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

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Abstract

How do corruption and the state apparatus interact, and how are they connected to the political and economic dimensions of state capacity? Motivated by historians' analysis of powerful empires, we build a model that emphasizes the corrosive effect of corruption on state power. Under general assumptions about fat-tailed risk, we show that the optimal response for the head of the state apparatus is an endogenous lexicographic rule whereby local corruption is maintained at such a level that no erosion of state power is tolerated. Comparative statics shows the impacts of additional risk of crisis on corruption tolerance as well as the complementarity between personalistic rule and corruption. Implications of corruption at the head of the state apparatus are also analyzed. We also investigate the conditions under which deviation from the lexicographic rule, over-tolerance of corruption, and erosion of state power become possible, showing a non-monotonic relationship in the relation between state power and corruption across different levels of fiscal capacity. The main results of the model are robustly consistent with empirical patterns based on recent cross-country panel-data.

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1 Introduction

Corruption is an important and pervasive phenomenon in human history and modern societies (Shleifer and Vishny, 1993, p. 599; MacMullen, 2015, pref., p. 11) 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, however, to how corruption erodes the power, authority, or control of the chain of command within the state apparatus.[3]

At the same time, analysis of the functioning of the state apparatus has gained much interest in the literature on state capacity.[4] This literature focuses on the capacity of the state to extract revenue and support the market, as well as on the dynamics or failure to build these capacities. Very little attention has been paid to how state authority can decay, and even collapse, weakening in the process 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 corrup-

[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 Key (1949), 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, Johnston (1979), 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 however that in recent decades, instead of 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).

tion by the central government authority? Finally, how can this relation be influenced by fiscal capacity, one of the most important economic dimensions of state capacity?

Our primary approach is to build an applied-theoretical model, in which we highlight a particular mechanism through which corruption can erode state power. Our notion of corruption concerns primarily 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 head of the state apparatus, i.e., the Center, in securing obedience of lower-level government authorities in times of *crisis,* 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 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 in 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, did not attack the Isaurians, but tried instead to secure rents from their jurisdictions, sometimes even fighting against each other.[6] This was quite common

[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)'s account and Jones (1964) and Rougé (1966)'s scholarships, MacMullen (1988, p. 182) states that Roman officials "were busy raking together their spoils from the subject population

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 consequence 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

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).

[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).

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 when the Center determines how much local corruption to tolerate, it faces a fundamental political–economic trade-off between losing control in crises and raising its own rents (and sometimes economic performance as well).[9] Using our model, we show that, under general conditions of fat-tailed risk of crises, the Center's optimal corruption tolerance should follow an *endogenous lexicographic rule:* 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 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 for example in the aforementioned historical cases. We further show the role of fiscal capacity of the state 1) in determining whether implementing the endogenous lexicographic rule is feasible or not for the Center, 2) in influencing the Center's choice of corruption tolerance, and 3) in preserving or not the stability of the political status quo. This analysis shows that there is a complementarity between fiscal capacity and crisis control through the Center's choice of corruption tolerance, answering the third above question.

Besides providing historical narratives and case studies, we also bring the main predictions of the model to the data. Our analysis predicts a three-phase relationship between corruption, political stability, and fiscal capacity. While political stability is generally positively correlated with fiscal capacity, it is negatively correlated with corruption only given medium, i.e., neither strong nor weak, fiscal capacity. These

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

predictions are consistent with the empirical pattern that emerges from various cross-country panel-data of the link between political stability and corruption. The empirical analysis shows that our answers to the three questions above are not only prominent among historical and contemporary narratives but also generally relevant in the current world.

The paper is organized as follows. Section 2 builds and analyzes the model and derives the main result. Section 3 extends the model to address the role of fiscal capacity. Section 4 brings the theoretical analysis to data. Section 5 concludes.

2 The Model

In this section, we start with a simple setting of the model and add important extensions later on.

2.1 Setup

Players. They are the Center, representing the highest level of the state apparatus, and a local official, representing all officials at lower levels of the hierarchy. The implications of having multiple local officials would be sensitive to the specification of the payoffs in the collective-action game among the local officials. To avoid these issues, the model features only a representative local official instead. We assume the players are risk-neutral.

Decisions and the timing. The model has two stages. At Stage 1, the Center chooses the level of rents $R \geq 0$ that it allows the local official to obtain through corruption, and the local official does obtain R. Between Stages 1 and 2, a random variable L takes a realization that is exogenous to existing corruption R. It is negatively correlated to the severity of a crisis and also represents the loss to the local official in case of defiance. We explain L in greater detail below. At Stage 2, taking the realized state L and rents R as given, the local official decides whether or not to comply with the Center to maintain the political status quo. We assume that the local official will defy if he is indifferent between defying and complying.

Payoffs if the local official complies. Depending on whether the local official complies with the Center after the occurrence of a crisis, there are two scenarios. If

he does comply, the status quo will be maintained and the local official will be sharing $t \in (0, 1]$ of the obtained rents, tR in total, with the Center. The share t is exogenous in the model, but it can be seen to be related to the bargaining power of the local official versus the Center, but could also be up to the Center's choice, which we discuss later in more detail. The eventual payoff of the local official is then $R - tR$.

In this scenario, we also assume that the Center will eventually get the status quo payoff $\pi(R; t)$. The dependence of the status quo payoff on the level of corruption can come from at least two sources. First, the Center can value the performance of the economy, 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).[10] Second, and perhaps more importantly, the Center can also value the rents tR that it reaps from the local official. Since the reaped rents tR also depend on t, we write t as a parameter in $\pi(R; t)$. 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 $\pi(R; t)$.[11] For reasons of generality, we leave the sign of the first derivative $\pi_R(R; t)$ unspecified.

