Erosion of State Power, Corruption Control, and Political Stability*

Weijia Li† Gérard Roland‡ Yang Xie§

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Abstract

Motivated by history, we model how corruption erodes state power. Under general assumptions about fat-tailed risk, we show that given strong fiscal capacity, the state apparatus' head will control local corruption at such a level that its power is secured; given weaker capacity, the state will over-tolerate corruption to retain officials, risking control in crises. The model predicts that only given medium fiscal capacity, a state's political stability will correlate with less corruption, consistent with recent cross-country panel-data. We also analyze the impacts of additional risk of crisis, personalistic rule, and corruption at the state apparatus' head on corruption control.

Keywords: corruption; state apparatus; state capacity; fiscal capacity; state authority; crisis.

JEL codes: D73; H12; D02.

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†Department of Economics, Monash University; weijia.li@monash.edu; ORCID: 0000-0003-4189-2140.

‡Department of Economics, University of California, Berkeley, CEPR, and NBER; groland@econ.berkeley.edu; ORCID: 0000-0003-1403-4351.

§Department of Economics, University of California, Riverside; yang.xie@ucr.edu; ORCID: 0000-0002-7047-8902.

1 Introduction

Corruption is an important and pervasive phenomenon in human history and modern societies (Shleifer and Vishny, 1993, p. 599; Kreike and Jordan, 2004) that receives much attention in political and economic research. Economic analysis emphasizes mostly the efficiency implications of corruption: sometimes its effects on "greasing the wheels" of the economy, more often its effects in distorting resource allocation, preventing creative destruction, increasing agency costs, and so on.[1] Political scientists, on the other hand, have investigated how corruption affects the functioning of the political system but also how it damages people's support for corrupt regimes.[2] Relatively little formal analysis has been devoted so far to how corruption erodes the power, authority, or control of the chain of command within the state apparatus.[3]

At the same time, the literature on state capacity has created interest in understanding better the functioning of the state apparatus.[4] That literature focuses on the capacity of the state to extract revenue and support the market, and on dynamic incentives to invest in state capacity. Very little attention has, however, been paid to how state authority can decay, and even collapse, and how this process can depend on the other dimensions of state capacity.

At the intersection of these two lines of research, we attempt in this paper to investigate three interconnected questions. First, how does corruption erode state power? Second, how can this erosion shape corruption control and the tolerance of local corruption by the central government? Finally, how can this relation be influenced by fiscal capacity, one of the most important economic dimensions of state capacity?

[1] A very incomplete list of influential studies includes Leff (1964), Tullock (1967), Krueger (1974), Rose-Ackerman (1978), Lui (1985), Laffont and Tirole (1991), Shleifer and Vishny (1993), Mauro (1995), Acemoğlu and Verdier (1998, 2000), Tanzi and Davoodi (1998), Guriev (2004), Méndez and Sepúlveda (2006), Olken (2006), Bertrand et al. (2007), Fisman and Svensson (2007), Cai et al. (2011), Colonnelli and Prem (2017), and Allen et al. (2018). See also surveys by Bardhan (1997), Tanzi (1998), Wei (1999), Jain (2001), Aidt (2003, 2009), Rose-Ackerman (1999, 2007), Svensson (2005), Olken and Pande (2012), and Rose-Ackerman and Palifka (2016).

[2] For the effects of corruption in politics, see for example Merton (1968), Huntington (1968), Waterbury (1973, 1976), and Heidenheimer et al. (1989). For the damaging impact of corruption on regime support and legitimacy, see for example Banfield, 1967, Etzioni-Halevy (1983), Della Porta (2000), Seligson (2002), Anderson and Tverdova (2003), Chang and Chu (2006), Gilley (2006), Morris and Klesner (2010), and Rothstein (2011). Guriev and Treisman (2018) show how in recent decades, instead of using mass repression, autocrats have increasingly been manipulating information to convince the public about their competence and win genuine popularity despite prevailing corruption in the state apparatus.

[3] Rose-Ackerman and Palifka (2016, p. 28) summarize the causes and consequences of corruption studied in the literature, and erosion of state power is not mentioned.

[4] For example, see Acemoğlu (2005), Besley and Persson (2008, 2009, 2010), Acemoğlu et al. (2011, 2015), Dincecco and Prado (2012), Padró i Miquel and Yared (2012), Dal Bó et al. (2013), Gennaioli and Voth (2015), Muralidharan et al. (2016), and the survey by Cingolani (2013).

We build an applied-theoretical model and analyze how the head of the state apparatus, i.e., the Center, when having the fiscal capacity to formally pay and retain its subordinates, would decide how much corruption to tolerate at the lower levels of the hierarchy. Our notion of corruption is primarily about the exchange of bribes and the building of relational contracts between a local official and firms or members of the population in the official's jurisdiction.[5] Our concept of state power, authority, and control relates to the success of the Center in securing the obedience of lower-level government authorities in times of *crises,* which we define as those exceptional times when the Center needs urgent support from within the apparatus to implement well-coordinated responses. The crises that are the most relevant are 1) political – wars, secession, revolts, or revolutions – since they may threaten the survival of the incumbent or the regime itself (Tilly, 1990), 2) economic crises with a high risk of contagion, and 3) important natural catastrophes, which can inflict severe damages. Answering the first question raised above, we show in our model how corruption can erode state power by creating local vested interests: in a crisis, corruption can push the local official to defy the Center's orders and secure local vested interests instead.

We focus on this specific effect of corruption because of its prominent relevance in theory and history. The ability to respond to exceptional situations, i.e., crises, has been viewed by political philosophers as a fundamental attribute of state power (e.g., Hobbes, 1651; Schmitt, 1921, 1922; Agamben, 2003). This idea has been well understood by practitioners of power in the real world (e.g., Lincoln, 1953, originally 1861). This ability to react in times of crisis has repeatedly been eroded by corruption in powerful empires throughout history, precisely because corruption creates the aforementioned Center–local government incentive misalignment. For example, as discussed by renowned historian MacMullen (1988), when Roman officials were ordered to clean up the Isaurian threat in the mid-350s, these officials were busy seeking rents from the local population. Not attacking the Isaurians, they tried instead to secure their own rents, sometimes even fighting against each other.[6] This was

[5]For examples of the coverage of this type of corruption over clientelism, the administrative, police, military, judicial, and political realms, and state capture, see Ezrow and Frantz (2013, p. 257–273). We also discuss in Appendix A the applicability of our model to other types of corruption, such as diversion of funds or embezzlement.

[6]MacMullen (1988, p. 182–183) examines why in the mid-350s the Isaurians, around southwestern Anatolia, "were well established as a quite uncontrollable force" threatening the Roman Empire. Citing Ammianus (c. 391), Jones (1964), and Rougé (1966), MacMullen (1988, p. 182) states that Roman officials "were busy raking together their spoils from the subject population under them," defying the Emperor's will: "no one [among them did] say the Isaurians nay ... [and these officials] were not very aggressive." In one infamous case, as told by Zosimus (c. 518) and Martindale (1980, p. 127–128) and cited by MacMullen (1988, p. 183), "the military Count Arbazacius, [who was] dispatched to the aid of villas and villages" but "wanting wealth and the pleasures of wealth," even "'shook down' the Isaurian leaders for a part of their plunder [and] relaxed his military efforts." Officials also frequently went further to fight against each other – "behind their own walls" – to secure their own interests (Ammianus, c. 391; MacMullen, 1988, p. 182).

quite common within the Roman regular army on other frontiers.[7] This erosion of central authority was highlighted by the Battle of Adrianople in 378 between the Eastern Roman Emperor Valens and the Gothic rebels: as pointed out by MacMullen (1988, p. 185), "what ...appears most striking is the contrast between the supposed great forces available to Valens and his sorry performance in bringing them to bear." Beyond the Roman Empire, corruption eroding state power is also well documented across time, for example, in Ancient Egypt, the Mamluk Sultanate, the Ottoman Empire, late Valois France, Ming–Qing China, British India, and the Soviet Union (Itzkowitz, 1972; Critchlow, 1988; Staples, 1993; Finer, 1997a,b,c; Petry, 1998; Pavarala, 2004; Fukuyama, 2011).[8]

The consequences of this mechanism can be very severe. In the case of the Roman Empire, Valens was killed at Adrianople, "marked among the most inauspicious of the Roman Calendar" (Gibbon, 1781, p. 613), and the defeat "set in motion the chain of events that would lead, nearly a century later, to the fall of the Western Roman Empire" (Barbero, 2008, p. 1). Realizing the potential consequences, the Center should have taken corruption and its corrosive impact seriously. Indeed, answering the second above question, our model shows that, in the Center's choice of local corruption tolerance, a fundamental political–economic trade-off exists between losing control in crises and raising its own rents (and sometimes economic performance as well).[9]

[7]For example, MacMullen (1988, p. 182) notices that Ammianus (c. 391) recorded the same situation on the Persian frontier in 356. According to Ammianus (c. 391) and MacMullen (1988, p. 175), all the "lust for plunder" generated likewise lack of "discipline, energy, and courage" inside the regular Roman army.

[8]Finer (1997a, p. 202–203, 208–209) documents how corruption in Ancient Egypt dislocated the command economy, thereby depriving the central authority of access to certain important resources when needed. In the Mamluk Sultanate, senior Mamluks employed their junior protégés to seek rents from the civilian population, accumulating such great fortunes that their loyalty toward the Sultan was replaced by economic calculus (Petry, 1998, p. 468; Fukuyama, 2011, p. 209). As a result, the Mamluks often intentionally delayed answering the Sultan's call for service and helped challengers supplant the Sultan (Petry, 1998, p. 468). The same causality from rent-seeking, creation of vested interests, to disloyalty applied to the relationship between the Janissaries and the Sultan in the Ottoman Empire (Itzkowitz, 1972, p. 89–92; Finer, 1997c, p. 1208; Fukuyama, 2011, p. 223–227). On late Valois France, Finer (1997c, p. 1309) argues that the rent-seeking behavior by the permanent civil service contributed to the "collapse" of "the entire edifice" of the king's power and its inability to respond to wars and resurgences. The Ming and Qing dynasties in Chinese history also show that corruption among civil and military officials seriously undermined and slowed down the royal court's response to invasions and rebellions (Finer, 1997b, p. 841–842, 848; Finer, 1997c, p. 1157). On British India, Pavarala (2004, p. 293, 295) observes that the trade interests of the East India Company were developed along with "the so-called 'Indian fortunes' made by East India Company officials," accompanied by "the struggle that marked most of the eighteenth century between the state [leadership in London] and the Company for control over India." On the Soviet Union, Critchlow (1988, p. 143–144) argued that, during Brezhnev's era, "irregularities," including corruption, "in the Central Asian republics [were] clearly widespread," so that they had "seriously eroded Moscow's ability to enforce directives" and created "de facto autonomy," when Moscow was worried about the looming economic, social, and demographic challenges at the time (Staples, 1993).

[9]The spirit of the trade-offs is consistent with the views of a few scholars in China and Soviet studies (e.g.,Will, 1980; Huang, 1981; Critchlow, 1988; Kuhn, 1990; Clark, 1993; Staples, 1993; Zhou, 2008, 2012,

Given this trade-off, we show that, under general conditions of fat-tailed risk of crises, if the Center's fiscal capacity is strong enough, the Center should follow an *endogenous lexicographic rule* when choosing its corruption tolerance: first, corruption must not exceed a critical threshold so that control is always secured in any possible crisis; second, given that the first condition is satisfied, the Center can tolerate corruption to a certain degree, raising its rents and economic performance as much as possible. Comparative statics of this rule also sheds lights on 1) why anti-corruption campaigns are often triggered by increased crisis risk, 2) why the dominance of the Center over the local official under the status quo may make it more difficult to keep control over the government in times of crisis, and 3) the empirical correlation between corruption and personalistic rule where the Center places family associates and loyalists in the state apparatus.

The endogenous lexicographic rule predicts that corruption should only cautiously be tolerated so that erosion of state power can be prevented. This immediately raises the question of why we observe erosion of state power and over-tolerance of corruption as in the aforementioned historical cases. We further show in our model that the feasibility of the endogenous lexicographic rule depends critically on the Center's fiscal capacity. When the capacity is not strong enough, the Center has to over-tolerate corruption to retain its subordinates, risking the stability of the political status quo. This analysis suggests a complementarity between fiscal capacity and crisis control through the Center's choice of corruption tolerance, thereby answering the third above question.

Besides providing historical narratives and contemporary examples, we also bring our theoretical analysis to the data. The main prediction of our model is a three-phase relationship between corruption, political stability, and fiscal capacity: political stability and corruption are negatively correlated only given medium fiscal capacity, and they are uncorrelated given strong or weak fiscal capacity. This prediction is consistent with the empirical pattern that emerges from various cross-country panel-data. The empirical analysis shows that our answers to the three questions above are not only prominent among historical and contemporary cases but also generally relevant in the current world.

The paper is organized as follows. Section 2 introduces and discusses the setup of the model. Section 3 analyzes the model, derives the theoretical results, and discusses their implications. Section 4 brings the theoretical analysis to data. Section 5 concludes.

2017; Sng, 2014; Walder, 2015; Zhang, 2018).

2 Setup of the Model

The model is a sequential game. Figure 1 presents its extensive form. There are two players: the Center, representing the highest level of the state apparatus, and a local official, representing all officials at lower levels of the hierarchy.

