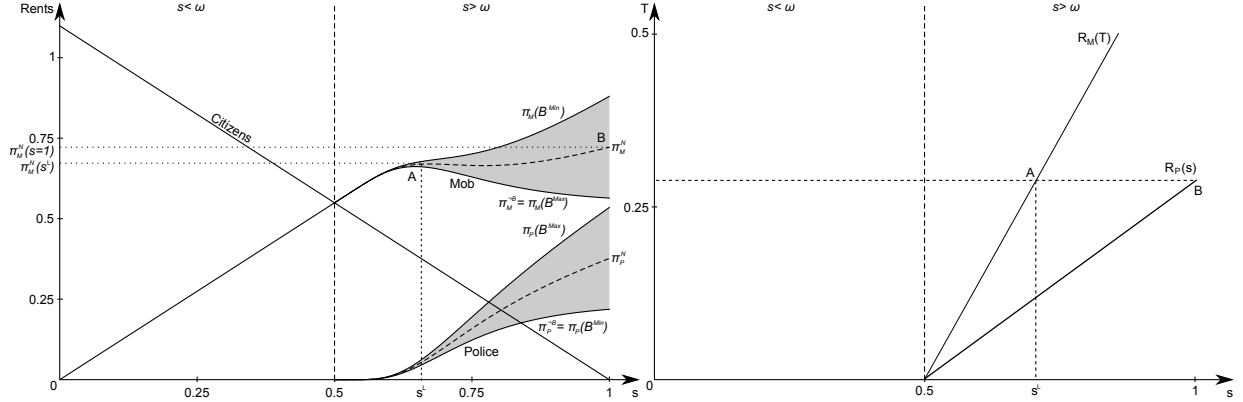

Source: Own illustration with $\sigma = 1$, $\mu = 0$, $\omega = 0.5$, $s = 1$ (left), and $T = 0.3466$ (right).

4.2 Decisions on Extortion Rate and Bribe

As we showed in the previous section, collusion between the Mob and the Police only requires that there exists a positive extra prize, in form of the negotiation range N, to share and thus that $s > w$ and $T > 0$ holds true. Although this seems not to be a very hard-to-reach condition, we will show that the player's strategic considerations could prevent them from colluding. Whether the Mob and the Police are able to exploit the citizens together (collusion equilibrium) depends on two factors: (i) the scale of inequality (σ) and (ii) the relative power of the Mob and the Police (ω). Generally spoken, citizens from less equal societies and/or societies with a relative strong criminal organization are more likely to live in societies trapped in a collusion equilibirum und, thus, to be subject of joint exploitation.

According to the game tree in Figure 4, the Police and the Mob decide simultaneously on the extortion rate and the bribe, respectively, while anticipating the expected respective reactions in the negotiation. Hence, the choosen parameters are the results of maximizations given the respective (anticipated) reactions of the opponent. Both players thus expect that they will collude if they are able to reach an equilibrium with $s > \omega$ and $T > 0$. Unfortunately, there is no convenient general analytical solution for those maxi-

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Figure 6: Players' payoffs (left) and reactions curves (right) with stable collusion.

Source: Own illustration with $\sigma = 0.5$, $\mu = 0$, $\omega = 0.5$, $s^L = 0.7049$, and $T^* = 0.2876$.

mization problems. Hence, we have to define equilibriums and to numerically evaluate the results respectively.

Cruical for the ability to collude are the Mob's payoffs. As illustrated by Figure 5, π_M^N as well as π_P^N can increase with s given an optimal behavior of the Police. In that cases, the Mob has an incentive to demand the highest possible extortion rate $s = 1$. Hence, if

$$\frac{\partial \pi_M^N}{\partial s} > 0 \quad \forall\, s \in [0,1]\,, \forall\, T \tag{19}$$

the Police and the Mob are able to collude and set

$$s^* = 1 \qquad \text{and} \qquad T = T^* > 0 \quad \forall\, T : \pi_P^N\left(s^*, T^*\right) \geq \pi_P^N\left(s^*, T\right). \tag{20}$$

This is a stable Nash equilibrium as none of the player would be better off by unilaterally deviating from it because, if inequality (19) is considered, $\pi_M^N\left(s^*, T^*\right) \geq \pi_M^N\left(s, T^*\right) \forall\, s$ is also always true. Even if there is a local maximum for π_M^N at s^L (e.g., in Figure 6) as

$$\pi_M^N\left(s_L, T^*\right) \geq \pi_M^N\left(s, T^*\right) \quad \forall\, s \in\,]\omega, 1)\,, \exists\, \epsilon > 0 \quad \text{with} \quad |s - s_L| < \epsilon \tag{21}$$