Payoffs if the local official defies. If the local official defies the Center at Stage 2 so that the status quo will end, he will not have to share his rents with the Center. The realization of the random variable $L > 0$ enters here as the loss that the local official will suffer in this scenario. We assume that the more severe the crisis, the smaller the ability of the Center to impose a punishment for defiance, therefore the smaller L, but the size of L can also be affected by the collateral damage caused by the ending of the status quo. What matters for us is that L is assumed to decrease with the severity of the crisis. The eventual payoff of the local official is then $R - L$.

In this scenario, since the status quo ends when the Center loses control over the government apparatus, we assume that the Center suffers an exogenous downfall payoff D, assumed to be very small.

[10] Inspired by recent economic development in China, Bai et al. (2014, 2020) and Li et al. (2019) provide a micro-foundation for when the economic performance increases with corruption.

[11] This argument can be formalized by further specifying $\pi(R; t) \equiv \gamma \cdot y(R) + (1 - \gamma) \cdot tR$, where $\gamma \in [0, 1]$ denotes the relative importance of economic performance versus rent-seeking in the Center's motive, $y(R)$ is the economic performance depending on corruption R with $y'(\cdot)$ unspecified, and tR is the rents reaped from the local official. Under this specification, if $\gamma < \frac{t}{t - y'(R)}$ or $y'(R) > 0$, then $\pi_R(R; t) > 0$, i.e., higher corruption raises the status quo payoff.

Interpreting the state of the world as the severity of crisis. Since the state of the world $L > 0$ represents the loss for the local official after he defies, it represents the exogenous component of the ability of the Center to enforce the status quo. It is intuitive that this ability can be weakened during a crisis that strikes the Center, which can be micro-founded by a Rubinstein (1982) bargaining game where the crisis makes the Center become much less patient. We thus interpret L as (the opposite of) the severity of crisis, where a smaller L represents a more severe crisis.

We further assume that L has a known, exogenous distribution with a mass point at $L = \infty$ with probability $1 - p$. meaning that no crisis strikes and that the Center is infinitely capable of enforcing the status quo. Moreover, L is assumed to have a continuous distribution between $[\underline{L}, \bar{L}] \subset (0, \infty)$, representing cases where a crisis may strike. Here $p \in (0, 1)$ denotes the probability that a crisis strikes, $\underline{L} \in (0, \infty)$ denotes the severest crisis possible, and $\bar{L} \in (\underline{L}, \infty)$ denotes the least severe crisis possible. We assume that the cumulative distribution function $F(L)$ is differentiable and the probability density $f(L) \equiv F'(L) > 0$ over $L \in (\underline{L}, \bar{L})$.

Whether a crisis strikes, and how severe it is, can, in reality, be endogenous to existing corruption. We nevertheless assume that L has an exogenous distribution. 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, we discuss later the case in which the distribution of L is endogenous to the level of corruption R; in Appendix A, we also 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.

Note that although the crisis severity is assumed to be exogenous, whether a crisis is consequential to the Center or not is endogenous in our model , as we will see below.

Informational environment and solution method. We assume complete, perfect, and symmetric information. Therefore, we use backward induction when solving the model.

The model's setup is summarized in Figure 1.

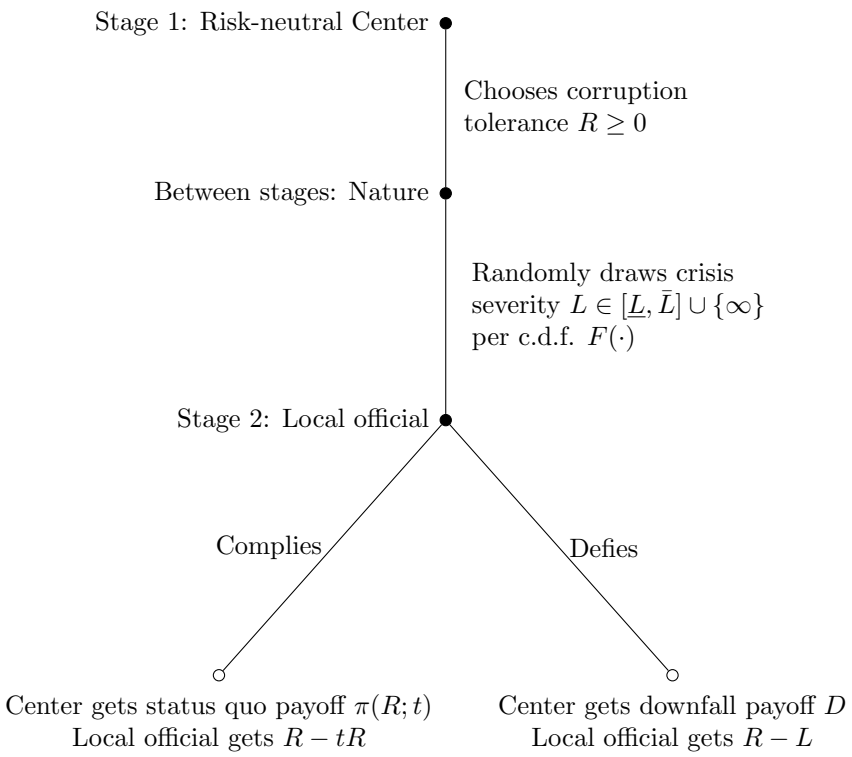


Figure 1: Setup of the model

2.2 Analysis of Stage 2

At this stage, having obtained rents R and learned the realization of L, the local official compares the payoffs from complying and from defying, $R - tR$ versus $R - L$. His optimal decision is then to defy if and only if

$$R - tR \leq R - L. \tag{1}$$

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

$$L \leq tR \equiv \hat{L}(R), \tag{2}$$

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

It is clear that a higher corruption tolerance R will increase the vested interests tR for the local official to secure during any crisis. This raises the critical threshold of $\hat{L}(R)$. Given the distribution of L, this higher threshold then suggests a higher likelihood of

the local official's defiance and of the Center's loss of control in a crisis. This is the corrosive effect of corruption on state power. The following result shows how this effect affects the political stability of the Center:

Proposition 1 (Corruption erodes state power)**.** *Political stability of the Center, i.e., the probability that the status quo will be maintained, is* $S(R) = 1 - F\left(\hat{L}(R)\right)$*, and it satisfies*

$$S(R) = \begin{cases} 1, & \text{if } R \in [0, \underline{R}); \\ 1 - F(tR) \in [1-p, 1], \text{ strictly decreasing in } R, & \text{if } R \in [\underline{R}, \bar{R}]; \\ 1 - p, & \text{if } R \in (\bar{R}, \infty), \end{cases} \tag{3}$$

where $\underline{R} \equiv \underline{L}/t$ *is the corruption level at which the Center just secures perfect control in any crisis, while* $\bar{R} \equiv \bar{L}/t$ *is the corruption level at which the Center just loses control in any crisis.*

Proof. Note that the cumulative distribution function $F(L) = 0$, if $L \in (0, \underline{L})$; $F(L) \in [0, p)$, if $L \in [\underline{L}, \bar{L})$; $F(L) = p$, if $L \in [\underline{L}, \infty)$; $F(L) = 1$, if $L = \infty$. Also note that $\hat{L}(R) \equiv tR$. The proposition then follows. □

Proposition 1 implies that political stability weakly decreases with the corruption rents R: if $R \in [0, \underline{R})$, the Center's will never lose control in any crisis; if $R \in [\underline{R}, \bar{R}]$, the Center is risking its crisis control and higher corruption will erode the control; if $R \in (\bar{R}, \infty)$, the Center will lose control in any crisis and the status quo can only be maintained when there is no crisis.

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 Xi Jinping's (the current leader of the Communist Party of China) understanding of the corrosive effect of corruption on the central authority of the party. In a well-known speech during the recent 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 Center's political stability would still weakly decrease with the corruption rents.[12] 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 political stability from an additional channel, thus not modifying the thrust of our result. Third, one can imagine that the crisis itself can affect the rents. As long as the post-crisis and ante-crisis rents are positively correlated given the crisis severity, the corrosive effect of corruption will still be there.

All in all, the driving force at Stage 2 is that corruption tolerance R creates central–local incentive misalignment in crises. To understand how corruption tolerance is determined by the Center, we now step back to Stage 1.

2.3 Analysis of Stage 1

At Stage 1, predicting what would happen at Stage 2, the Center decides how much local corruption to tolerate by maximizing its expected payoff:

$$\max_{R\geq 0} \quad \big(1-S(R)\big)\cdot D + S(R)\cdot \pi(R;t) = D + S(R)\cdot\big(\pi(R;t)-D\big), \tag{4}$$

subject to

$$S(R) = 1 - F\left(\hat{L}(R)\right) \quad \text{and} \quad \hat{L}(R) = tR. \tag{5}$$

This program suggests that, as long as the Center prefers maintaining the status quo than ending it ($\pi(R;t) > D$), it can face a fundamental trade-off between keeping control and raising the status quo payoff: a higher R will lead to a lower political stability $S(R)$, but it can grant a higher status quo payoff $\pi(R;t)$ if $\pi_R(R;t) > 0$. This trade-off is truly political–economic, since one side of the trade-off is about making sure that the local official will comply with the Center, whatever the severity of the crisis, which is political, and the other side is about the economic payoff under the status quo.

This trade-off is instrumental in understanding the Center's choice of corruption tolerance. We now derive the main result of the model – a sufficient condition on the

[12] The defiance condition would become $R - \min\{M, R\} \leq R - L$, where M is the fixed fee. Political stability then becomes $S(R) = 1 - F(\min\{M, R\})$, which weakly decreases with R.

risk distribution under which the political side of the trade-off dominates the economic side, and the Center therefore chooses a corruption tolerance that does not pose any risk to power at all. To do that, we now define four thresholds of different parameters of the model:

$$\bar{D} \equiv \min_{R\in[\underline{R},\bar{R}]} \pi(R;t), \quad \underline{D} \equiv \sup_{R>\bar{R}} \pi(R;t), \quad \underline{p} \equiv \frac{\underline{D} - \max_{R\in[0,\bar{R}]} \pi(R;t)}{\underline{D} - D}, \tag{6}$$

and

$$\bar{\epsilon} \equiv \max_{R\in[\underline{R},\bar{R}]} \frac{\pi_R(R;t)\cdot R}{\pi(R;t) - D}. \tag{7}$$

All these thresholds are exogenous to the Center's choice of the corruption tolerance R. We then have the following proposition:

Proposition 2 (Endogenous lexicographic rule)**.** *Assume that the downfall payoff is sufficiently low and that a crisis is sufficiently likely to strike. If the risk of crisis is sufficiently fat-tailed, then 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 the Center will tolerate corruption as much as possible while securing perfect control. Mathematically, assume $D < \min\left\{\bar{D}, \underline{D}\right\}$ *and* $p > \underline{p}$*, where* $\underline{p} < 1$*. If* $\frac{L\cdot f(L)}{1-F(L)} \equiv \epsilon > \bar{\epsilon}$ *for any* $L \in (\underline{L}, \bar{L})$*, then the Center's optimal choice* $R^* \leq \underline{R}$*. Further, if* $\pi_R(R;t) > 0$ *over* $R \in [0, \underline{R}]$*, then* $R^* = \underline{R}$*.*

Proof. First, consider the range $R \in \left(\underline{R}, \bar{R}\right)$. The objective function becomes $F\left(\hat{L}(R)\right)\cdot D + \left(1 - F\left(\hat{L}(R)\right)\right)\cdot \pi(R;t)$. By $\hat{L}(R) = tR$, this objective function is decreasing in R if and only if

$$f\left(\hat{L}(R)\right)\cdot t\cdot\left(\pi(R;t) - D\right) > \left(1 - F\left(\hat{L}(R)\right)\right)\cdot \pi_R(R;t). \tag{8}$$

By $\hat{L}(R) = tR$, again, this condition is equivalent to

$$\frac{f\left(\hat{L}(R)\right)\cdot \hat{L}(R)}{1 - F\left(\hat{L}(R)\right)}\cdot\left(\pi(R;t) - D\right) > \pi_R(R;t)\cdot R. \tag{9}$$

By $D < \bar{D}$, this condition is equivalent to

$$\epsilon \equiv \frac{f\left(\hat{L}(R)\right) \cdot \hat{L}(R)}{1 - F\left(\hat{L}(R)\right)} > \frac{\pi_R(R;t) \cdot R}{\pi(R;t) - D}. \tag{10}$$

By $\epsilon > \bar{\epsilon}$, this condition holds. Therefore, the objective function is decreasing in $R \in (\underline{R}, \bar{R})$, so the optimal choice $R^* \notin (\underline{R}, \bar{R}]$.

Second, compare the best choices over $R \in [0, \underline{R}]$ and $R \in (\bar{R}, \infty)$. When $R \in [0, \underline{R}]$, the objective function becomes $\pi(R;t)$, and its highest possible value is $\max_{R\in[0,\underline{R}]} \pi(R;t)$; when $R \in (\bar{R}, \infty)$, the objective function becomes $p \cdot D + (1-p) \cdot \pi(R;t)$, and its highest possible value is not higher than $p \cdot D + (1-p) \cdot \sup_{R>\bar{R}} \pi(R;t)$. The best choice over $R \in [0, \underline{R}]$ will dominate the best choice over $R \in (\bar{R}, \infty)$, if

$$\max_{R\in[0,\underline{R}]} \pi(R;t) > p \cdot D + (1-p) \cdot \sup_{R>\bar{R}} \pi(R;t). \tag{11}$$

By $D < \underline{D}$, this condition is equivalent to

$$p > \frac{\underline{D} - \max_{R\in[0,\underline{R}]} \pi(R;t)}{\underline{D} - D} \equiv \underline{p}, \tag{12}$$

where $D < \bar{D} \leq \pi(\underline{R}) \leq \max_{R\in[0,\underline{R}]} \pi(R;t)$ implies $\underline{p} < 1$. Therefore, by $p > \underline{p}$, the best choice over $R \in [0, \underline{R}]$ will dominate the best choice over $R \in (\bar{R}, \infty)$. Therefore, the optimal choice $R^* \in [0, \underline{R}]$.

Further, since the objective function is $\pi(R;t)$ when $R \in [0, \underline{R}]$, if $\pi_R(R;t) > 0$, then the optimal choice $R^* = \underline{R}$. □

Figure 2 illustrates the intuition of Proposition 2 for the case where the status quo payoff increases with corruption ($\pi_R(R;t) > 0$) over $R \in \left[0, \bar{R}\right]$. When the downfall payoff is sufficiently low ($D < \min\left\{\bar{D}, \underline{D}\right\}$) and the probability that a crisis will strike is sufficiently high ($p > \underline{p}$), 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 in the more severe direction, i.e., $\frac{L \cdot f(L)}{1-F(L)} \equiv \epsilon > \bar{\epsilon}$ for any $L \in (\underline{L}, \bar{L})$, 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