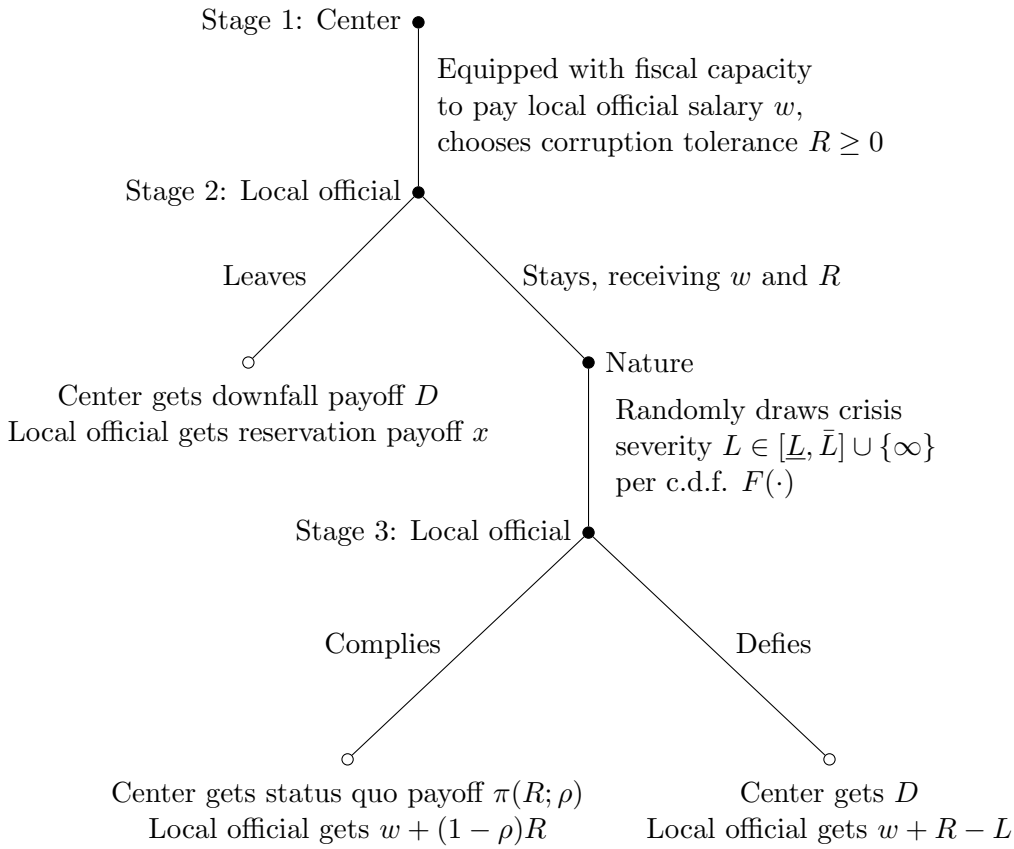


Figure 1: Extensive form of the game

At Stage 1, the Center chooses the level of rents $R \geq 0$ that it allows the local official to obtain through corruption in his jurisdiction. Besides this corruption tolerance, the Center is equipped with some fiscal capacity to pay an exogenous salary $w > 0$ to the local official.

At Stage 2, the local official chooses to leave or stay in the state hierarchy, and we assume that he will stay if indifferent. If he chooses to leave, the state apparatus will be short of staff and the Center will face its downfall. The game will then end, with the Center getting an exogenous payoff D for its downfall, while the local official gets an exogenous reservation payoff x.

If the local official chooses to stay he will receive the salary $w > 0$ and also obtain the corruption rents. Nature will then randomly draw a crisis severity level L from an exogenous distribution. The crisis of this severity will then strike the Center, and the game will move

into Stage 3.

At Stage 3, the local official chooses whether to comply with the orders from the Center and help survive the crisis. We assume that he will defy if indifferent. If he does comply, the game will end with the status quo being maintained, in which the local official is assumed to share an exogenous $\rho \in (0, 1)$ of his obtained rents, ρR in total, with the Center. The eventual payoff of the local official is then $w + (1 - \rho)R$. The Center is assumed to get a status quo payoff $\pi(R; \rho)$, depending on the prevalence of corruption R and the rent-sharing arrangement ρ.

If the local official chooses to defy, the status quo ends and the local official will no longer have to share his rents with the Center. The realization of crisis severity L enters here as the loss that the local official suffers in this scenario. The eventual payoff of the local official is then $w + R - L$. Since the Center has lost control of the state apparatus, we assume that the Center eventually gets the downfall payoff D.

We assume von Neumann and Morgenstern (1944) payoffs so that the players maximize their own expected payoffs. We also assume complete, perfect, and symmetric information. Therefore, we use backward induction when solving the model.

Before analyzing the model, we make a few remarks about the setup and interpretation of the model, along with three additional assumptions that help maintain realistic outcomes:

Crisis and its severity. First, as introduced above, the crisis severity L represents the loss that the local official will suffer if he defies the Center and the status quo ends. It can be interpreted as the punishment that the Center can impose on the local official for his potential defiance, or as the collateral damage that may occur after the Center's downfall. This setup is consistent with the idea that, when a crisis strikes the Center, the Center's ability to force the local official to comply and help survive the status quo is weakened; and the more severe the crisis, the weaker this expected ability.[10]

Note that a more severe crisis is proxied by a smaller L in the model. We further specify the distribution of L as follows:

Assumption 1 (Distribution of crisis severity)**.** *The cumulative distribution function* $F(\cdot)$

[10] In particular, since any punishment would be conditional on the Center's survival (e.g., Egorov and Sonin, 2011), the Center's enforcing ability is weakened in expectation during crises. This idea can also be micro-founded by the Rubinstein (1982) protocol where a crisis makes the Center become much less patient, lose bargaining power, and, therefore, become weaker in forcing the local official to obey orders.

and probability density $f(\cdot)$ of the crisis severity L satisfy:

$$\begin{aligned}
&\textit{when } L \leq \underline{L}, && F(L) = 0; \\
&\textit{when } \underline{L} < L < \bar{L}, && F(L) \in (0, p) \textit{ is differentiable and } f(L) > 0 \textit{ everywhere}; \\
&\textit{when } \bar{L} \leq L < \infty, && F(L) = p \in (0, 1); \\
&\textit{when } L = \infty, && F(L) = 1.
\end{aligned} \tag{1}$$

In other words, with probability $1 - p$, no real crisis will strike and the Center will be infinitely capable of forcing the local official to obey and maintain the status quo; with probability p, however, a real crisis may occur, the most severe crisis possible is denoted by $\underline{L} \in (0, \infty)$, and the least severe crisis possible is denoted by $\bar{L} \in (\underline{L}, \infty)$.

In reality, whether a real crisis strikes and how severe it is can be endogenous to existing corruption. We nevertheless keep the distribution of L exogenous. This is because we would like to highlight in our model the essence of power: power fundamentally means that the person at the lower level of the hierarchy will comply with the higher level, *whatever* the situation may be. This *arbitrariness* of the situation is exactly captured by the exogeneity of L. That said, in the analysis of Stage 3, we will discuss the case in which the distribution of L is endogenous to the level of corruption R; in Appendix A, we extend the model to introducing, in case of defiance, an additional loss to the local official that is dependent on R, and we discuss its implications. Also, note that although the crisis severity is assumed to be exogenous, whether a crisis is consequential or not to the Center is endogenous in our model, as we show below in our analysis.

Rent-sharing arrangement. Second, the rent-sharing arrangement ρ in the status quo is assumed to be exogenous. We can interpret a higher ρ as a more corrupt or dominant Center in the status quo of the central–local relationship. In the analysis of the Center's decision at Stage 1, we will analyze how ρ affects the Center's calculation and also how the Center would choose ρ if it had the choice.

Status quo payoff. Third, the dependence of the Center's status quo payoff $\pi(R; \rho)$ on the prevalence of corruption R can come from a few sources. First of all, the Center can value the performance of the economy because, for example, better economic performance can generate greater tax revenues or stronger popular support, and there are arguments for both corruption "greasing" and "sanding the wheels" of the economy (e.g., Leff, 1964; Lui, 1985; Shleifer and Vishny, 1993; Mauro, 1995; Wei, 1999; Guriev, 2004; Méndez and Sepúlveda, 2006; Bai et al., 2014, 2020; Li et al., 2019). Moreover, and perhaps more importantly, the Center can also value the rents ρR that it reaps from the local official. Since the reaped rents

ρR also depend on ρ, the status quo payoff also depends on the rent-sharing arrangement ρ, which is a parameter in $\pi(R;\rho)$.

Note that if the Center's rent-seeking motive dominates its concern for economic performance, or if corruption is "greasing the wheels" of the economy so much, higher corruption tolerance R will raise the status quo payoff $\pi(R;\rho)$. For reasons of generality, we assume $\pi(R;\rho)$ to be continuous and differentiable in R but leave the sign of the first derivative $\pi_R(R;\rho)$ unspecified.

Downfall payoff. Fourth, we make two additional assumptions that the Center's downfall payoff is sufficiently low:

Assumption 2. $D < \inf_{R\geq 0} \pi(R;\rho)$.

This assumption narrows our focus only to the scenarios in which the Center always prefers the status quo to downfall, which is reasonable. Assumption 2 itself, however, does not imply that the Center will always prevent the eventuality of a downfall. This is because the Center's status quo payoff and survival probability could move in opposite directions, depending on the properties of the other parts of the model, i.e., $\pi(R;\rho)$, x, w, and $F(L)$. It is thus a priori unclear whether the Center will prefer the status quo to be totally or only partially secured.

Assumption 3. $D < \frac{\inf_{R\geq 0} \pi(R;\rho) - (1-p)\cdot \sup_{R\geq 0} \pi(R;\rho)}{p}$.

Assumption 3 further narrows our focus to the cases in which the Center also always prefers the status quo to any situation where it would lose control in any real crisis, which is also reasonable. Assumption 3 does so because it is equivalent to

$$\inf_{R\geq 0} \pi(R;\rho) > p \cdot D + (1-p) \cdot \sup_{R\geq 0} \pi(R;\rho), \tag{2}$$

where the left-hand side is the minimum that the status quo can provide while the right-hand side is the maximum that the Center can expect if it may lose control in any real crisis. Like Assumption 2, this assumption does not imply either whether the Center will prefer the status quo to be totally or partially secured.

Fiscal capacity. Finally, the Center's fiscal capacity is modeled as its ability to pay and retain the local official without allowing him to take bribes. It is measured by the relative amount of the local official's reservation payoff x and salary w. In the analysis of the model, we refer to the difference $x - w \in (-\infty, \infty)$ as the measure of the Center's fiscal capacity; the higher this difference, the weaker the capacity.

3 Analysis of the Model

3.1 Stage 3

At this stage, having received the salary w and corruption rents R and learned the realization of the crisis severity L, the local official will defy if and only if

$$w + (1 - \rho)R \leq w + R - L. \tag{3}$$

This is equivalent to ρR being sufficiently big, or to the crisis being sufficiently severe:

$$L \leq \rho R \equiv \hat{L}(R), \tag{4}$$

where $\hat{L}(R)$ is the critical threshold of the crisis severity at which the local official will switch between complying and defying.

A higher corruption tolerance R will increase the vested interests ρR for the local official to secure during any crisis. This raises the critical threshold $\hat{L}(R)$. Given the distribution of L, this higher threshold suggests a higher likelihood of the local official's defiance and the Center's loss of control in a crisis. This is the corrosive effect of corruption on state power. We then have the following result:

Proposition 1 (Corrosive corruption)**.** *Just before nature draws the crisis severity L, the probability that the local official will comply at Stage 3 is $1 - F(\hat{L}(R))$. There exist $\underline{R} \equiv \underline{L}/\rho$ and $\bar{R} \equiv \bar{L}/\rho$ such that:*

- *when $0 \leq R \leq \underline{R}$, $1 - F(\hat{L}(R)) = 1$;*
- *when $\underline{R} \leq R \leq \bar{R}$, $1 - F(\hat{L}(R))$ continuously, strictly decreases from 1 to $1 - p$ as R increases from $\underline{R}$ to $\bar{R}$;*
- *when $\bar{R} \leq R < \infty$, $1 - F(\hat{L}(R)) = 1 - p$.*

The proposition directly follows the result on the critical threshold of the crisis severity $\hat{L}(R) = \rho R$ and Assumption 1 on the distribution of L. Figure 2 plots the result. The threshold $\underline{R}$ is the corruption level at which the Center just secures perfect control in any crisis, while the threshold $\bar{R}$ is the corruption level at which the Center just loses control in any real crisis. If the corruption tolerance $R \in [0, \underline{R}]$, then the Center's will never lose control in any crisis; if $R \in [\underline{R}, \bar{R}]$, the Center starts to risk its crisis control and higher corruption will erode crisis control; if $R \in [\bar{R}, \infty)$, the Center will lose control in any real crisis and the status quo can only be maintained when no real crisis strikes.

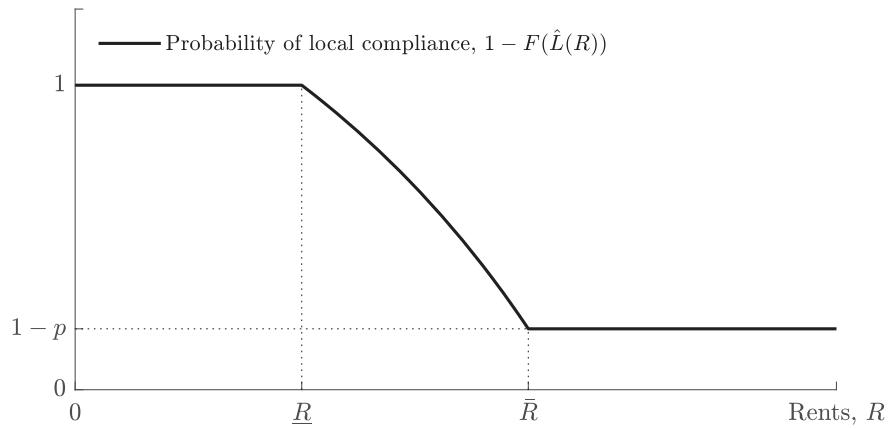


Figure 2: Corrosive impact of corruption on Center's crisis control

The intuition behind Proposition 1 is that corruption creates vested interests, and the impulse to secure these interests can push officials at the lower levels of the hierarchy to defy the orders from the Center. Besides being consistent with the aforementioned historical accounts, for example, the cases of the Roman Empire, the Mamluk Sultanate, and the Ottoman Empire, this intuition also captures the understanding of the current leader of the Communist Party of China Xi Jinping about the corrosive effect of corruption on the central authority of the party. In a well-known speech during the anti-corruption campaign, Xi (2014) asserted that "the gravest danger that challenges the Party comes from corruption within the Party," precisely because "when power seeks rents, people within the system hook up with people outside, group by vested interests, and challenge the leadership of the Party."