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holds true, collusion is still possible if

$$\pi_M^N \left(s = 1, T^*\right) \geq \pi_M^N \left(s^L, T^*\right) \tag{22}$$

holds true. In that case, both actors also set

$$s^* = 1 \quad \text{and} \quad T = T^* \quad \forall T : \pi_P^N \left(s^*, T^*\right) \geq \pi_P^N \left(s^*, T\right). \tag{23}$$

According to Figure 6 (right side), this Nash equilibrium is not the intersection of the reaction curves but it is nevertheless stable because, as shown on the left side of Figure 6, the Mob's payoff π_M^N is higher in this point (B) than in its actual "optimal" reaction (A).

However, there is no stable collusion equilibrium if there is a (local) maximum[26] for π_M^N at s^L but

$$\pi_M^N \left(s = 1, T^*\right) < \pi_M^N \left(s^L, T^*\right) \quad \forall s^L \in {]}\omega, 1{[} \tag{24}$$

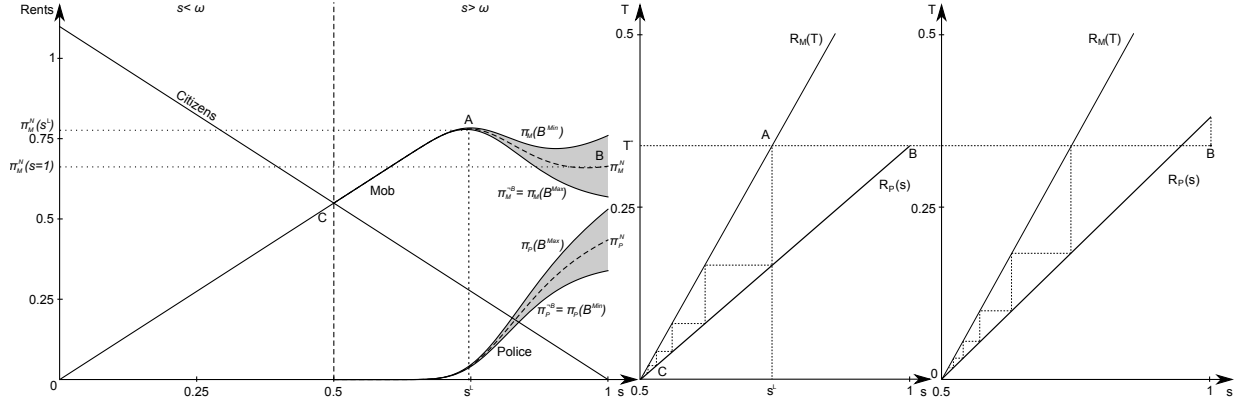holds true. In that case, there is no stable equilibrium for $s \in {]}\omega, 1]$ because

$$0 = \frac{\partial \pi_M^N}{\partial s} \neq \frac{\partial \pi_P^N}{\partial T} = 0 \quad \forall s \in {]}\omega, 1], \forall T > 0 \tag{25}$$

holds true. According to the Mob's and the Police's reaction curves in the middle of Figure 7, both actors would start a "race-to-the-bottom" and outbid each other, if the Mob has an incentive to lower s from $s = 1$. This process only ends for $s = \omega$ and $T = 0$ and therefore, there would be no collusion at the next stage.

However, if both actors anticipate that they are not able to reach an agreement in the negotiation, they would know that they have to compete for citizens instead and maximize their payoffs according to equations (7) and (14). Interestingly, also in the cases of such

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[26]Here, the same condition as in inequality (21) must hold true.

Figure 7: Payoffs (left) and reactions curves w/ (middle) and w/o collusion (right).

Source: Own illustration with $\sigma = 0.25$, $\mu = 0$, $\omega = 0.5$, $s^L = 0.7448$, and $T^* = 0.3383$.

an uncooperative behavior, the only stable equilibrium is $s = \omega$ and $T^* = 0$.