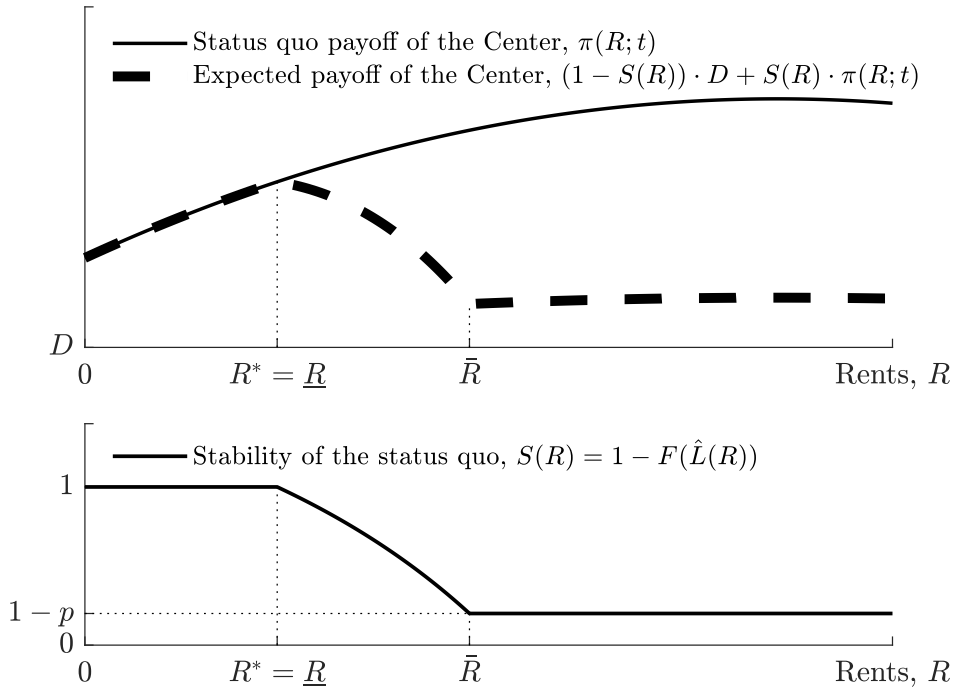


Figure 2: Optimal choice of corruption tolerance (R^*) given bad downfall ($D < \min\left\{\bar{D}, \underline{D}\right\}$), sufficiently likely and fat-tailed crisis risk ($p > \underline{p}$ and $\epsilon > \bar{\epsilon}$), and status quo payoff that increases with corruption ($\pi_R(R;t) > 0$) over $R \in \left[0, \bar{R}\right]$

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 ($R^* = \underline{R}$).

For the case where the status quo payoff does not always increase with corruption ($\pi_R(R;t) > 0$ 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 on 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. As an example, Deng Xiaoping's catchphrase "stability overrides everything" has been widely viewed as the most fundamental principle of the Chinese Communist Party (e.g., People's Daily, 1990; Schoenhals, 1999; Sandby-Thomas, 2010; Qian, 2012). Behind this catchphrase is Deng (1993, originally 1990, p. 364)'s concern over unbalanced economic development: "when conflicts of interest develop between the Center and local authorities, turmoil can happen. I have said more than once: stability overrides everything." Although his thinking did not explicitly involve corruption, our model captures exactly the political–economic trade-off and the central–local incentive misalignment behind it.

Fourth, the key condition for the endogenous lexicographic rule is the fat-tailed condition $\epsilon \equiv \frac{L \cdot f(L)}{1-F(L)} > \bar{\epsilon}$. Indeed, as shown in Appendix B , if the distribution were sufficiently thin at the extreme end, and if the status quo payoff did increase with corruption, the Center would tolerate local corruption to the extent that would compromise its control in crises.

Finally, the conditions needed for the endogenous lexicographic rule are hardly controversial and arguably general. The condition $D < \min\left\{\bar{D}, \underline{D}\right\}$ simply requires the Center to prefer maintaining to ending the status quo, and the condition $p > \underline{p}$ only suggests that a crisis is sufficiently likely so that a total loss of control would not be appealing to the Center; these conditions, however, do not impose any restriction on whether the Center would like to risk some, if not all, control in exchange for a higher status quo payoff. The fat-tailed condition $\epsilon \equiv \frac{L \cdot f(L)}{1-F(L)} > \bar{\epsilon}$ suggests that bad situations are relatively likely or *extremely severe.* This condition 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). This condition is also consistent with the typical narrative of practitioners of power that describes crises as "black swans"" and 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;

Barro and Jin, 2011; Nakamura et al., 2013; Cooke et al., 2014; Ackerman, 2017).[13] Therefore, one can argue that the endogenous lexicographic rule is quite general.

Comparative statics. We now turn to comparative statics. We focus on the case where $\pi_R(R;t) > 0$, 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)**.** *Assume* $D < \min\left\{\bar{D}, \underline{D}\right\}$, $\frac{L \cdot f(L)}{1-F(L)} \equiv \epsilon > \bar{\epsilon}$ *for any* $L \in (\underline{L}, \bar{L})$*, and* $p > \underline{p}$*. If* $\pi_R(R;t) > 0$ *so that* $R^* = \underline{R} \equiv \underline{L}/t$*, then* R^* *increases with* $\underline{L}$ *and decreases with* t*.*

Corollary 1 can help us understand corruption in authoritarian regimes where cronyism and rent-seeking dominate in the economy and in politics. 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 Corollary 1.[14]

[13] The measure we use for the tail fatness or end thickness, i.e., $\frac{L \cdot f(L)}{1-F(L)}$, 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).

[14] 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).

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) and was in particular "a factor in boosting the morale of the Central Asians" (Critchlow, 1988, p. 144). 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), consistent with Corollary 1.[15]

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 t. A higher t 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 is, however, quite counterintuitive. On the one hand, although not modeled explicitly, the more dominant the Center is (higher t), the more rents it can reap from the local official (higher tR), and the higher the status quo payoff of the Center. On the other hand, our analysis at Stage 2 shows that precisely because the Center can reap more rents from the local official (higher tR), 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 $F\left(\hat{L}(R)\right)$ 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 t presents a fundamental conflict between crisis control and payoffs in ordinary 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 $\pi_R(R;t) > 0$, 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 t? Here we provide a result when local corruption "greases the wheels" of the economy,

[15] 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."

i.e., specifying $\pi(R;t) \equiv y(R) + tR$, where tR is the rents reaped to the Center and $y(R)$ is the economic performance with $y'(R) > 0$:

Corollary 2. *Assume* $D < \min\left\{\bar{D}, \underline{D}\right\}$, $\frac{L \cdot f(L)}{1-F(L)} \equiv \epsilon > \bar{\epsilon}$ *for any* $L \in (\underline{L}, \bar{L})$, $p > \underline{p}$, $\pi(R;t) \equiv y(R) + tR$, *and* $y'(R) > 0$. *Given* $t > 0$, *then Center's optimal choice of the rent-sharing scheme is* $t^* = \tau > 0$, *where* τ *is infinitesimal.*

Proof. First note that $\pi(R;t) \equiv y(R)+tR$ and $y'(R) > 0$ suggest $\pi_R(R;t) = y'(R)+t > 0$. Proposition 2 then suggests that, given $t > 0$, the optimal choice of $R^* = \underline{R} \equiv \frac{\underline{L}}{t}$, securing control in crises. Given this choice, the objective function of the Center becomes $\pi(R^*;t) = y(\frac{\underline{L}}{t}) + \underline{L}$. Given $t > 0$ and $y'(R) > 0$, the Center would then like to maximize $\frac{\underline{L}}{t}$. The result 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 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: that 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 some 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 C, 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.[16] As pointed out by Frantz et al. (2018, p. 4), "[s]uch personnel choices ... link the fates of those in the ... apparatus with that of the leader." Considering this, if the primary purpose of tolerating corruption is to buy support, should not the ruler tolerate less, not more, corruption when the officials are personally tied to and, therefore, intrinsically more loyal to the ruler?

Our Corollary 1 provides an explanation to the complementarity between personalistic rule and corruption, through the comparative statics with respect to both $\underline{L}$ and t. When the local official is personally tied to the ruler, one can argue that the Center has more personal leverage and, therefore, a stronger ability to enforce the local official to comply, suggesting a greater $\underline{L}$; one can also interpret t as the net share of rents that the local official will gain by defying relative to complying, and a local official who is personally tied to the ruler can be assumed to incur additional loss of rents when the ruler loses power, suggesting a smaller t.[17] As seen above, a smaller t suggests that any given level of corruption R becomes less corrosive to the Center's control, since tR becomes smaller; a greater $\underline{L}$ also suggests that, given any tR, the critical threshold of these interests for the Center to just start losing control in crises becomes higher. Both effects imply that, as suggested by Corollary 1, while still covering the worst relevant crisis ($R^* = \underline{R} \equiv \frac{\underline{L}}{t}$), the Center can now tolerate more corruption R^*. In other words, personalistic rule tolerates more corruption because corruption poses less threat to personalistic rule.

3 Fiscal Capacity and Over-tolerance of Corruption

Proposition 2 predicts that the Center chooses corruption tolerance carefully 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 on 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

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

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

Roman Empire."[18] 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?

Among various answers that can be provided, we focus on one mechanism related to the fiscal capacity of the state: if the state is fiscally too weak to sufficiently pay its officials, the Center will have to over-tolerate corruption to retain them within the apparatus, risking control in times of crisis.[19]

We focus primarily on this mechanism for three reasons. First, fiscal capacity is among the most important dimensions of state capacity (e.g., Besley and Persson, 2009). Understanding its role in over-tolerance of corruption can help us understand the link between state capacity and power via corruption.

Second, this mechanism has been well noticed by historians. For example, 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.[20]

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

[19]As an example of other potential answers, the Center might not be able to enforce the chosen corruption tolerance in the first place. This is the case of states without a strong enough state apparatus. We focus on how a state with a strong apparatus can be weakened by corruption. Another example involves the collective-action problem within the Center, where central leaders might not be able to agree on how much to tolerate local corruption because of conflicts of interests, which might paralyze decision-making when a crisis strikes. Li et al. (2019) develop this point in more detail in the context of China.

[20]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

Finally, fiscal capacity has measurable variation across countries (e.g., Besley and Persson, 2011). Investigating its role in the Center's choice of corruption tolerance can deliver empirical predictions that we can map to existing data. We hope this can help us extend the relevance of our insight from ancient history to the contemporary world.

To analyze the role of fiscal capacity formally, we extend the simple model by introducing a participation constraint for the local official. We assume that, after the Center chooses R and before the crisis strikes, the local official can leave the state apparatus, and he will stay if and only if a retention condition holds:

$$R \geq r, \tag{13}$$

where r is an exogenous level of corruption that proxies negatively the Center's fiscal capacity: a higher r suggests that the Center is fiscally weaker and has to allow for more local corruption to retain the official. In other words, if the local official is not properly paid, higher corruption would have to be tolerated to convince the official to stay in his position. We also assume that if the local official stays, the game will continue as modeled; if he leaves, the game will end, and the Center will get downfall payoff D, because the apparatus is short of staff and the status quo ends. Appendix D further provides the micro-foundation and more details of the setup of this extension.

Given the extension above, the Center's objective function is still

$$\max_{R\geq 0} \quad \big(1 - S(R)\big) \cdot D + S(R) \cdot \pi(R;t), \tag{14}$$

but the constraints become

$$S = \mathbf{1}_{R\geq r} \cdot \left(1 - F\left(\hat{L}(R)\right)\right) \quad \text{and} \quad \hat{L}(R) = tR, \tag{15}$$

where $\mathbf{1}_{R\geq r}$ is the indicator function for retention success.