Although derived from a simple setting, the intuition behind Proposition 1 is robust to alternative settings. First, instead of rent-sharing, the status quo could require the local official to submit a fixed fee. In this setting, the probability that the local official will defy would still weakly increase with the corruption rents.[11] Second, one can argue that corruption can shift the distribution of crisis severity in the wrong direction by creating more social discontent, or through other channels generating similar effects. In that case, the corruption rents would further decrease the probability of crisis control, but from an additional channel, and would not modify the thrust of our result. Third, one can imagine that the crisis itself can affect the rents. As long as the post-crisis and pre-crisis rents are positively correlated given the crisis severity, the corrosive effect of corruption will still be there. Fourth, one can argue that during the collapse of the status quo the local official might lose a share of the corruption rents. As shown in Appendix A, the corrosive effect of corruption will hold, as long as this share is not too large. Appendix A further provides

[11] The defiance condition would become $w + R - \min\{M, R\} \leq w + R - L$, where M is the fixed fee. Then the focal probability would be $F(\min\{M, R\})$, which weakly increases with R.

justifications for this condition.

Understanding his own Stage-3 decision as analyzed, the local official has to decide at Stage 2 whether to stay in the state hierarchy. We know step back to analyze this decision.

3.2 Stage 2

The local official will stay if and only if

$$x \leq w + \mathbf{E}_L[\max\{(1-\rho)R, R-L\}] = w + R - \mathbf{E}_L[\min\{\rho R, L\}]. \tag{5}$$

If we denote the expected rents the local official will eventually gain after Stage 3 by $X(R) \equiv R - \mathbf{E}_L[\min\{\rho R, L\}]$, this condition is equivalent to

$$X(R) \geq x - w, \tag{6}$$

which means that the local official decides to stay if his expected rents cover the gap between his reservation payoff and salary.

To understand when this condition holds, we take a closer look at the expected rents $X(R)$:

Lemma 1 (Local official's expected rents)**.** *At Stage 2, the local official's expected rents $X(R)$ after Stage 3 strictly and continuously increase from 0 to ∞ as R increases from 0 to ∞.*

Proof. By the definition of $X(R)$ and the distribution of L in Assumption 1, we have:

- when $R \in [0, \underline{R}]$, $X(R) = (1-\rho)R$;
- when $R \in (\underline{R}, \bar{R})$, $X(R) = R - \int_{\underline{L}}^{\rho R} L dF(L) - \rho R\left(1 - F(\rho R)\right)$ and $X'(R) = 1 - \rho\left(1 - F(\rho R)\right) > 0$;
- when $R \in [\bar{R}, \infty)$, $X(R) = \left(1 - (1-p)\rho\right) R - p \cdot \int_{\underline{L}}^{\bar{L}} L dF(L)$.

The result then follows the fact that $\rho \in (0, 1)$. □

This result is intuitive in the sense that the higher the rents R that the local official will have obtained before Stage 3, the higher the local official's expected rents $X(R)$ after Stage 3. A characterization of Stage 2 then follows Lemma 1:

Proposition 2 (Scenarios depending on fiscal capacity)**.** *The model has two scenarios:*

1. *when $x - w \leq 0$, the local official will always stay in the state apparatus at Stage 2 regardless of the Center's choice of $R \in [0, \infty)$;*

2. *when $x - w > 0$, the local official will stay if and only if $R \geq r$, where $r > 0$ uniquely solves $X(r) = x - w$ and increases with $x - w$.*

This proposition suggests that in Scenario 1 when the Center's fiscal capacity is sufficiently strong, no gap between the reservation payoff and salary needs to be covered. The local official will thus always stay. In Scenario 2 when the Center's fiscal capacity is not as strong, the Center will face a problem to retain the local official and its choice of corruption tolerance R will have to be sufficiently high.

All the analysis above suggests that the Center's choice of corruption tolerance R drives Stages 2 and 3: at Stage 3, it creates central–local incentive misalignment in crises; at Stage 2, it decides whether the expected rents $X(R)$ can cover the gap between the local official's salary and reservation payoff. To understand the Center's choice of R, we now step back to analyze Stage 1.

3.3 Stage 1, Scenario 1 (No Retention Problem)

Given Proposition 2, we first analyze Stage 1 in Scenario 1. By muting the retention problem at Stage 2, this scenario helps us isolate out the Center's concern about its crisis control at Stage 3. After that we turn to Scenario 2, bringing the retention problem back and investigating the implications of weaker fiscal capacity.

In Scenario 1, fiscal capacity is strong enough ($x - w \leq 0$) and the local official will always stay regardless of the Center's choice of R. The Center's program is then

$$\max_{R} \quad \big(1 - S(R)\big) \cdot D + S(R) \cdot \pi(R; \rho) = D + S(R) \cdot \big(\pi(R; \rho) - D\big), \quad \text{s.t.} \quad R \geq 0, \tag{7}$$

where the Center's political stability $S(R)$, i.e., the probability that it will survive at the end of the game, is

$$S(R) = 1 - F(\hat{L}(R)), \text{ in which } \hat{L}(R) = \rho R. \tag{8}$$

This program suggests that, given Assumption 2 ($\pi(R; \rho) > D$) and a sufficiently strong fiscal capacity ($x - w \leq 0$), the Center faces a fundamental trade-off between keeping control and raising the status quo payoff: a higher R will lead to a higher probability $F(\hat{L}(R))$ to lose control in crises and, therefore, a lower political stability $S(R)$, but it can grant a higher status quo payoff $\pi(R; \rho)$ if $\pi_R(R; \rho) > 0$. This trade-off is truly political–economic, since one side of the trade-off is political: making sure that the local official will comply with the

Center, whatever the severity of the crisis would be; the other side is economic: it is about the payoff under the status quo.

We now derive the main result related to this trade-off – a sufficient condition about the risk distribution under which the political side of the trade-off dominates the economic side, and the Center chooses a corruption tolerance that does not pose any risk to power at all:

Proposition 3 (No retention problem)**.** *If the Center does not face a retention problem, and if the risk of crisis is sufficiently fat-tailed, the Center will follow a lexicographic rule when choosing the corruption tolerance:*

perfect crisis control first, status quo payoff second.

Further, if the Center's status quo payoff increases with corruption, then it will tolerate corruption as much as possible while securing perfect control. Mathematically, if $x - w \leq 0$, and if, for any $L \in (\underline{L}, \bar{L})$,

$$\frac{L \cdot f(L)}{1 - F(L)} \equiv \epsilon > \bar{\epsilon} \equiv \max_{R \in [\underline{R}, \bar{R}]} \frac{\pi_R(R; \rho) \cdot R}{\pi(R; \rho) - D}, \tag{9}$$

then the Center's optimal choice $R^* \in \arg\max_{R \in [0, \underline{R}]} \pi(R; \rho)$, which implies $R^* \leq \underline{R}$ and $S(R^*) = 1$. Furthermore, if $\pi_R(R; \rho) > 0$ over $R \in [0, \underline{R}]$, then $R^* = \underline{R}$.

Proof. First, by Assumptions 2 and 3 and Proposition 1, the Center must prefer any $R \in [0, \underline{R}]$ to any $R \in (\bar{R}, \infty)$, because the former would secure perfect crisis control and the latter would make the Center lose any crisis control. Second, by $\hat{L}(R) = \rho R$, the Center's expected payoff will be strictly decreasing over $R \in \big(\underline{R}, \bar{R}\big)$, if and only if the marginal gain from additional security brought by a slightly lower corruption tolerance dominates the marginal sacrifice in the status quo payoff, i.e.,

$$-S'(R) \cdot \big(\pi(R; \rho) - D\big) > S(R) \cdot \pi_R(R; \rho). \tag{10}$$

By $S(R) = 1 - F(\hat{L}(R))$, $\hat{L}(R) = \rho R$, and Assumption 2, this condition is equivalent to

$$\frac{f(\hat{L}(R)) \cdot \hat{L}(R)}{1 - F(\hat{L}(R))} > \frac{\pi_R(R; \rho) \cdot R}{\pi(R; \rho) - D} \tag{11}$$

and, by $\epsilon > \bar{\epsilon}$, this condition holds. Therefore, the Center's expected payoff is strictly decreasing over $R \in (\underline{R}, \bar{R})$. Therefore, the optimal choice $R^* \in [0, \underline{R}]$ must hold. The proposition then follows. □

Figure 3 illustrates the intuition of Proposition 3 for the case where the status quo payoff increases with corruption ($\pi_R(R; \rho) > 0$) over $R \in \big[0, \bar{R}\big]$. Under Assumptions 2 and

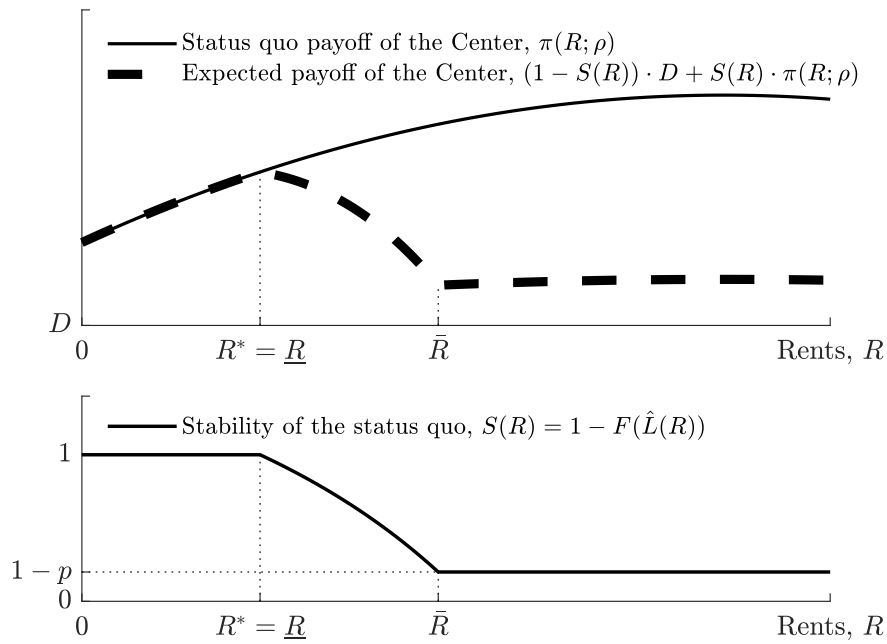


Figure 3: Center's choice of corruption tolerance (R^*) in Scenario 1 given crisis risk fat-tailed ($\epsilon > \bar{\epsilon}$) and status quo payoff increasing ($\pi_R(R;\rho) > 0$) over $R \in \left[0, \bar{R}\right]$

3, the Center will prefer to avoid a total loss of crisis control, which means it will never tolerate corruption without limit (i.e. $R^* \leq \bar{R}$). The key trade-off is that higher corruption tolerance raises the status quo payoff while weakening control in a crisis. When the crisis risk distribution is sufficiently fat-tailed or thick-ended ($\epsilon > \bar{\epsilon}$), a severe crisis is sufficiently likely on the margin, so the gain from any additional control by lowering the corruption tolerance will always dominate the marginal sacrifice in the status quo payoff. Therefore, the Center will prefer to secure perfect control first ($R^* \leq \underline{R}$). Given that, the Center will tolerate corruption as much as possible to raise the status quo payoff, without sacrificing any control ($R^* \in [0, \underline{R}]$).

For the case where the status quo payoff does not always increase with corruption ($\pi_R(R;\rho) > 0$ not always true) over $R \in \left[0, \bar{R}\right]$, the condition of fat-tailed risk of crisis suffices to guarantee any additional control to dominate the marginal sacrifice, if any, in the status quo payoff, so that the Center will still prefer to secure perfect control first. The Center will then choose the corruption tolerance that maximizes the status quo payoff within the perfect-control range ($R^* \leq \underline{R}$).

Remarks. Before moving to comparative statics, we would like to make a few remarks on this result of the endogenous lexicographic rule. First, it is *lexicographic,* since it specifies that the Center foremost maximizes control in crises; given that perfect control is secured, the Center then adjusts the corruption tolerance to maximize the status quo payoff.

Second, it is a decision *rule,* not a *preference* between power, on the one hand, and the economic payoff in the status quo, on the other hand. In our model, there is only one thing that matters in the Center's preference, which is the payoff. Power, control, and authority have no intrinsic value to the Center; instead, they only have instrumental value because they can increase the Center's expected payoff.

Third, it is *endogenous*, different from the assumption of "power first" as an *axiom* for political agents and organizations (e.g., Downs, 1957; Roemer, 1985; Svolik, 2009). Instead, our model endogenizes this assumption with a consequentialist justification.

Fourth, the key condition for the endogenous lexicographic rule is the fat-tailed condition $\epsilon > \bar{\epsilon}$. Indeed, the following result shows that unsecured control will be optimal if the risk of crisis is instead sufficiently thin-tailed; it is exactly because the marginal sacrifice in the status quo payoff will dominate the marginal gain of better control in crises:

Proposition 4 (Unsecured control under thin-tailed risk)**.** *Under the same assumptions as in Proposition 3, if the risk of crisis is instead sufficiently thin-tailed, then the Center's optimal corruption tolerance will risk control in crises. Mathematically, assume* $x - w \leq 0$ *and* $\pi_R(R;\rho) > 0$ *over* $R \in [0, \underline{R}]$*. If there exists* $\underline{R}' \in (\underline{R}, \bar{R})$ *such that, for any* $L \in (\underline{L}, \rho\underline{R}')$*,*

$$\epsilon < \underline{\epsilon} \equiv \min_{R \in [\underline{R}, \underline{R}']} \frac{\pi_R(R;\rho) \cdot R}{\pi(R;\rho) - D}, \tag{12}$$

then the Center's optimal choice $R^* \in [\underline{R}', \bar{R})$*, which implies* $R^* > \underline{R}$ *and* $S(R^*) < 1$*.*

Proof. By Assumptions 2 and 3, $R = \underline{R}$ dominates any $R \geq \bar{R}$. By $\pi_R(R;\rho) > 0$ over $R \in [0, \underline{R}]$, $R = \underline{R}$ dominates any $R \in [0, \underline{R})$. Therefore, $R = \underline{R}$ dominates any $R \in [0, \underline{R}) \cup [\bar{R}, \infty)$. Seen in the proof of Proposition 3, by $\epsilon < \underline{\epsilon}$ for any $L \in (\underline{L}, \rho\underline{R}')$, the Center's expected payoff is strictly increasing over $R \in [\underline{R}, \underline{R}']$. Then any $R \in [0, \underline{R}') \cup [\bar{R}, \infty)$ cannot be the optimal choice. The proposition then follows. □

Finally, the fat-tailed condition $\epsilon \equiv L \cdot f(L)/(1 - F(L)) > \bar{\epsilon}$ is hardly controversial and arguably general. It suggests that the Center's perceived probability of extremely bad situations does not decrease too quickly. This is consistent with the etymology of the word *crisis* – it comes from the Greek word *κρίσις,* which means *decision,* and describes "a state of affairs in which a decisive change for ... worse is imminent" (OED2, 1989); it is consistent with the notion that "crises are difficult to learn about because they are by definition infrequent, low-probability events" (Taylor, 2009, p. 1243), often described by practitioners of power as "black swans" (e.g., Xi in People's Daily, 2019); it is also consistent with the common approach to modeling crises in the literature across disciplines (e.g., Burroughs

and Tebbens, 2001; Aban et al., 2006; Barro, 2006; Resnick, 2007; Taleb, 2007; Bremmer and Keat, 2009; Taylor, 2009; Weitzman, 2009, 2011; Barro and Jin, 2011; Pindyck, 2011; Nakamura et al., 2013; Cooke et al., 2014; Ackerman, 2017).[12] Therefore, one can argue that, under sufficiently strong fiscal capacity as in Scenario 1 (no retention problem), the endogenous lexicographic rule is quite general.