Proposition 4. *If there is no stable equilibrium with collusion for $s > \omega$, there is also no stable equilibrium for s and T without but $s^* = \omega$ and $T^* = 0$.*

Proof. With collusion, there is no stable equilibrium if inequality (24) and $s > \omega$ hold true. In that case, there is also no stable equilibrium without collusion because $\pi_M^{\neg B} < \pi_M^N$ is always true and, at the same time,

$$\frac{\partial \left(\pi_M^N - \pi_M^{\neg B} \right)}{\partial s} > 0 \qquad \text{and} \qquad 0 = \frac{\partial \pi_M^{\neg B}}{\partial s} \neq \frac{\partial \pi_P^{\neg B}}{\partial T} = 0 \qquad \forall\, s \in]\omega, 1], \forall\, T \geq 0 \qquad (26)$$

also holds true. It can thus be concluded that

$$\pi_M^{\neg B}\left(s^L, T^* \right) > \pi_M^{\neg B}\left(s = 1, T^* \right) \quad \exists\, s^L \in\,]\omega, 1[,\ \forall\, T : \pi_P^N\left(s^*, T^* \right) \geq \pi_P^N\left(s^*, T \right) \qquad (27)$$

is true, too. In other words, if there is no stable collusion equilibrium between the Mob and the Police, there is also no stable Nash equilibrium for s and T without their cooperation, which would yield $s > \omega$ because (i) the Mob's and the Police's reaction curves only

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Figure 8: Illustration of the location of the tipping points.
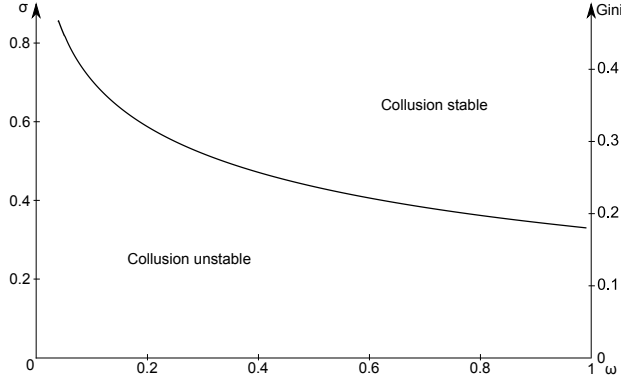
Source: Own illustration of a numerical evaluation with $\mu = 0$.

intercept at $s = \omega$ (right side of Figure 7) and $T^* = 0$ and (ii) in that cases, there always exists at least one $\omega < s^L < 1$ at which the Mob's payoff is higher than at $s = 1$. Hence, $s = 1$ could be no equilibrium, too. □

To conclude, in the absence of stable collusion between the Mob and the Police, the Mob always outbids the Police (e.g., demands a rate for protection money at which no citizen would bribe the Police). More concisely, in the absence of a stable agreement between the Police and the Mob, the latter would always extorts the maximum, which is possible without participation of the former. Hence, the Police does not receive any bribe, neither from the Mob nor from the citizens. As a consequence, there is no law enforcement in this society but no citizen demands it and, thus, organized crime only exists at the surface.

To summarize, depending on the course of π_M^N and π_P^N and thus on the ratio of ω and σ, collusion between the Mob and the Police is possible. Unfortunately, there is no convenient general analytical solution regarding the stability of the collusion but Figure 8 and Table 1 show numerically evaluated results. The collusion's stability only depends on the relation of σ and ω, whereby both are substitutes: According to Figure 8, more equal societies (i.e., societies with a lower σ and a lower Gini coefficient, respectively) need less powerful police

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Table 1: Location of Tipping Points

No.	σ	μ	ω	Gini	with	T^*	$\overline{G}$	s^L	e^μ
1	.6178	0	⅙	.3378		.2961	.4442	.3495	1.0000
2		1				.8049	1.2074		2.7183
3	.5009	0	⅓	.2768		.3333	.5000	.5529	1.0000
4		1				.9060	1.3590		2.7183
5	.4346	0	½	.2414		.2959	.5918	.7026	1.0000
6		1				.8044	1.6080		2.7183
7	.3892	0	⅔	.2168		.2191	.6573	.8209	1.0000
8		1				.5955	1.7865		2.7183
9	.3485	0	⅚	.1946		.1179	.7074	.9301	1.0000
10		1				.3206	1.9236		2.7183

Source: Own calculations.

forces (i.e., a higher ω) to prevent collusion between the police and criminal organizations. At the same time, the tipping point towards the collusion equilibrium is, according to Table 1, not affected by a variation of the median income (e^μ), or, in other words, an proportional increase of the income of all citizens ($\mu \uparrow$) has no effect on the collusion between the Police and the Mob. Here, only T^* increases proportionately to the median income. Interestingly, the Police always demanded, *ceteris paribus*, the same share of the median income (T^*/e^μ) if μ increases.