We now define another three thresholds of different parameters of the model:

$$\underline{\underline{D}} \equiv \lim_{r\to\infty} \sup_{R\geq r} \pi(R;t) \leq \underline{D} \quad \text{and} \quad \bar{p} \equiv \frac{\underline{D} - \pi(\underline{R};t)}{\underline{D} - D}. \tag{16}$$

Both thresholds are exogenous to the Center's choice of the corruption tolerance R and to fiscal capacity r. With these thresholds and similar assumptions to those in Propo-

between the size of the shadow economy and the amount of corruption is strong and consistent, as different measures show." The statistical relationship is, however, open to different interpretations.

sition 2, the following proposition shows the complementarity between fiscal capacity, adoption of the lexicographic rule to control corruption, and stability of the status quo:

Proposition 3 (Fiscal capacity, corruption tolerance, and stability of the status quo)**.** *Assume that the downfall payoff is sufficiently low, that a crisis is sufficiently likely to strike, and that the risk of crisis is sufficiently fat-tailed. Then the Center's choice of the corruption tolerance varies across strong to weak fiscal capacity:*

1. *given strong fiscal capacity, the Center will choose the tolerance that maximizes the status quo payoff, given that both retention and crisis control are secured;*

2. *given medium fiscal capacity, the Center will over-tolerate corruption just enough to guarantee retention, risking some crisis control;*

3. *given weak fiscal capacity, the Center will over-tolerate corruption to guarantee retention, losing all crisis control.*

A lexicographic rule then appears: retention first, perfect crisis control second, status quo payoff third. Mathematically, assume $D < \min\left\{\bar{D}, \underline{\underline{D}}\right\}$, $p > \bar{p}$, *where* $\bar{p} \in \left[\underline{p}, 1\right)$, *and* $\frac{L \cdot f(L)}{1-F(L)} \equiv \epsilon > \bar{\epsilon}$ *for any* $L \in (\underline{L}, \bar{L})$. *Then, there are three cases from low to high* r*:*

1. *if* $r < \underline{R}$, *then* $R^* \in [r, \underline{R}]$ *and* $S^* = 1$*;*

2. *if* $r \in \left[\underline{R}, \tilde{R}\right)$, *then* $R^* = r$ *and* $S^* = 1 - F(tr) \in [1-p, 1]$*;*

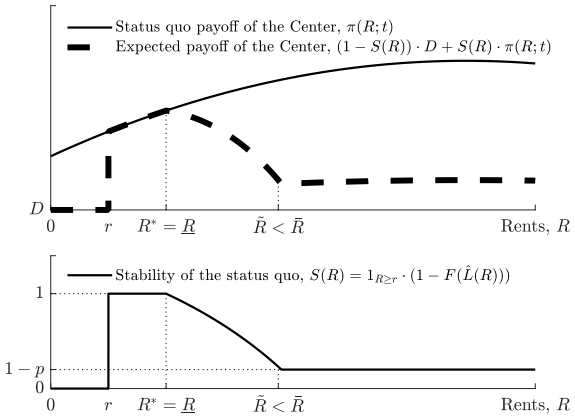
3. *if* $r \geq \tilde{R}$, *then* $R^* \geq \max\{r, \bar{R}\}$ *and* $S^* = 1 - p$,

where $\tilde{R} \equiv \bar{R}$, *if* $\pi(\bar{R}; t) \geq \underline{D}$*; if otherwise,* $\tilde{R} \in (\underline{R}, \bar{R})$ *is uniquely defined by*

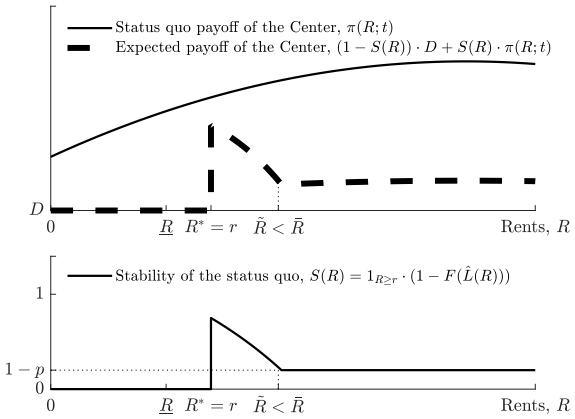
$$F(t\tilde{R}) \cdot D + \left(1 - F(t\tilde{R})\right) \cdot \pi(\tilde{R}; t) = pD + (1-p)\,\underline{D}. \tag{17}$$

We leave the proof of Proposition 3 to Appendix E and only discuss the intuition here. First, note that the Center will get the downfall payoff for sure if retention is not achieved. Given that the downfall payoff is sufficiently bad ($D < \min\left\{\bar{D}, \underline{\underline{D}}\right\}$), the Center will always want to guarantee retention if it can.

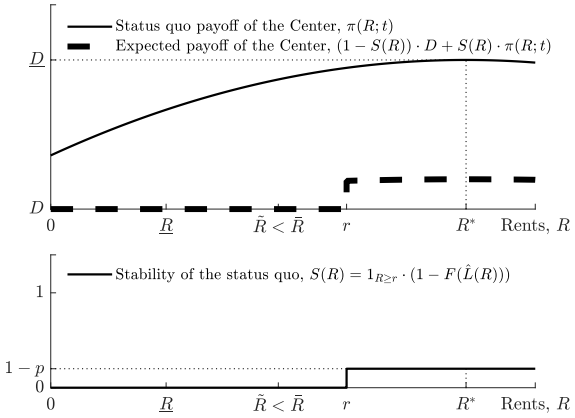
Figure 3 further illustrates the result of Proposition 3 in the case where the status quo payoff increases with corruption over $R \in \left[0, \bar{R}\right]$ and $\pi(\bar{R}; t) < \underline{D}$ holds. In Panel 3a, when the state has strong fiscal capacity ($r < \underline{R}$), the optimal choice implied by the lexicographical rule in Proposition 2 is still feasible given successful retention,