Comparative statics. We now turn to comparative statics of Proposition 3. We focus on the case where $\pi_R(R;\rho) > 0$, i.e. the Center's rent-seeking motive dominates or corruption "greases the wheels of the economy" so much that higher corruption raises the Center's status quo payoff, making the comparative statics more clear-cut:

Corollary 1 (Comparative statics)**.** *Under the same assumptions as in Proposition 3, if $\pi_R(R;\rho) > 0$ over $R \in [0, \underline{R}]$ so that $R^* = \underline{R} = \underline{L}/\rho$, then R^* will increase with $\underline{L}$ and decrease with ρ.*

Corollary 1 can help us understand corruption in authoritarian regimes where cronyism and rent-seeking dominate in the economy and politics and when the Center does not face difficult retention problems about the affiliates in the state apparatus. A few important implications follow:

Impact of additional risk of crisis. Corollary 1 first implies that the Center will crack down on corruption to cover any additional risk of crisis (a lower $\underline{L}$). This helps explain a few anti-corruption campaigns in reality. For example, if we understand the Chinese economy as in Bai et al. (2014, 2020) and Li et al. (2019) where corruption "greases the wheels," Corollary 1 is consistent with the Communist Party of China's narrative that "the major risks in the political, ideological, economic, scientific and technological, social, international-relation, and party-building realms" faced by the party was one of the primary motives behind the anti-corruption campaign since 2012 (e.g., Xi, 2017; People's Daily, 2019). Jiang and Xu (2015) recognize that between 1988 and 2014 "[a]nticorruption enforcement [was] tightened in years when there were significant economic/political events that have, or could have instigated considerable popular unrest." They also provide time-series evidence that higher intensity of anti-corruption enforcement was correlated with lower economic growth and higher inflation in the previous year, which they interpret as signs of greater social pressure and higher risk of political instability. All these observations are consistent with

[12] The measure we use for the tail fatness or end thickness, i.e., $\epsilon \equiv L \cdot f(L)/(1 - F(L))$, is asymptotically equivalent to the tail index in the literature (e.g., Cooke et al., 2014, p. 2) and can also apply to the finite case (e.g., Aban et al., 2006).

Corollary 1.[13]

As another example, in Brezhnev's Soviet Union, corruption "in many cases ... [was] necessary for even the meagre levels of growth enjoyed by the state economy" (Clark, 1993, p. 278). When Moscow faced increasing economic, social, and demographic challenges in the post-Brezhnev era (Staples, 1993), however, Yuri Andropov cracked down on corruption in the Central Asian republics as "a bid ... to recapture maverick party and state organs in the republics from partial control" (Critchlow, 1988, p. 142), also consistent with Corollary 1.[14]

The paradoxical role of the Center's share of corruption rents. Second, Corollary 1 focuses on another important parameter in the model – the rent-sharing arrangement ρ. As discussed, a higher ρ proxies a more corrupt Center and a more dominant Center in the central–local relationship in the status quo. Its role in the Center's political–economic trade-off can be counterintuitive, however. On the one hand, although not modeled explicitly, the more dominant the Center is (higher ρ), the more rents it can reap from the local official (higher ρR), and the higher the status quo payoff of the Center. On the other hand, our analysis of Stage 3 shows that precisely because the Center can reap more rents from the local official (higher ρR), the local official has more vested interests to secure in a crisis. The local official is more likely to defy the Center and end the status quo (higher $F(\hat{L}(R))$ and lower $S(R)$), and the Center has to control local corruption more tightly to secure perfect control (lower $\underline{R}$). Therefore, this paradoxical role of ρ presents a fundamental conflict between crisis control and payoffs in normal times:

> The Center's weakness in a crisis comes precisely from its share of rents under the status quo, while lower rent-sharing in the status quo helps bring the hierarchy under control in a crisis.

Facing this fundamental conflict, Corollary 1 suggests that, as long as the Center's status quo payoff increases with local corruption, since the Center will always tolerate corruption to the perfect-control limit, a more corrupt or dominant Center under the status quo will tolerate less corruption of local officials.

Given this result, what would the Center do, if it could choose not only R but also ρ? Here we provide a result when local corruption "greases the wheels" of the economy:

[13] For more theoretical and empirical analyses on the motivations behind Xi's anti-corruption campaign, see for example Francois et al. (2016), Lu and Lorentzen (2018), Xi et al. (2018), and Li et al. (2019).

[14] In the Russian context, Shlapentokh (2013) also discusses that, when situations were tightened during the Russo–Japanese War, the Russia Empire cracked down on corruption within the state and "drastically increased the punishment for bribing."

Corollary 2. *Under the same assumptions as in Proposition 3 and assuming* $\pi(R;\rho) \equiv y(R) + \rho R$ *over* $R \in [0, \underline{R}]$ *with* $y'(R) > 0$*, the Center's optimal choice of the rent-sharing arrangement is* $\rho^* = \varrho > 0$*, where* ϱ *is infinitesimal.*

Proof. First note that $\pi(R;\rho) \equiv y(R) + \rho R$ and $y'(R) > 0$ suggest $\pi_R(R;\rho) = y'(R) + \rho > 0$. Proposition 3 then suggests that, given $\rho > 0$, the optimal choice of $R^* = \underline{R} = \underline{L}/\rho$, securing control in crises. Given this choice, the Center is then maximizing $\pi(R^*;\rho) = y\left(\underline{L}/\rho\right) + \underline{L}$ by choosing $\rho \in (0,1)$. Given $y'(R) > 0$, the Center would then like to maximize $\underline{L}/\rho$. The result then follows. □

The intuition of Corollary 2 is as follows. If corruption "greases the wheels" of the economy, then the Center's status quo payoff will increase with corruption, which leads to an optimal choice of corruption tolerance that is always just what is needed to secure crisis control. This corruption tolerance suggests that the rents that the Center can reap are limited to exactly $\underline{L}$, so that the Center maximizes its expected payoff as if it maximizes only the economic performance. To do that, the Center should choose a sharing scheme to tolerate corruption as much as possible. The Center then prefers to discipline itself and to decentralize corruption: this would allow more corruption at the local level, simultaneously maximizing the Center's status quo payoff and securing perfect control in case of a crisis.

Complementarity between personalistic rule and corruption. Finally, Corollary 1 can shed light on the relationship between personalistic rule and corruption. In recent years the world has seen a rising trend of personalistic regimes (e.g., Kendall-Taylor et al., 2017; Geddes et al., 2018). The common view is that corruption is more severe in these regimes compared to other types of non-democratic regimes and in democracies (e.g., Chang and Golden, 2010); in Appendix B, we confirm this view using cross-country panel-data that cover 134 countries between 1996 and 2010. This correlation is apparently intuitive, since a personalistic ruler often finds it less constrained or more necessary to tolerate officials' corruption in exchange for their support (e.g., Bueno de Mesquita et al., 2003; Chang and Golden, 2010).

This understanding ignores, however, a predominant feature of personalistic rule: personalistic rulers often place their personal associates, e.g., family members, close friends, and loyalists, in the state apparatus (e.g., Kendall-Taylor et al., 2017; Frantz et al., 2018; Geddes et al., 2018), and these officials who are personally tied to the ruler are usually especially corrupt.[15] As pointed out by Frantz et al. (2018, p. 4), "[s]uch personnel choices . . . link the

[15] Kendall-Taylor et al. (2017, p. 14–15) identify five indicators of personalistic rule, and the first and foremost two are to "install loyalists" and "promote family." Geddes et al. (2017, 2018) present an index

fates of those in the ... apparatus with that of the leader." Considering this, if the primary purpose of tolerating corruption is to buy support, shouldn't the ruler tolerate less, not more, corruption when the officials are personally tied or intrinsically more loyal to the ruler and, therefore, easier for the ruler to retain?

Our Corollary 1 explains the complementarity between personalistic rule and corruption. When the local official is personally tied to the ruler, the Center has arguably more personal leverage and, therefore, a stronger ability to force the local official to comply, suggesting a greater $\underline{L}$. One can also interpret ρ as the net share of rents that the local official will gain by defying, and a local official who is personally tied to the ruler can be assumed to incur an additional loss of rents when the ruler loses power, suggesting a smaller ρ.[16] As seen above, a smaller ρ suggests that any given level of corruption R becomes less corrosive to the Center's control, since ρR becomes smaller; a greater $\underline{L}$ also suggests that, given any ρR, the critical threshold of these interests for the Center to just start losing control in crises becomes higher. Both effects imply that, while still covering the worst possible crisis, the Center can now tolerate more corruption R^*. In other words, personalistic rule tolerates more corruption because corruption poses a lesser threat to personalistic rule.

3.4 Stage 1, Scenario 2 (Weaker Fiscal Capacity)

Proposition 3 in Scenario 1 predicts that the Center chooses corruption tolerance so that corruption does not threaten the Center's control at all. As discussed above, this result is quite general if one accepts the fat-tailed condition of the crisis risk. Indeed, MacMullen (2015, pref., p. 10–11) once remarked: "[a]lthough corruption has been pervasive in all times of history and even in the most powerful empires, more than often it has been under control and has not led to disastrous consequences comparable to the case of the Roman Empire."[17] That said, in many historical examples, such as those cited in the introduction, state power was not fully shielded from the corrosive effect of corruption on state power, and in "a handful of examples in human history" corruption was "as consequential as in the case of the Roman Empire" (MacMullen, 2015, pref., p. 10). Why would the Center deviate from the lexicographic rule and over-tolerate corruption?

Scenario 2 of our model helps us investigate whether fiscal capacity could play a role in the over-tolerance, since the weaker fiscal capacity in this scenario ($x - w > 0$) makes

to measure personalistic rule. The index is constructed by eight criteria, among which five concerns placing personal associates in the state apparatus.

[16] In the extension in Appendix A, this effect is explicitly modeled.

[17] MacMullen (2015, pref., p. 11, fn. 12) further discussed references on examples of historical states and empires that survived despite pervasive corruption, including Britain, India, Russia, and China. Shlapentokh (2013) discusses how the state in Imperial and Soviet Russia kept corruption under control.

retaining the local official a real challenge for the Center. In this scenario, by Proposition 2, the Center's program at Stage 1 is

$$\max_{R} \quad \big(1 - S(R)\big) \cdot D + S(R) \cdot \pi(R; \rho), \tag{13}$$

where

$$R \geq 0 \text{ and } S(R) = \mathbf{1}_{R \geq r} \cdot \Big(1 - F(\hat{L}(R))\Big), \tag{14}$$

in which

$$\hat{L}(R) = \rho R, \text{ and } r > 0 \text{ uniquely solves } X(r) = x - w. \tag{15}$$

To solve the program, first note that if the Center's choice of R cannot retain the local official, the Center will face downfall for sure. Second, by Assumption 2, we know that the Center will prefer any status quo to downfall. Third, if the local official does stay at Stage 2, the Center can for sure maintain the status quo at the end of Stage 3 if no real crisis strikes, which will happen with probability $1 - p > 0$. Therefore, the Center will prefer to retain the local official as long as it is feasible. It is indeed feasible, by Proposition 2, because the Center can always choose $R \geq r$.