It is also worth to notice that the Police and the Mob always agree on extorting as much money as possible if they are able to coordinate.[27] Due to this behavior, there is a possible transmission channel from inequality to poverty. If the Mob and the Police coordinate to squeeze out the maximum amount of money from the citizens, the latters would retain only

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[27]The model's stable Nash-equilibria always contain $s^* = 1$. Accordingly, the citizens would have no income at all and, thus, would be unproductive due to malnutrition or, in the worst case, would die of starvation. Hence, the Mob and the Police would not appropriate the citizens' total income but concede them an (absolute) minimum subsistence level in order to let the latter stay alive and productive. A $s = 1$ should thus be interpreted as skimming off the total income above this minimum. If, instead, the citizens have accumulated some wealth before, the extortion rate could also be $s > 1$ as the Mob would try to extort this wealth, too. The citizens would thus be forced to dissave.

the (absolute) minimum subsistence level or, in the extreme, would be forced to dissave. The citizens would subsequently be driven below the poverty line and would remain there because all future improvements would be skimmed off by the Mob and the Police. To be more concise, countries, trapped in a collusion equilibrium, are exploited until there is nothing left to lose. Hence, without an effective containment of crime or a significant reduction of inequality, the citizens have no chance to participate in future prosperity. Development or reconstruction aid would thus have no effect, too. These results allow for some interesting policy implication, which we will discuss in the next section.

5 Implications for Fighting Crime

In the previous section, we argue that organized crime and corrupt police forces are more likely to collude in an environment characterized by an unequal distribution of income and/or a rather powerless police. It is obvious that the elimination of public security results directly from the (assumed) willingness of the security forces to accept bribes. Naturally, the best way to prevent collusion between organized crime and police forces is to contain this *willingness to be corrupt.* Unfortunately, public employees accepting bribes are indeed a problem in many countries, in which an environment exists similar to the one we analyze in our model. However, changing the "culture" in public administration with regard to the acceptance of corruption is tedious and would hardly have any short-term effects.[28] We thus concentrate on policy measures, which derived directly from our analysis in this section. Nevertheless, especially in those countries with a dysfunctional public administration, actions targeting alliances between organized crime and security forces should always be supported by containing the willingness to be corrupt.

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[28]As we will argue in the following, the same should be true for changing the level of income inequality.

According to our model, the societies, trapped in the collusion equilibrium, have two self-evident instruments for challenging this cooperation and enhancing their security: first, they could empower the police forces and, second, they could try to lower income inequality. However, both instruments require major efforts, as they might not have any effect on a small scale due to the tipping-point nature of the collusion.[29] In addition, these instruments are anything but "magic bullets". In fact, they could have some severe disadvantages and, as we will argue in the following, they are no appropriate measures to challenge the collusion between the Mob and the Police.

For societies with a very unequal distribution of income, lowering inequality is definitely a desirable policy goal as many people have an aversion to inequality (Fehr and Schmidt, 1999) or as there is some empirical evidence that horizontal economic inequalities[30] and, to a lesser extent, even individual inequality may be causes of civil war or unrest (see e.g., Buhaug et al., 2011; Cederman et al., 2011).[31] At the same time, policy measures aiming at lowering inequality are only reasonable if they are intended to increase low incomes in relative terms.[32] From this point of view, it has to discuss how rigid inequality is and whether such policy measures could be effective at all in the short run.

In our model, this problem is strengthened by the need to cross the tipping point and the powerful position of the criminal organization. If the politics only tries to lower inequality

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[29] Of course, small-scale variations could also have effects if the equilibrium before the variation is close to the tipping point. For the scope of interpretation, we distinguish the following way: Smale-scale variations have no effects as they do not cross the tipping point whereas large-scale variations indeed cross the tipping point and, thus, have effects.

[30] According to Stewart (2008, p. 3), those are "inequalities in economic, social or political dimensions or cultural status between culturally defined groups".