Given this reasoning, the Center's program is reduced to

$$\max_{R} \quad \big(1 - S(R)\big) \cdot D + S(R) \cdot \pi(R; \rho), \tag{16}$$

where

$$R \geq r \text{ and } S(R) = 1 - F(\hat{L}(R)), \text{ in which } \hat{L}(R) = \rho R. \tag{17}$$

We then have the following result:

Proposition 5 (Retention problem likely)**.** *If a retention problem is likely, and if the risk of crisis is sufficiently fat-tailed as in Proposition 3, the Center's optimal corruption tolerance depends on its fiscal capacity:*

- *when fiscal capacity is still sufficiently strong, the Center will choose the corruption tolerance that maximizes the status quo payoff, given that both retention and crisis control are secured;*
- *when fiscal capacity is intermediate, the Center will over-tolerate corruption just enough to guarantee retention, risking some crisis control;*
- *when fiscal capacity is weak, the Center will over-tolerate corruption to guarantee retention, losing all crisis control.*

Mathematically, if $x - w > 0$, and if, for any $L \in (\underline{L}, \bar{L})$, $\epsilon > \bar{\epsilon}$, then the Center's optimal choice R^* follows:

- *when $0 < x - w < X(\underline{R})$, $R^* \in \arg\max_{R \in [r, \underline{R}]} \pi(R; \rho)$, implying $S(R^*) = 1$;*
- *when $X(\underline{R}) \leq x - w < X(\bar{r})$, $R^* = r$, implying $S(R^*) = 1 - F(\rho r) \in (1 - p, 1)$;*
- *when $x - w \geq X(\bar{r})$, $R^* \in \arg\max_{R \geq \max\{r, \bar{R}\}} \pi(R; \rho)$, implying $S(R^*) = 1 - p$,*

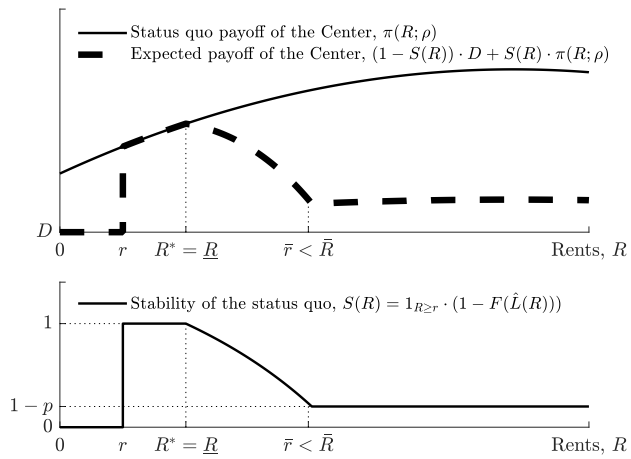
where $\bar{r} \equiv \bar{R}$, if $\pi(\bar{R}; \rho) \geq \sup_{R > \bar{R}} \pi(R; \rho)$; if otherwise, $\bar{r} \in (\underline{R}, \bar{R})$ uniquely solves

$$F(\rho \bar{r}) \cdot D + \big(1 - F(\rho \bar{r})\big) \cdot \pi(\bar{r}; \rho) = pD + (1 - p) \cdot \sup_{R > \bar{R}} \pi(R; \rho). \tag{18}$$

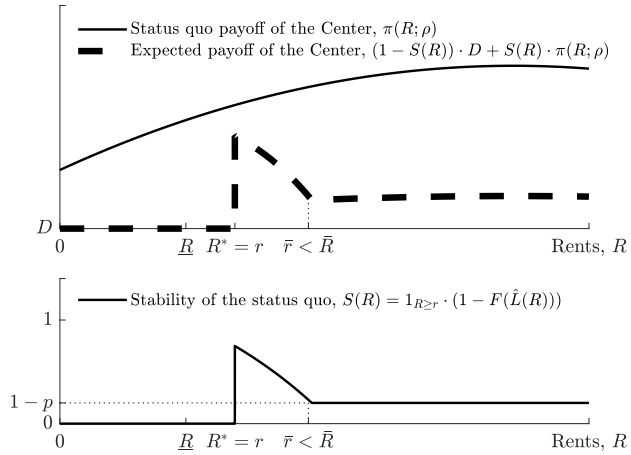
We leave the proof of Proposition 5 to Appendix C and only discuss the intuition here. Figure 4 illustrates the case where the status quo payoff increases with corruption over $R \in \big[0, \bar{R}\big]$ and $\pi(\bar{R}; \rho) < \sup_{R > \bar{R}} \pi(R; \rho)$ holds. In Panel 4a, when the state is fiscally strong ($x - w < X(\underline{R})$, i.e., $r < \underline{R}$), the optimal choice implied by the lexicographical rule in Proposition 3 is still feasible given successful retention, and it dominates any choice with even partial crisis control. By Assumption 3, this choice will dominate choices with a total loss of control, so the Center simply adopts the lexicographical rule and secures both retention and control ($R^* = \underline{R}$). In Panel 4b, given a medium fiscal capacity ($X(\underline{R}) \leq x - w < X(\bar{r})$, i.e., $r \in [\underline{R}, \bar{r})$), the optimal choice implied by the lexicographical rule in Proposition 3 would not allow to retain the local official, so the Center has to over-tolerate corruption, risking crisis control. Since the fiscal capacity is not sufficiently weak either, the Center will still prefer an over-tolerance that is just sufficient to retain the official ($R^* = r$) to any choice that would imply a total loss of crisis control. In Panel 4c, the fiscal capacity is so weak ($x - w \geq X(\bar{r})$, i.e., $r \geq \bar{r}$) that the Center has to over-tolerate corruption so much that it will not have control in any real crisis. This yields a choice $R^* \in \arg\max_{R \geq \max\{r, \bar{R}\}} \pi(R; \rho)$.

For the case where $\pi(\bar{R}; \rho) \geq \sup_{R > \bar{R}} \pi(R; \rho)$, $\bar{r}$ will be differently defined, and all the intuitions spelled out above go through. For the case where the status quo payoff does not always increase with corruption over $R \in \big[0, \bar{R}\big]$, when the state has strong fiscal capacity, it is not necessary that the Center chooses the just-perfect-control corruption tolerance level – it could choose a lower one that maximizes its status quo payoff while securing perfect control and retention. Except for this last point, all other intuitions go through.

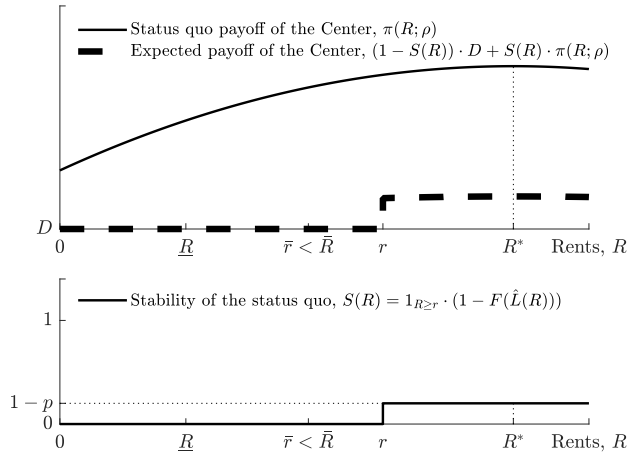
Proposition 5 suggests that when the state is fiscally too weak to sufficiently pay its officials, the Center will choose to over-tolerate corruption to retain them within the apparatus, risking loss of control in times of crisis. This link from weak fiscal capacity to over-tolerance of corruption through the retention problem has been noticed by historians. For example,



(a) Still strong fiscal capacity: $0 < x - w < X(\underline{R})$, i.e., $r < \underline{R}$



(b) Medium fiscal capacity: $X(R) \leq x - w < X(\bar{r})$, i.e., $r \in [\underline{R}, \bar{r})$



(c) Weak fiscal capacity: $x - w \geq X(\bar{r})$, i.e., $r \geq \bar{r}$

Figure 4: Center's choice of corruption tolerance (R^*) in Scenario 2 given crisis risk fat-tailed ($\epsilon > \bar{\epsilon}$), status quo payoff increasing ($\pi_R(R;\rho) > 0$) over $R \in [0, \bar{R}]$, and $\pi(\bar{R};\rho) < \sup_{R>\bar{R}} \pi(R;\rho)$

citing Huang (1974, 1981)'s works on the history of Ming China, Finer (1997b, p. 841–843) argues that, a primary reason for over-toleration of corruption in the late Ming dynasty was that "mandarins were grossly underpaid." He applies the same argument to the decay of the Qing dynasty starting from the late eighteenth century (Finer, 1997c, p. 1157–1159), supported by the data from Ch'ü (1962). Will (2004, p. 30–31) points out that this logical link dates back to the Song dynasty, about 300 years before the Ming dynasty. Beyond China, basing himself on the account by Rycaut (1668), Finer (1997c, p. 1208) shows that the fiscal difficulty–corruption channel manifested itself again during the decline of the Ottoman Empire.[18]

3.5 Two Scenarios Combined

Recall that, in Scenario 1, the Center's fiscal capacity is sufficiently strong ($x - w \leq 0$) and the Center will choose the corruption tolerance such that perfect control will be secured. Therefore, by combining Proposition 3 in Scenario 1 and Proposition 5 in Scenario 2, we have the following prediction:

Corollary 3 (Correlations in equilibrium)**.** *In equilibrium, higher political stability and less corruption are correlated only when fiscal capacity is at an intermediate level, and they are uncorrelated when fiscal capacity is either strong or weak. Mathematically, when* $X(\underline{R}) \leq x - w < X(\bar{r})$*,* $S'(R^*) < 0$*; when* $x - w < X(\underline{R})$ *or* $x - w \geq X(\bar{r})$*,* $S'(R^*) = 0$*.*

4 Corruption, Political Stability, and Fiscal Capacity in Data

When bringing the model to the data, one may want to directly test the comparative statics of our model in Corollary 1 by exploiting exogenous changes in the Center's perception of crisis risk, extent of personalistic rule, and Center–local power structure in the status quo. It is, however, difficult to locate these changes in a setting that is more general than a case study. We therefore turn to cross-country panel-data to check whether empirical patterns

[18]For more discussion on the relationship between corruption and the structure of pay and recruitment of civil service, see Rose-Ackerman and Palifka (2016, p. 168–172). On the statistical relationship between corruption and fiscal capacity, Van Rijckeghem and Weder (2001) show a negative correlation between the level of corruption and public-sector salaries relative to private-sector salaries in a cross-country data set of 31 developing countries and low-income OECD countries over the period 1982–1994; the survey by Schneider and Enste (2000) concludes that "the [statistical] relationship between the size of the shadow economy and the amount of corruption is strong and consistent, as different measures show."

are consistent with Corollary 3 summarizing the predictions for the differences in correlation between corruption and political stability across different levels of fiscal capacity.

For corruption and political stability, our main source of data is the World Bank's Worldwide Governance Indicators (WGI, Kaufmann and Kraay, 2018). These well-known data cover 214 countries and territories biannually for 1996, 1998, and 2000 and annually for 2002–2017. Detailed in Kaufmann et al. (2011), the methodology of the data construction allows the indicators to be used in cross-country and time-series comparisons.[19]

We use the WGI "control of corruption" variable to negatively proxy corruption tolerance in our model. Based on a large number of international surveys, this variable measures "perceptions of the extent to which public power is exercised for private gain" (Kaufmann et al., 2011, p. 223). A higher value indicates less corruption. This is the best cross-country data source for corruption over time.

For political stability, we first use the WGI "political stability and absence of violence/terrorism" variable. This variable captures "perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means" (Kaufmann et al., 2011, p. 223). A higher value indicates higher political stability.

To measure fiscal capacity, we first use Medina and Schneider (2018)'s estimates of the share of the formal economy of a country in its GNP for 158 countries in 1995. A higher share proxies stronger fiscal capacity. We make this choice based on the following considerations. First, given that Besley and Persson (2011) adopt an early version of these estimates (Schneider, 2002) as a primary measure of fiscal capacity in their analysis, using these updated estimates puts us in the same empirical context as Besley and Persson (2011); second, the coverage of countries in that data set can yield a balanced set of panel-data that covers as many countries as possible; finally, the year 1995 is chosen to start one year before the WGI data that starts in 1996.

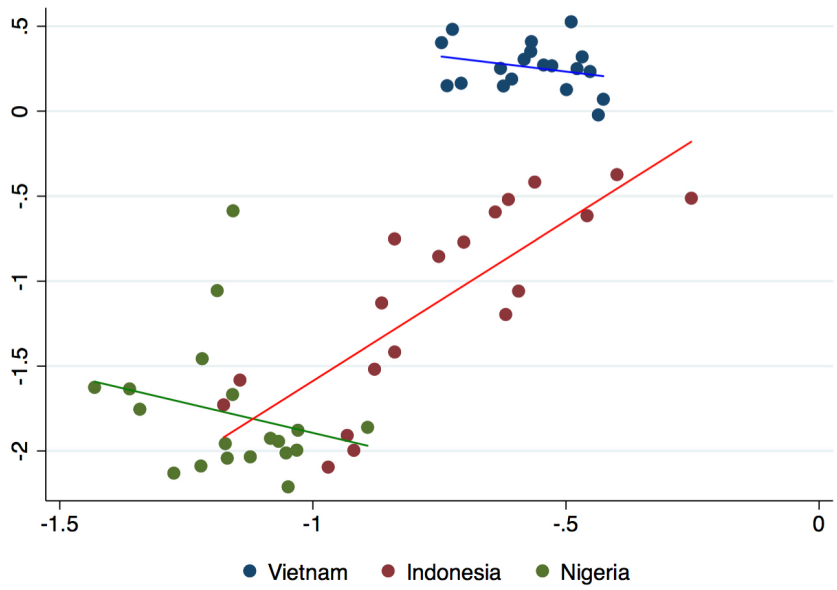
Merging all these data, we use in our benchmark empirical analysis the WGI panel-data of political stability and corruption across 155 countries over the 1996–2017 period and these countries' 1995 shares of the formal economy.[20] In later tests that address empirical concerns, we incorporate other data, including a series of control variables, alternative measures for political stability and fiscal capacity, and other country characteristics.

[19] For more details on the methodology of the data, see Kaufmann et al. (2007a,b,c, 2010a,b).

[20] For better exposition, we winsorize the merged data by excluding Georgia and Switzerland, the countries with the smallest and the largest shares of the formal economy. Georgia is an outlier: its size of the formal economy 28.05% is 2.79 times the standard deviation away from the sample mean; it also exhibits a significantly negative stability–corruption correlation, contrasting with other former USSR countries, where fiscal capacity is low and the stability–corruption correlation is insignificantly different from zero; Switzerland is excluded for symmetric winsorization.

4.1 An Illustrative Example

We start with an illustrative example based on three representative countries: Vietnam has a big formal sector, representing countries with strong fiscal capacity; Indonesia has a medium-sized formal sector, representing countries with medium fiscal capacity; Nigeria has a small formal sector, representing countries with weak fiscal capacity.[21] Figure 5 shows that a country with high fiscal capacity like Vietnam does not exhibit much correlation between corruption and political stability; for a country with low fiscal capacity like Nigeria, similarly, corruption does not correlate with stability either; it is only for a country with medium fiscal capacity like Indonesia that less corruption and higher political stability are significantly correlated. These observations are consistent with Corollary 3.



The horizontal axis indicates the WGI "control of corruption" index, where a higher value indicates less corruption. The vertical axis indicates the WGI "political stability and absence of violence/terrorism" index, where a higher value suggests higher stability. Measured by the 1995 share of the formal economy in GNP, Vietnam has a strong fiscal capacity, Indonesia has a medium fiscal capacity, and Nigeria has a weak fiscal capacity. A linear fit is shown for each country.

Figure 5: Political stability and corruption, three countries, 1996–2017

[21] Vietnam, Indonesia, and Nigeria rank the 33rd, 38th, and 153rd among 155 countries, respectively in terms of size of the formal sector.

4.2 Main Empirical Result

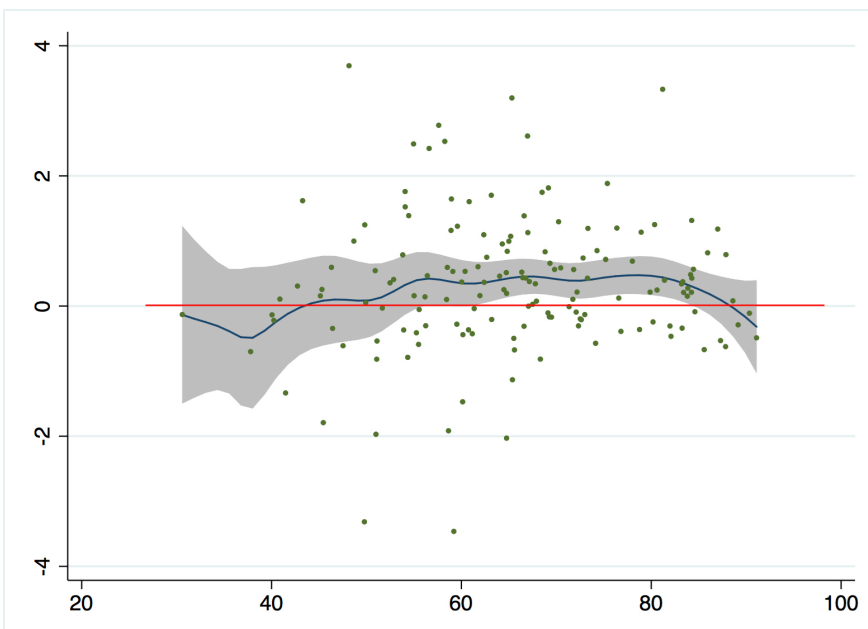
We now go beyond this illustrative example and test more formally Corollary 3. We first run the following regression for each country:

$$\text{Political Stability}_{it} = \beta_i \cdot \text{Corruption Control}_{it} + \delta_i + u_{it}, \tag{19}$$

where Political Stability$_{it}$ is country i's WGI "political stability and absence of violence/terrorism" index in year t, Corruption Control$_{it}$ is the WGI "control of corruption" index, δ_i is the country-fixed effect, and u_{it} is the error term. We then estimate

$$\hat{\beta}_i = h(\text{Fiscal Capacity}_i) + v_i, \tag{20}$$

where $\hat{\beta}_i$ is the estimate of β_i in Equation (19), $h(\cdot)$ has a flexible, non-parametric specification, Fiscal Capacity$_i$ is country i's 1995 share of the formal economy in GNP, and v_i is the error term. The non-parametric estimation follows Robinson (1988) and Verardi and Debarsy (2012).



The horizontal axis indicates fiscal capacity, measured by the 1995 share of the formal economy in GNP. The vertical axis indicates the estimate of β_i in Equation (19). Each dot represents a country; the blue line plots the prediction of $\hat{\beta}_i$ in Equation (20) as a function of fiscal capacity; the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 6: Correlation between control of corruption and higher political stability as a function of fiscal capacity, 1996–2017

Figure 6 shows the result. In the figure, the predicted within-country correlation between

control of corruption and higher political stability is statistically significant and positive only when the country has medium fiscal capacity, while it is statistically insignificant when fiscal capacity is either weak or strong. This is consistent with Corollary 3.

4.3 Tests Addressing Empirical Concerns

4.3.1 Omitted Variables

One of the first concerns about our main empirical result is that the result could be driven by omitted variables. To address this concern, we first borrow Besley and Persson (2011)'s conceptual framework of fiscal capacity and control for four variables that Besley and Persson (2011, Fig. 1.7) list as affecting fiscal capacity while not being affected by it: common versus redistributive interests, cohesiveness of political institutions, aid independence, and competitiveness of executive recruitment, which we call the Besley and Persson (2011) controls. To do so, following the regressions of Equation (19), we estimate instead

$$\hat{\beta}_i = h(\text{Fiscal Capacity}_i) + \chi \cdot \text{B–P Controls}_i + v_i, \tag{21}$$

where B–P Controls$_i$ are six variables that Besley and Persson (2011) use to proxy the four Besley and Persson (2011) controls, including the proportion of years in external conflict up to 2000 and ethnic fractionalization; average executive constraints up to 2000 and high executive constraints; aid/GDP ratio; and average non-open executive recruitment up to 2000, respectively.[22]

We further control for all six WGI indicators, i.e., "voice and accountability," "political stability," "government effectiveness," "regulatory quality," "rule of law," and "control of corruption." To do so, we estimate

$$\hat{\beta}_i = h(\text{Fiscal Capacity}_i) + \chi \cdot \text{B–P–WGI Controls}_i + v_i, \tag{22}$$

where B–P–WGI Controls$_i$ are the Besley and Persson (2011) controls plus the six 1996–2017 country-averages of the WGI indicators, 12 control variables in total.

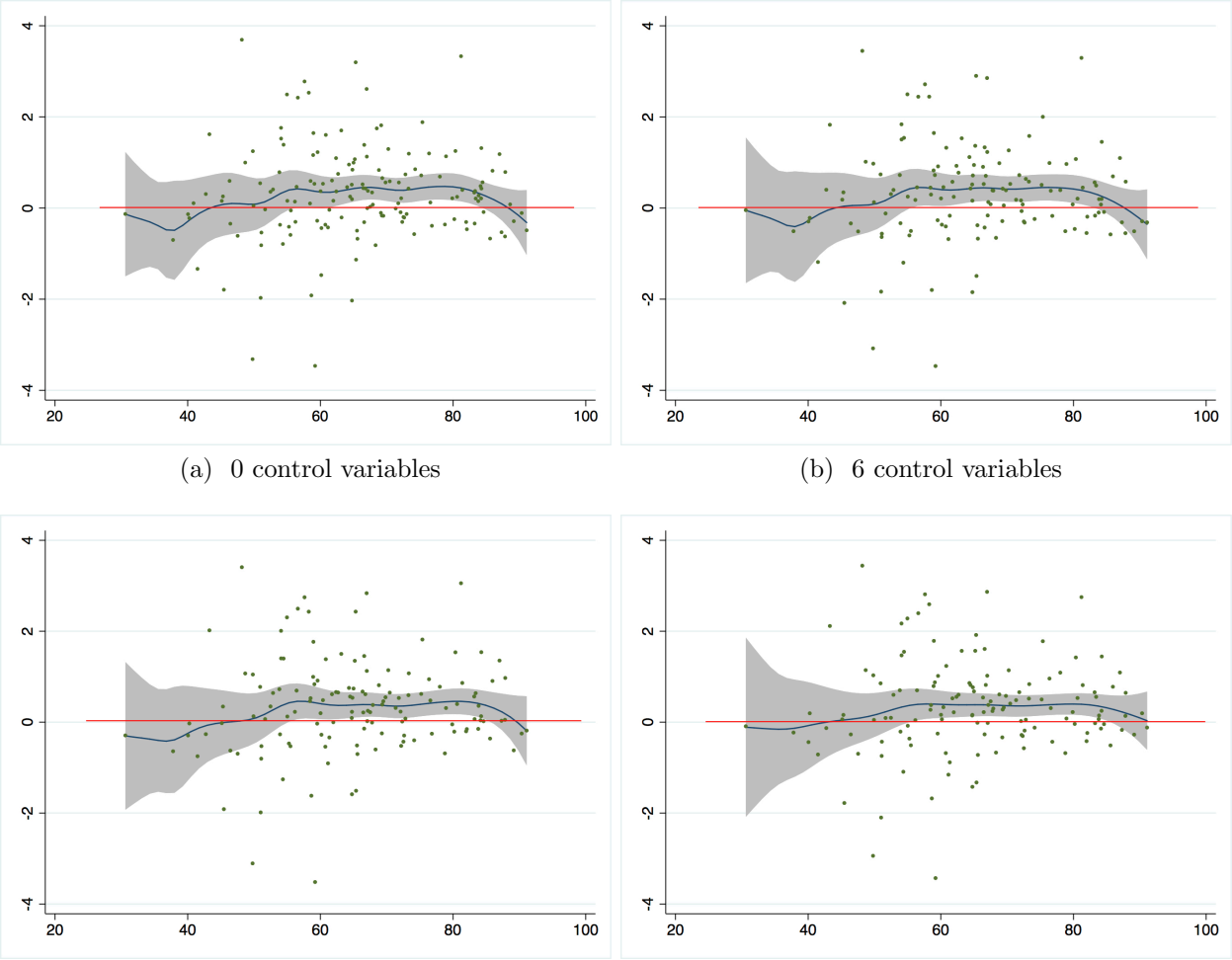
Finally, since our main result depicts a non-monotonic relationship between fiscal capacity and the corruption–stability correlation, we further control for the square terms of all the Besley and Persson (2011) and WGI controls. To do so, we estimate

$$\hat{\beta}_i = h(\text{Fiscal Capacity}_i) + \chi \cdot \text{B–P–WGI Controls and Squares}_i + v_i, \tag{23}$$

[22]For the sources of these data, see Besley and Persson (2011).

where B–P–WGI Controls and Squares$_i$ are all the Besley and Persson (2011) and WGI controls plus all their square terms, 24 control variables in total.

Figure 7a replicates Figure 6, where we do not control for any variables; Figures 7b–7d plot the results as we add the control variables in the three steps indicated above. From Figure 7a to 7d, i.e., from zero to 24 control variables, our main empirical result is always robust. The predicted correlation between less corruption and higher stability is significantly positive only when fiscal capacity is at the medium level, while insignificantly different from zero when fiscal capacity is strong or weak.



(a) 0 control variables

(b) 6 control variables

(c) 12 control variables

(d) 24 control variables

From (a) to (d), each panel plots the result of Equation (20), (21), (22), or (23), respectively. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1995 share of the formal economy in GNP; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in the respective regression; the blue line plots the prediction of $h(\cdot)$ in the respective regression and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 7: Correlation between control of corruption and higher political stability as a function of fiscal capacity, 1996–2017, from no control variables to 24 control variables

4.3.2 Within-country Variation in the Political Stability Measure Given Strong or Weak Fiscal Capacity

Another possible concern about our main empirical result is that the lack of correlation between corruption and political stability given strong or weak fiscal capacity could be driven by a lack of within-country variation in political stability. To address this concern, we implement a placebo test: for each country, instead of Equation (19), we estimate

$$\text{Political Stability}_{it} = \beta_i \cdot Z_{it} + \delta_i + u_{it}, \tag{24}$$

where Z_{it} is a different variable from Corruption Control$_{it}$; we then use the estimates of β_i in Equation (24) to estimate Equations (20)–(23). If there exists Z_{it} such that the predicted β_i is significantly different from zero at strong or weak fiscal capacity, we can then argue that the lack of within-country correlation between corruption and political stability at certain levels of fiscal capacity is unlikely to be driven by a lack of within-country variation in the political stability measure.

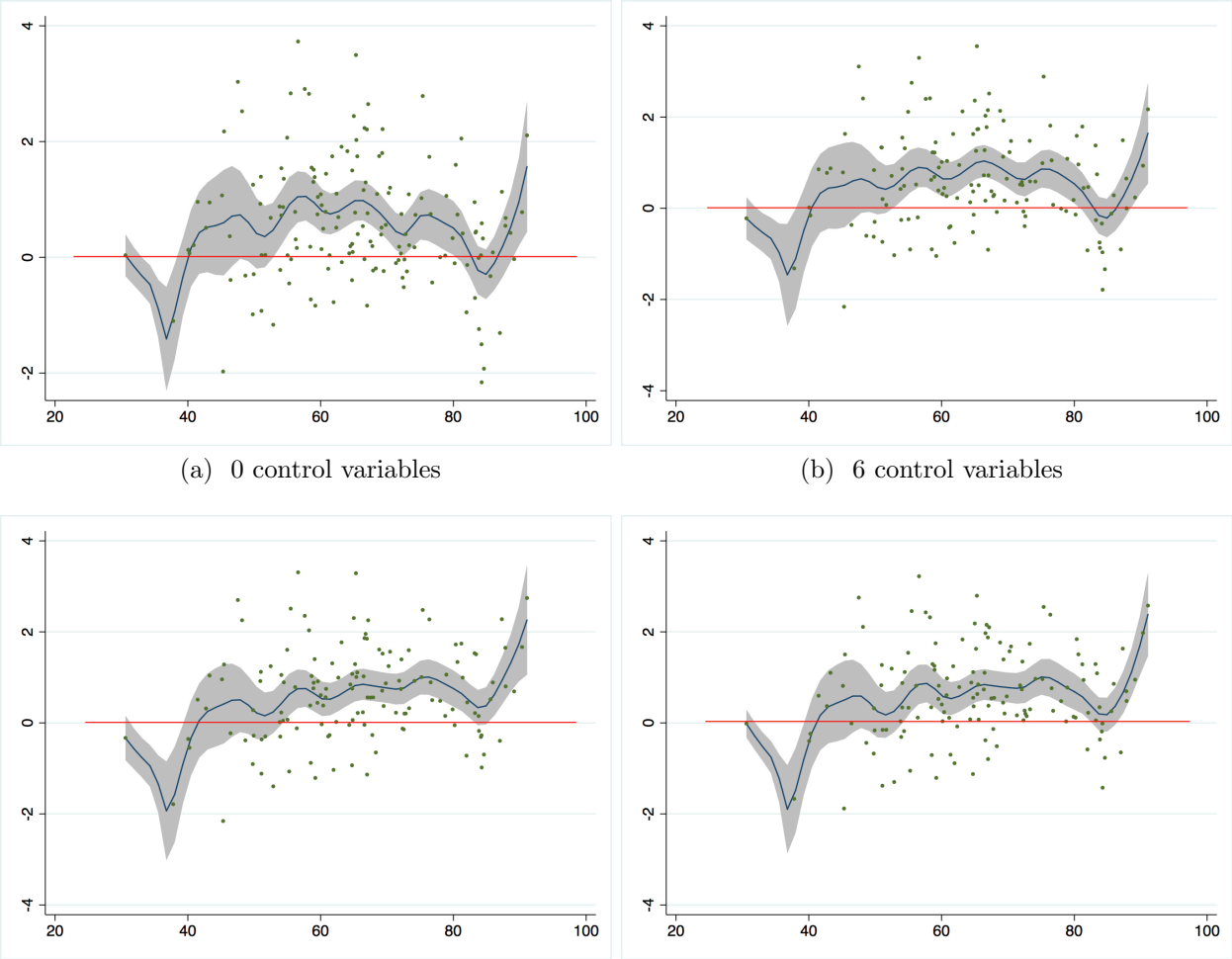
Figure 8 shows an example of the placebo test, in which Z_{it} is the WGI "rule of law" variable. In all the panels, the within-country correlation between political stability and Z_{it} is significantly different from zero at the higher and lower ends of fiscal capacity. This suggests that our main empirical result is unlikely to be driven by a lack of within-country variation in the political stability measure at both ends of fiscal capacity.