[31] It remains controversial and doubtful whether individual or only inter-group economic related inequalities increase the risk of civil war (see e.g., Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Cederman et al., 2011; Nepal et al., 2011). See Lichbach (1989) or Østby (2013) for overviews.

[32] Lowering only the richs' incomes would naturally have the same result in our model. However, this is probably not "good" policy because this measure simply comes down to the fact that the central government just robs the (rich) citizens before the Mob.

moderately, there is no improvement for the citizens: Without crossing the tipping point, the related relatively higher incomes of low-income citizens are still completely skimmed by the Mob. They only result in higher bribes for the Police by the Mob as the (temporary) lower inequality, due to higher incomes of the poor, increases the citizens' willingness to bribe the Police and, hence, the latter's bargaining power. Lowering inequality could thus only be an appropriate instrument to break out of the collusion equilibrium, if significant reductions of inequality are possible in short periods of time. However, as massive redistribution is not in accordance with the rule of law, we are of the opinion that policy measures could not significantly affect inequality in short periods of time.

Besides lowering inequality, another self-evident way of challenging crime would be to strengthen the police.[33] This may indeed be self evident but, nevertheless, it is a double-edged sword. If the police does not get strong enough that the tipping point is crossed, empowering the police does not enhance the citizens' security. Small-scale improvements only shift the power balance between the Police and the Mob and, again, enable the former to enforce a higher bribe. Moreover, even if the tipping point is crossed and collusion is terminated, the end of collusion is *not* a result of the containment of crime although there is a reduction of criminal activity. Here, collusion ends because more potent police forces try to extort higher bribes from the Mob. If this bribe is prohibitive the Police unintentionally sets an incentive for the Mob to extort less money from the citizens and not to bribe the Police anymore. In addition, here, the Mob has to restrict itself from too excessive extortion in order to prevent that citizens are willing to pay for public security. In other words, the police does not stop to be corrupt, there is only none willing to bribe them and

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[33]There is empirical evidence that more police officers (Corman and Mocan, 2000; Levitt, 1997, 2004) as well as an increased police presence generally reduce crime (Di Tella and Schargrodsky, 2004). In addition, Donohue and Levitt (2001) explain the reduction of crime in the 1990th with the legalization of abortion in the 1970th and 1980th. See Levitt and Miles (2006) for a survey of the literature.

the criminals restrict themself to maintain this situation.

Irrespective of these motivations, a society, nevertheless, experiences less perceived corruption and less criminal activity without collusion between the Mob and the Police. At the same time, conventional law-and-order politics also become most effective at this point although it does not target the roots of crime. By increasing the police's vigor, the citizens' extortion regresses as ω decreases. However, this approach could be problematic because strengthening the police force in such an anarchic, dysfunctional environment could also backfire. Instead of being a counterbalancing factor to the criminals, a powerful police could eliminate the mobsters and take over the latter's position. In that case, the police would turn into a criminal organization itself, extorting protection money from the citizens. This argument is not as far-fetched as it may seem[34] if it is taken into account that the police, as we consider it in the model, is not driven by any professional ethics and is indeed acting extremly unlawful. Based on these considerations, it is, at least, doubtful whether empowering the local police forces is an expedient instrument to end the collusion between the Police and the Mob and to (re-)establish the rule of law.

Yet, if both obvious countermeasures could have severe unintended consequences, the question arises, how governments could intervene in order to end collusion in that situation. Considering the failed local state of our model, feasible solutions could only come from outside. Hence, another possible instrument is to resort to external (e.g., special, military, central government, or even foreign) law enforcement agencies, which have no connections to the region of conflict. In terms of our model, improving law enforcement by involving new agencies would impose additional costs on both the Mob for extorting money and

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[34]And, as well, it is not pure fiction. In 1984, the Key West Police Department was declared a "Criminal Enterprise" as a consequence of the involvement of high-ranking officer in the distribution of drugs (New York Times, 1984). The "Los Zetas", one of the large Mexican drug cartels, have their roots in special forces of the Mexican Army, who, first, serve as the gulf cartel's armed wing and split off later.

on the Police for accepting bribes.[35] The Mob would refrain from extorting money if the additional costs exceed the gains from crime. Regarding the game tree in Figure 4, raiding the citizens thus has to become so expensive for the Mob that it chooses "Doesn't extort" at the first node. This decision could be fostered by increasing the Mob's payoffs of choosing not to extort (e.g., by offering amnesties to former mobsters).[36]

The example of the decline of the American Mafia from the beginning of this paper illustrates that this strategy could be a success if local political machines dissolve due to the involvement of external agencies. However, such a strategy could also induce some severe problems and is anything but a nostrum as more recent examples from Latin America reveal.[37] In Mexico as well as in El Salvador, the respective governments were not successful with deploying military units in order to resolve the conflict with local drug cartels (Mexico) and to contain gang crime (El Salvador), respectively.[38] Moreover, both governments were accused of (massive) human rights abuses, committed by military and special police forces (see e.g., Bureau of Democracy, Human Rights and Labor, 2015; Malkin, 2016; Human Rights Watch, 2016). This is apperently a frequent problem of the deployment of military units or militarized police forces for police duties (see e.g., Kraska and Cubellis, 1997; Dunn, 2001; Fabricant, 2011).[39]

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[35]The actual consequences of penalties for being corrupt in our model should be analyzed by further research. They could result in prohibitive costs of being corrupt as well as in higher bribes. Interestingly, both consequences make extortion less attractive for the Mob: the former reduces the benefits from extortion because, as our model shows, the Mob could extract more money from the citizens together with the Police and the latter increases the Mob's costs.

[36]Panama had good experiences with an amnesty for former gang members, which started in 2014 and was later extended to 2015 (see Carpenter, 2016, p. 38).

[37]In Latin America, the governments, which apply such a strategy, do not primarily resort to military units in order to dissolve local political machines but rather as a last resort in order to fight back highly armed groups that pose a threat to national security and overextend the capabilities of the (local) police forces (Pion-Berlin, 2016). Nevertheless, they could serve as examples for the possible problems of such strategies.

[38]See e.g. Pion-Berlin (2016) for an overview for Latin America and especially Mexico.

[39]Concededly, systematic research beyond case studies on this issue is missing. Anyway, according to Kraska and Cubellis (1997, p. 27) for many people militarized police forces stand for "tyranny, state

The case of Colombia, where such a strategy was, at least in part, successful, probably reveals some important reasons for these failures. In Colombia, the government was challenged by powerful drug cartels, a rebel group (FARC), and other paramilitary groups (AUC).[40] However, contrary to the examples of Mexico and El Salvador, the involvement of the military was part of a grand strategy, which also aimed on containing corruption (see Benítez Manaut, 2014, p. 65) and included a policy of social and economic development (see Llorente and McDermott, 2014, p. 7f.). In addition, it was heavily funded by the USA. These differences were probably reasons for the greater success[41] although, according to Llorente and McDermott (2014, p. 16ff.), strengthening the security forces and territorial consolidation were still the main instruments for forcing back the Colombian cartels and guerilla groups.

To summarize, there exists no panacea for countries trapped in a vicious circle of mutually reinforcing inequality, low institutional quality, corruption, and crime. Breaking this trap requires a multidimensional approach as targeting inequality and crime only could have a prospect of success if it is accompanied by a massive strengthening of the security forces and a dissolvement of local political machines. In addition, we argue that the latter objective requires that the law enforcement should be accomplish by deploying external agencies, in some cases military units. However, the deployment of those security forces is

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violence, human rights abuses, [and] war". It appears likely that the same should be true for soldiers deployed in a domestic "war" on crime. The reasons for these problematic side effect are probably the special training and the military-style appearance and rhetoric of those units. According to Dunn (2001, p. 8), "[p]olice authorities must be nominally concerned with civil rights and due process, while military troops are not. Instead, they are oriented toward the 'neutralization' or elimination of hostile threats or enemies." In addition, Fabricant (2011, p. 378) held that "[a] consequence of both the use of war rhetoric and the warlike approach to addressing societal problems is the dehumanization of citizens as 'enemies'."

[40]It is not possible to clearly distinguish between those groups as the last two also financed through drug trafficking and the former fought the government, too.

[41]See Llorente and McDermott (2014) for a general overview and Benítez Manaut (2014) for an overview of US-aid in fighting drug trafficking. Despite the greater success, the Colombian security forces were also (probably correctly) accused of human rights abuses (see e.g., Human Rights Watch, 2016, p. 188ff.).

not without risks as the use of military or militarized units for domestic security probably raises the risk of human rights abuses.