4.3.3 Alternative Measure of Political Stability

As one may be worried that the WGI "political stability" variable is defined rather broadly, we now proxy political instability by counts of irregular turnovers of governmental leaders up to 2014 in the well-known Archigos dataset (Goemans et al., 2015), where "irregular" means that "the leader was removed in contravention of explicit rules and established conventions" (Goemans et al., 2009, p. 273).

As the first look at the data, Figure 9 plots the moving average of frequencies of irregular turnovers across different levels of fiscal capacity. We see that countries whose formal economy share is greater than 75% are completely immune to irregular turnovers, while the other countries are not. This pattern is consistent with the key idea of our model: a country with sufficiently strong fiscal capacity will be able to manage corruption in a way to achieve perfect control.

As shown in Figure 9, irregular turnovers are such rare events that we cannot obtain



(a) 0 control variables

(b) 6 control variables

(c) 12 control variables

(d) 24 control variables

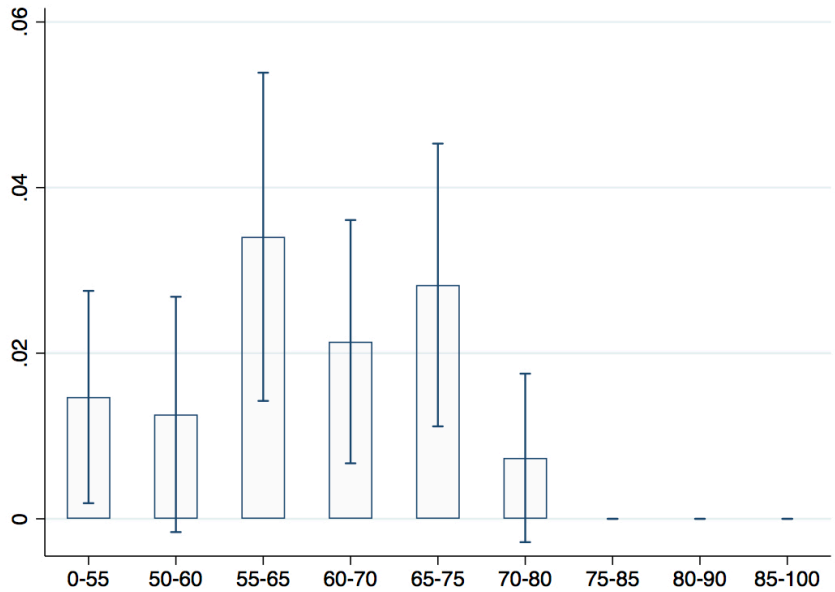
From (a) to (d), each panel plots the result of Equation (20), (21), (22), or (23), respectively, with $\hat{\beta}_i$ from Equation (24), where Z_{it} is the WGI "rule of law" variable. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1995 share of the formal economy in GNP; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i)+v_i$ in the respective regression; the blue line plots the prediction of $h(\cdot)$ in the respective regression and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 8: Placebo test: Correlation between stronger rule of law and higher political stability as a function of fiscal capacity, 1996–2017

estimates of β_i in Equation (19) for most countries. We then estimate instead

$$\text{Irregular Exits}_{it} = \sum_k \beta_k \cdot \text{Corruption Control}_{i,t-1} \cdot \text{Capacity Group}_i^k + \delta_i + \gamma_t + u_{it} \quad (25)$$

using the panel-data, where Irregular Exits_{it} is the number of irregular exits in country i in year t; we use the lagged variable of corruption control, considering that the WGI corruption data in the year of irregular turnovers could be less indicative because of political turmoil;



The horizontal axis indicates levels of fiscal capacity, measured by the 1995 share of the formal economy in GNP. The vertical axis indicates the group average of frequencies of irregular turnovers at the top leadership level. The 95% heteroskedasticity-robust confidence intervals of the estimates are plotted.

Figure 9: Average of frequencies of irregular turnovers of the top leadership (times per country-year) across different levels of fiscal capacity, 1996–2014

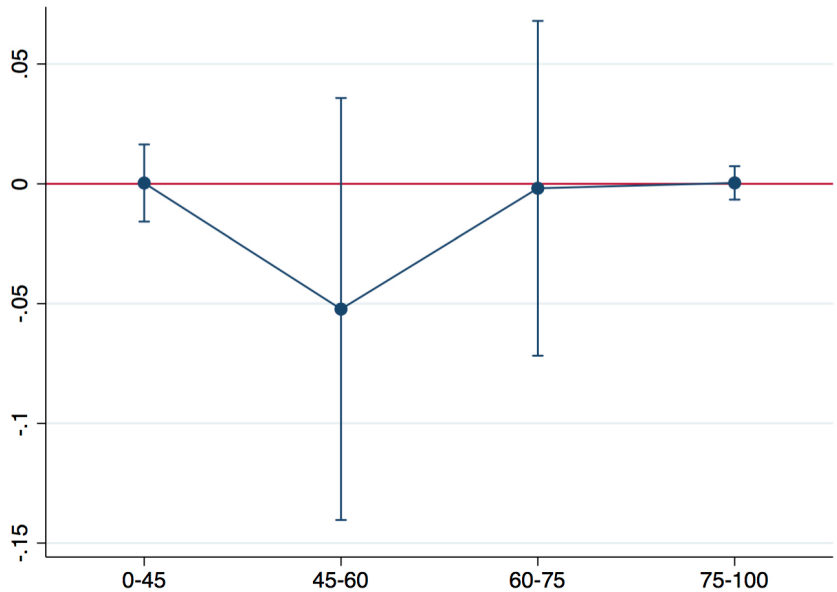
Capacity Group$_i^k$ is a dummy variable that is equal to one if country i's fiscal capacity is in group k; γ_t is the year-fixed effect.

Figure 10 reports the result of regressing Equation (25) when we partition the countries into four fiscal capacity groups. The point estimates of the correlation between irregular turnovers and control of corruption are almost exactly zero for the groups of weak, medium-strong, and strong fiscal capacity; although not statistically precisely estimated, the point estimate of the correlation for the group of medium-weak fiscal capacity is much more negative than the other three. This observation is consistent with Corollary 3 and our main empirical result.

4.3.4 Alternative Measures of Fiscal Capacity

To test how sensitive our main empirical result is to our use of the size of the formal sector to measure fiscal capacity, we examine two alternative measures of fiscal capacity.

Tax revenue/GDP ratio. First, we use instead Besley and Persson (2011)'s data of the 1999 tax revenue/GDP ratio of the countries from Baunsgaard and Keen (2005), where a higher ratio indicates stronger fiscal capacity. When doing so, after regressing Equation (19)



The horizontal axes indicate levels of fiscal capacity, measured by the 1995 share of the formal economy in GNP. The vertical axis indicates the estimates of β_k in Equation (25). Standard errors are clustered at the country level in the regression. The 95% heteroskedasticity-robust confidence intervals of the estimates are plotted.

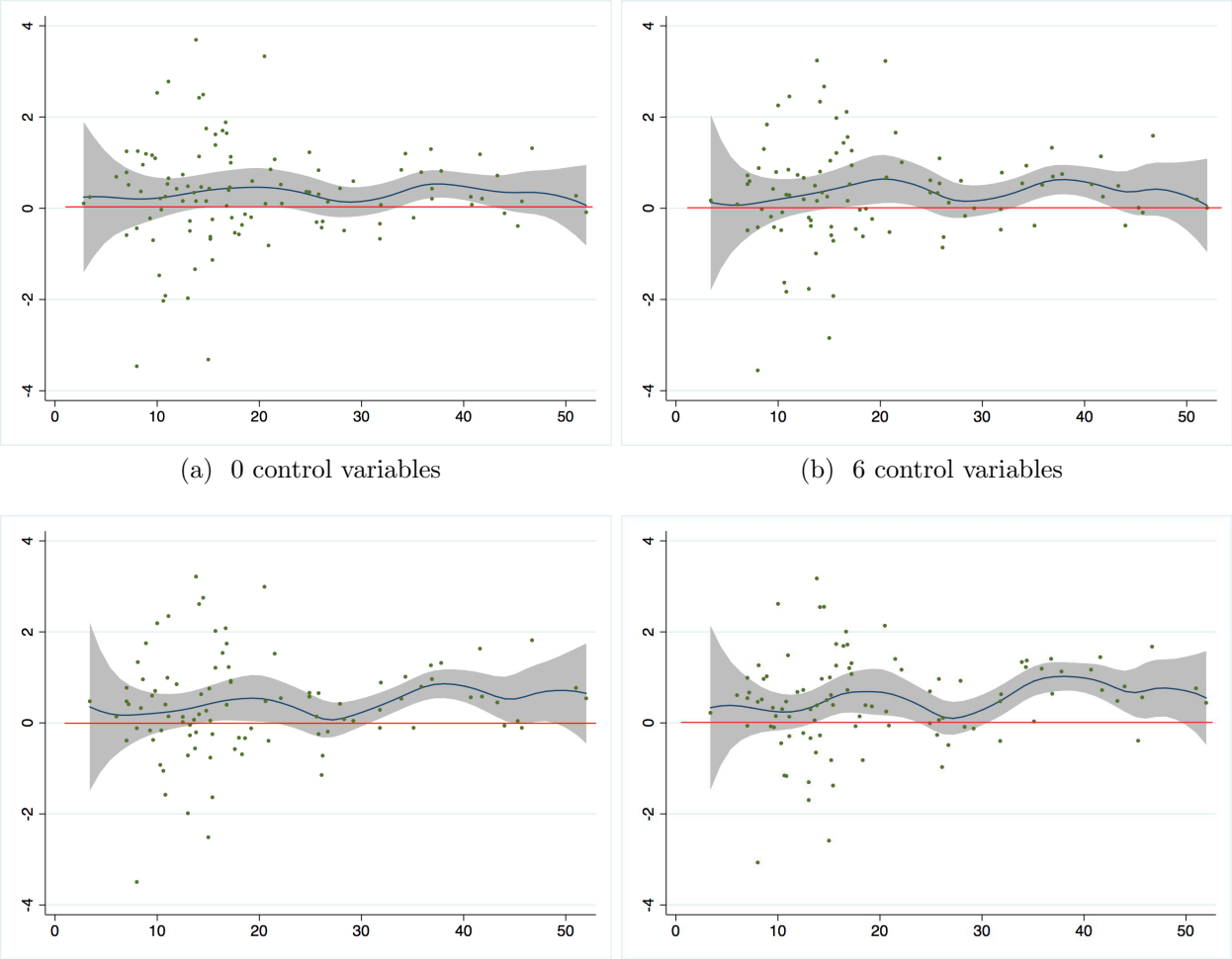
Figure 10: Correlation between control of corruption and irregular turnovers across different levels of fiscal capacity, 1996–2014

for each country, we estimate Equations (20)–(23) while using this alternative measure of fiscal capacity.

Figure 11 shows the results: the predicted correlation is still insignificantly different from zero when the tax revenue/GDP ratio is sufficiently high or low, and the predicted correlation is still generally significantly positive at the medium level of the ratio, except for a slight dip into the insignificant area when the tax revenue/GDP ratio is slightly lower than 30%. This pattern is mostly consistent with our main empirical result.