6   Conclusion

In this paper, we analyze how unlawful cooperation could arise between security forces and criminal organizations in dysfunctional societies, characterized by weak property rights, a widespread willingness to be corrupt, and a power vacuum. With the help of a game-theoretic model, we show that this kind of collusion with the aim of exploiting the citizens is more likely in societies with an unequal distribution of income and/or a less powerful local police force. Those societes are thus trapped in a vicious circle of mutually reinforcing inequality, organized crime, corruption, and, in the end, poverty.

Interestingly, more equal societies are less endangered by this kind of collusion because, in those societies, a relatively larger share of the population is willing and able to afford public security by bribing the police. As a consequence, the security forces have a higher bargaining power and are therefore able to claim higher bribes from the mobsters. These higher claims could set an incentive for the criminal organization to settle for a lower extortion rate, which could be enforced without any bribery. Even more important, due to the same mechanism the criminals could also end collusion if inequality decreases (e.g., as the result of an external shock). To be more concise, in our model, the end/absence of collusion always emenates from the mobsters and is the consequence of prohibitive bribes claimed by the security forces. Even if more powerful police forces lead to an end, this is not due to better public security but rather the result of a power disparity in favor of the (criminal) police forces.

Aggravating this situation, neither reducing inequality nor strengthening the local po-

lice forces are, according to our results, appropriate policy measures to break out of this trap. If a society intends to reduce inequality only by improving the situation of low-income citizens without the others being much worse off, inequlity should be very rigid and it could not be reduced on a large scale in a short period of time.[42] At the same time, collusion between the security forces and the mobsters takes the form of a tipping-point phenomenon[43] and, thus, is generally only affected by large-scale variations.[44] Hence, according to our model, policies reducing inequality should often have no effect on collusion. In fact, due to the uncontested position of the mobsters-security-forces syndicate all improvements of relatively poor citizens' incomes would be completely extorted.

The same considerations would, of course, apply to small-scale variations of the security-forces' strenght. Small improvements of the police, *ceteris paribus*, only shift the power balance between the police and the criminal organization towards the former, resulting in higher bribes for the police but no improvements for the citizens. In addition, empowering the local police could also be counterproductive: If the police is heavily strengthened, collusion would fail but there is always the danger that the security forces take over the criminal organization in order to be compensated for the lost bribes. The former would thus turn into a criminal organization itself, extorting money from the citizens on their own. This danger becomes even more realistic if it is taken into account that, as already

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[42]We do not consider excessive redistribution policies due to expropriation of rich citizens because such policies are not compatible with the rule of law and it would be pointless to fight one wrong with another injustice.

[43]Interestingly, this result allows us to explain a puzzle, emerging from the empirical literature: According to several authors (see, e.g., Saridakis, 2004; Brush, 2007; Neumayer, 2003, 2005), there probably exists a relation between inequality and crime *between different states* but not *over time in a state*. This discrepancy is often explained by methodological shortcomings (see, e.g., Neumayer, 2005, p. 101). Now, we can offer a more sophisticated explanation: If this relation takes the form of a tipping-point phenomenon, as our model suggests, only large-scale variations of inequality could trigger (large-scale) variations of crime rates. However, as inequality only gradually change in a country, its effects over time should be hard to detect. At the same time, variations between countries should be detectable, using econometrics.

[44]As we already noted before, we distinguish, for interpretation, small-scale from large-scale variations by assuming that the formers do not cross the tipping point whereas the latters do. See also Fn. 29.

mentioned above, this collusion does not end due to a reduced willingness of being corrupt or as a result of containing crime.

Concerning the implications for fighting crime and corruption, our results allow us to conclude three policy advices: First, all political actions, targeting the collusion between the security forces and a criminal organization, have to be accompanied by measures improving the enforcement of property rights and actions containing the willingness to be corrupt. Second, lowering inequality could be a supplementary measure but it is not appropriate in order to end collusion between a criminal organization and the securitiy forces. Third, proper solutions for improving the security have to come from the outside. Instead of strengthening the local police, those societies, trapped in a collusion equilibrium, should deal with crime by relying on central government law enforcement agencies or on military units without any connections to the contested area. These units are better able to challenge organized crime because they are not part of the collusion and are, thus, able to make extortion less attractive for the criminal challengers of public order. Interestingly, this approach succeeded in the Colombian "War on Drugs" and, as we could see at the beginning of this paper, was utilized in order to contain the influence of the American Mafia in the 1960th.

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