Formal economy size/GDP per capita ratio. Second, a specific concern about our fiscal capacity measure is that the state's ability to retain local officials without allowing corruption, i.e., the fiscal capacity in our model, might depend not only on the size of the formal economy, but also on the officials' outside options, which in turn depend on the level of economic development, while our fiscal capacity measure would not be able to capture this part. To address this concern, we consider two reduced-formed relationships

$$w_i = \ln\left(\alpha_w \cdot \text{Formal Economy Size}_i\right) \text{ and } x_i = \ln\left(\alpha_x \cdot \ln\left(\text{GDP per capita}_i\right)\right), \tag{26}$$



(a) 0 control variables

(b) 6 control variables

(c) 12 control variables

(d) 24 control variables

From (a) to (d), each panel plots the result of Equation (20), (21), (22), or (23), respectively. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1999 tax revenue/GDP ratio; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in the respective regression; the blue line plots the prediction of $h(\cdot)$ in the respective regression and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

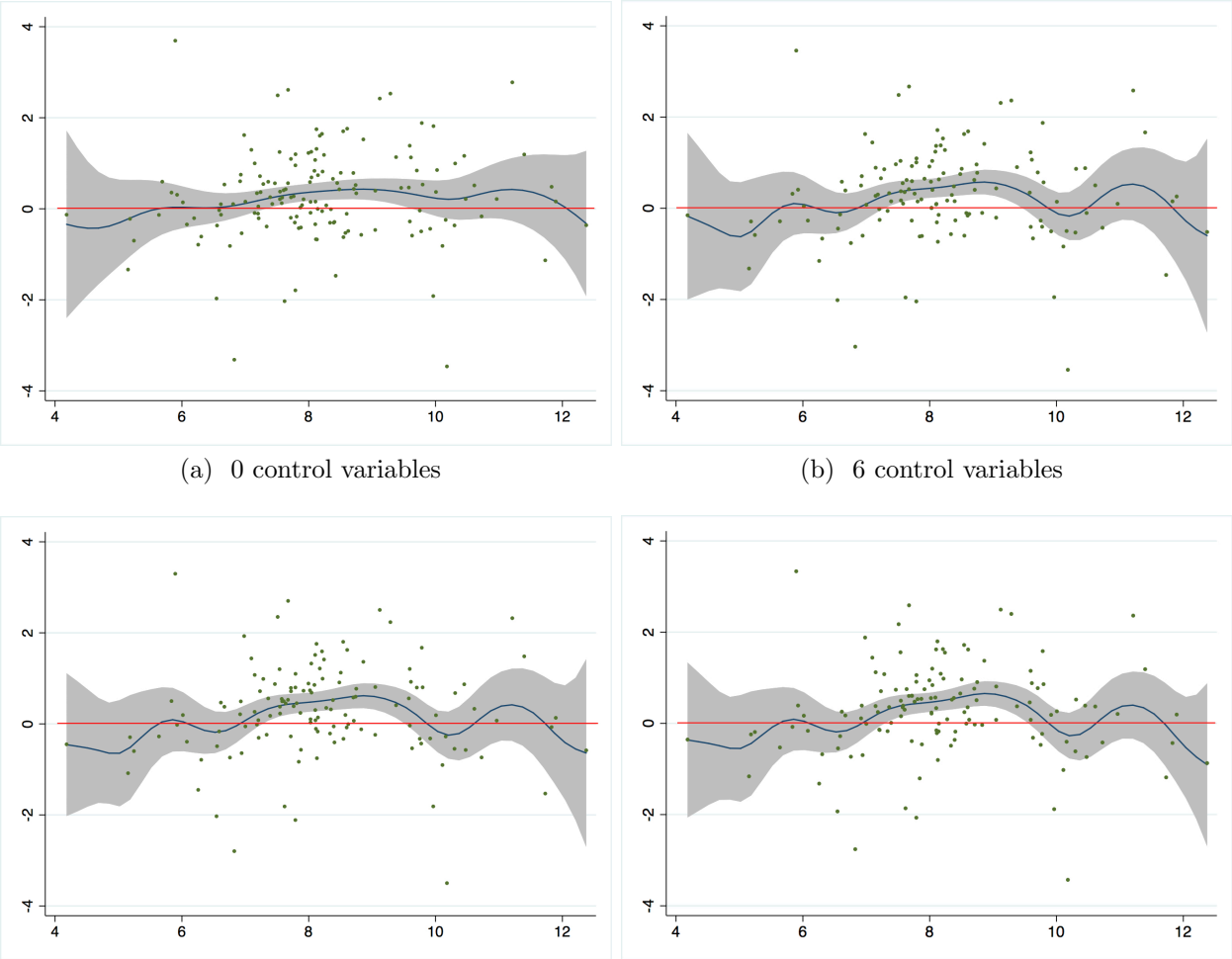
Figure 11: Correlation between control of corruption and higher political stability as a function of fiscal capacity, 1996–2017, fiscal capacity alternatively measured by the 1999 tax revenue/GDP ratio

where w_i is the salary and x_i is the reservation payoff of the local official in our model for country i; $\alpha_w > 0$ and $\alpha_x > 0$ are constants; Formal Economy Size$_i$ is the share of the formal economy of a country in its GNP in 1995, which we have used as our primary measure of fiscal capacity; GDP per capita$_i$ is purchasing power parity adjusted, in 1995, and from the

World Bank. Then the positive proxy of fiscal capacity $w_i - x_i$ in our model becomes

$$w_i - x_i = \ln\left(\frac{\alpha_w}{\alpha_x}\right) + \ln\left(\frac{\text{Formal Economy Size}_i}{\ln\left(\text{GDP per capita}_i\right)}\right). \tag{27}$$

We can then use Formal Economy Size$_i$/ ln (GDP per capita$_i$) as an alternative measure of fiscal capacity when regressing Equations (20)–(23) after regressing Equation (19).



(a) 0 control variables

(b) 6 control variables

(c) 12 control variables

(d) 24 control variables

From (a) to (d), each panel plots the result of Equation (20), (21), (22), or (23), respectively. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1995 ratio between the size of the formal economy and the logarithm of GDP per capita; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in the respective regression; the blue line plots the prediction of $h(\cdot)$ in the respective regression and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 12: Correlation between control of corruption and higher political stability as a function of fiscal capacity, 1996–2017, fiscal capacity alternatively measured by the 1995 formal economy size/GDP per capita ratio

Figure 12 reports the results, showing the same pattern as in Figures 6 and 7: the less corruption–higher stability correlation is significantly positive only when fiscal capacity is at the medium level, and it is insignificantly different from zero when fiscal capacity is either strong or weak. This is consistent with our main empirical result and Corollary 3.

5 Conclusion

Motivated by historical observations, we focus in this paper on the corrosive effect of corruption on power within the state apparatus. We build a model to analyze its implications and how fiscal capacity could play a role in the implications. We demonstrate that the head of the state apparatus can face a fundamental political–economic trade-off when deciding how much corruption to tolerate at the lower level in the hierarchy: more corruption can raise the Center's economic payoff in the status quo while threatening its control over the state apparatus during crises.

Our model shows that a fat-tailed risk of crisis implies an endogenous lexicographic rule that the Center should follow when choosing corruption tolerance, implying perfect control in crises. Comparative statics further sheds light on the impact of additional crisis risk on corruption control, the complementarity between personalistic rule and corruption, and implications of corruption within the Center and the dominance of the Center in the status quo. This lexicographic rule is, however, not always feasible, and weak fiscal capacity can be a major reason behind the over-tolerance of corruption.

Our model primarily predicts that political stability and corruption are negatively correlated only at a medium level of fiscal capacity. Recent cross-country panel-data support this prediction.

Our analysis displays a close relationship between the *economic* dimension of state capacity in *normal times,* for example, the state's ability to extract revenue from the population, reap rents from its affiliates, and properly pay these affiliates, and the *political* dimension of state capacity during *states of exception,* which requires absolute compliance of the state apparatus to respond to crises. Corruption is at the core of this relationship.

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Appendix

A Endogenous Enforcement of the Status Quo

We can extend Stage 3 of our model by introducing a second component in the Center's ability to enforce the status quo that is endogenous to corruption R. We model it as $sR \geq 0$, representing the rents that the local official will eventually lose after he defies the Center. This component can either be a punishment from the Center or some collateral damage. The share $s \in [0, 1]$ is assumed exogenous, so sR is exogenous at Stage 3; since R is eventually determined by the Center at Stage 1, sR is eventually endogenous in the model. The total loss that the local official will bear in case of defiance is then $L + sR > 0$. The defiance condition for the official then becomes $w + (1 - \rho)R \leq w + (1 - s)R - L$, i.e., $L \leq (\rho - s)R \equiv \hat{L}(R)$.

Following this extension, all results from the model will hold, with ρ replaced by $\rho - s$, as long as we assume that the share of the rents that the local official will lose in case of his defiance and the ending of the status quo is relatively small, i.e., $s < \rho$. Our model in the main text is a special case in which $s \equiv 0$. If $s \geq \rho$ otherwise, given $R \geq 0$ and $L > 0$, the local official would never defy in any crisis, and corruption would then have no impact on the Center's crisis control at all – the model will become trivial.

We further provide two justifications for the assumption $s < \rho$. First, if we expect the Center to lose its political power when the status quo cannot be maintained, it would then become extremely difficult for the Center to still be able to punish the local official at that time (e.g., Egorov and Sonin (2011)). This means that s can be small and even zero.

Second, given that our focus of corruption is on bribes and other exchanges of interests through relational building in the local official's jurisdiction, the local official's control over the rent generation process can be relatively independent of the status quo, and the Center can be especially weak to expropriate the rents in a crisis. The local official can then still keep most of the rents when the status quo ends, suggesting that s can be relatively small.

This second justification also links to two remarks on the interpretation of the corruption and rents in our model. First, it is less applicable to corruption such as embezzlement and diversion of public funds, because these rent-generation processes are highly dependent on the status quo, and the ending of the status quo can destroy the source of the rents, suggesting a relatively high s.[23] Second, one might want to interpret R as the local tax revenue in a formal fiscal arrangement, but this interpretation is less applicable, too. Since the fiscal arrangement is formal, the Center would still have the legitimacy and even more legitimacy to exert sufficient control over local tax revenue during a crisis, so s can be high.

[23] Fan et al. (2010) discuss the different efficiency implications of embezzlement and bribery.

This distinguishes our model of corruption tolerance from fiscal decentralization.[24]

B Corruption across Political Regimes

We run the regression

$$\text{Corruption Control}_{it} = \kappa_k \cdot \text{Regime Type}_{it}^k + \ln(\text{GDP per capita}_{it}) + \delta_i + \gamma_t + u_{it}, \quad (28)$$

where Corruption Control$_{it}$ is the "control of corruption" index in the Worldwide Governance Indicators (Kaufmann and Kraay, 2018), denoting how little corruption country i sees in year t; Regime Type$_{it}^k$ is a series of dummy variables from Geddes et al. (2014) indicating the regime type; the data of GDP per capita$_{it}$ are from the World Bank; δ_i and γ_t are the fixed effects; u_{it} is the error term. The sample covers 134 countries over 1996–2010.

Table 1: Corruption across political regimes, 1996–2010

	(1)	(2)	(3)	(4)
	Corruption control			
Non-monarchic personalistic regime	-0.568***	-0.560***	-0.299*	-0.307*
	(0.168)	(0.171)	(0.158)	(0.159)
Monarchical regime	-0.532***	-0.546***	-0.071***	-0.052**
	(0.178)	(0.184)	(0.006)	(0.017)
Military regime	-0.683***	-0.677***	0.032	0.015
	(0.170)	(0.166)	(0.091)	(0.090)
Party-based regime	-0.269	-0.268	-0.113	-0.160
	(0.167)	(0.168)	(0.132)	(0.130)
Failed state	0.053	0.067	0.001	0.007
	(0.123)	(0.118)	(0.047)	(0.047)
Democracy (as benchmark)	-	-	-	-
ln(GDP per capita)	Y	Y	Y	Y
Year-fixed effect	N	Y	N	Y
Country-fixed effect	N	N	Y	Y
N	1425	1425	1425	1425
R^2	0.590	0.604	0.976	0.977

Results are estimates of Equation (28). Standard errors are clustered at the country level and shown in parentheses. Levels of statistical significance are denoted by * for p-value < 0.1, ** for p-value < 0.05, and *** for p-value < 0.01.

[24] Another difference between our model and the literature on fiscal decentralization is that this literature often involves central–local information asymmetry and externality of local policies (e.g., Qian and Roland, 1998), which are not necessary for our result.

Table 1 reports the results. Personalistic rule and corruption are indeed correlated: when controlling for all the fixed effects, two most personalistic regime types, i.e., non-monarchic personalistic rule and monarchy, are the only ones where corruption is significantly more severe than under a democracy.

C Proof of Proposition 5

Proof. First, consider the case in which $0 < r < \underline{R}$. By the proof of Proposition 3, $R = \underline{R}$ dominates any $R \in (\underline{R}, \bar{R}]$ because the objective function is strictly decreasing in this range. By Assumption 3, $R = \underline{R}$, which would guarantee crisis control, dominates any $R \geq \bar{R}$, which would induce a total loss of crisis control. Therefore, the Center will choose $R^* \in \arg\max_{R \in [r, \underline{R}]} \pi(R; \rho)$, so $S(R^*) = 1$.

Second, consider the case in which $r \in [\underline{R}, \bar{R})$. By the proof of Proposition 3, again, $R = r$ dominates any $R \in (r, \bar{R}]$ because the objective function is strictly decreasing in this range. The Center will then choose $R = r$ instead of any $R \geq \bar{R}$, if and only if

$$F(\rho r) \cdot D + \big(1 - F(\rho r)\big) \cdot \pi(r; \rho) \geq pD + (1-p) \cdot \sup_{R > \bar{R}} \pi(R; \rho). \tag{29}$$

Now examine this condition. Its right-hand side is a constant; the left-hand side is strictly decreasing for $r \in [\underline{R}, \bar{R})$, and it is equal to $\pi(\underline{R}; \rho)$ at $r = \underline{R}$, and $pD + (1-p)\,\pi(\bar{R}; \rho)$ at $r = \bar{R}$, respectively; also, by Assumption 3, we have $\pi(\underline{R}; \rho) > pD + (1-p) \cdot \sup_{R > \bar{R}} \pi(R; \rho)$. Therefore, if $\pi(\bar{R}; \rho) \geq \sup_{R > \bar{R}} \pi(R; \rho)$, the condition will hold for any $r \in [\underline{R}, \bar{R})$, and the Center will choose $R^* = r \in [\underline{R}, \bar{R})$, implying $S(R^*) = 1 - F(\rho r)$. If $\pi(\bar{R}; \rho) < \sup_{R > \bar{R}} \pi(R; \rho)$, instead, then there exists a unique $\bar{r} \in (\underline{R}, \bar{R})$ such that

$$F(\rho \bar{r}) \cdot D + \big(1 - F(\rho \bar{r})\big) \cdot \pi(\bar{r}; \rho) = pD + (1-p) \cdot \sup_{R > \bar{R}} \pi(R; \rho), \tag{30}$$

and the Center will choose $R^* = r$ and induce $S(R^*) = 1 - F(\rho r)$, if $r \in [\underline{R}, \bar{r}]$, and $R^* \in \arg\max_{R \geq \bar{R}} \pi(R; \rho)$ and induce $S(R^*) = 1 - p$, if $r \in (\bar{r}, \bar{R})$, respectively.

Finally, consider the case in which $r \geq \bar{R}$. When $R \geq r$, the objective function becomes $pD + (1-p)\,\pi(R; \rho)$. The Center will then choose $R^* \in \arg\max_{R \geq r} \pi(R; \rho)$. Since $r \geq \bar{R}$, $S^*(R) = 1 - p$.

The proposition then follows by collecting the three cases, regrouping the last two cases by $R^* = r$ and $R^* \in \arg\max_{R \geq \max\{r, \bar{R}\}} \pi(R; \rho)$, and recalling Proposition 2 that $r > 0$ uniquely solves $X(r) = x - w$ and Lemma 1 that $X(r)$ is strictly increasing. □