(a) Strong fiscal capacity: retention and crisis control secured, $R^* = \underline{R}$



(b) Medium fiscal capacity: retention secured but crisis control at risk, $R^* = r$



(c) Weak fiscal capacity: retention secured but no crisis control, $R^* \geq \max\{r, \bar{R}\}$

Figure 3: Optimal corruption tolerance (R^*) across fiscal capacities (r), given bad downfall ($D < \min\{\bar{D}, \underline{D}\}$), sufficiently likely and fat-tailed crisis risk ($p > \bar{p}$ and $\epsilon > \bar{\epsilon}$), status quo payoff that increases with corruption ($\pi_R(R;t)$) over $R \in [0, \bar{R}]$, and $\pi(\bar{R};t) < \underline{D}$

and it dominates any choice with even partial crisis control. Moreover, if the crisis is sufficiently likely to strike ($p > \bar{p}$), then this choice will dominate choices with loss of control, so the Center simply adopts the lexicographical rule and secures both retention and control ($R^* = \underline{R}$). In Panel 3b, given medium fiscal capacity ($r \in \left[\underline{R}, \tilde{R}\right)$), the optimal choice implied by the lexicographical rule in Proposition 2 would not permit to retain the local official, so the Center has to over-tolerate corruption, risking crisis control. Since fiscal capacity is not sufficiently low either, the Center will still prefer an over-tolerance that is just enough to retain the official ($R^* = r$) to any choice that would imply a total loss of crisis control. In Panel 3c, fiscal capacity is so weak ($r \geq \tilde{R}$) that the Center has to over-tolerate corruption so much that it will not have any crisis control. This yields a choice $R^* \geq \max\{r, \bar{R}\}$.

For the case where $\pi(\bar{R}; t) < \underline{D}$, $\tilde{R}$ 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 $R \in \left[0, \bar{R}\right]$, 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 the rest of the intuitions go through.

Proposition 3 then provides following empirical implications that we can bring to the data. Between them, Prediction 2 is the main prediction of the model.

Corollary 3 (Predictions on correlations in equilibrium)**.** *The relationship between corruption in equilibrium, political stability in equilibrium and fiscal capacity is as follows:*

1. *Higher political stability (higher S^*) and stronger fiscal capacity (lower r) are correlated;*

2. *Higher political stability (higher S^*) and less corruption (lower R^*) are positively correlated when fiscal capacity is at an intermediate level (intermediate value of r), while they are uncorrelated when fiscal capacity is strong (low r) or weak (high r).*

4 Corruption, Political Stability, and Fiscal Capacity in the Data

When bringing our theory to the data, the most ideal approach would be 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 the empirical patterns are consistent with Corollary 3. As a disclaimer, we would by no means interpret the empirical patterns we identify as causal relationships. We will instead interpret them as endogenous equilibrium relationships, as stated in Corollary 3, since both corruption and political stability are indeed endogenous in our model.

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. Kaufmann et al. (2007a,b,c, 2010a,b) further discuss the methodology and applicability of the data.

We use in particular the "control of corruption" variable to proxy negatively 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 use the "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. As this definition can be seen to be rather broad, we later also 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).

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. As an alternative measure for fiscal capacity, we use in addition Besley and Persson (2011)'s data of the tax revenue/GDP ratio of the countries in 1999, which is from Baunsgaard and Keen (2005), where a higher ratio indicates stronger fiscal capacity.

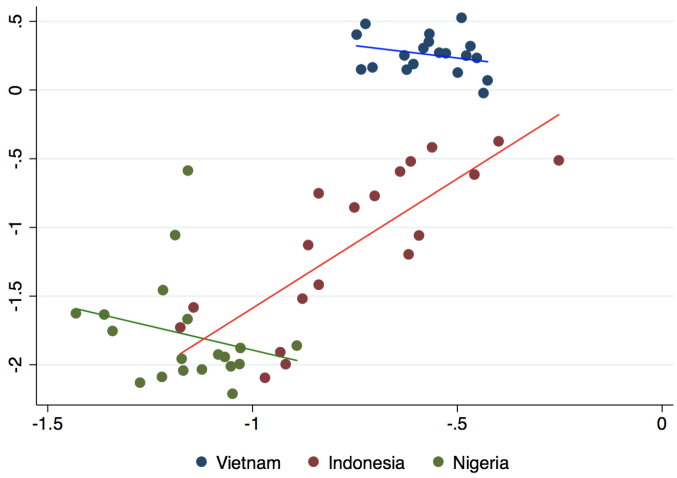
Merging all these data, we can use the WGI panel-data of political stability and corruption across 155 countries over the 1996–2017 period and use these countries' 1995 shares of the formal economy as the benchmark data for our empirical analysis. In robustness tests, we later incorporate a few other data. These data include the Archigos data of irregular turnovers up to 2014, all countries' 1995 GDP per capita (purchasing power parity adjusted) from the World Bank, their 1999 tax revenue/GDP ratio, and the Polity IV (Marshall et al., 2018) data on the countries' institutional characteristics over 1996–2017.

4.1 An Illustrative Example

We start by showing 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 4 shows that a country with high fiscal capacity like Vietnam is politically stable, and corruption is not correlated with political stability; a country with low fiscal capacity like Nigeria is politically unstable, but 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.

[21]Vietnam, Indonesia, and Nigeria rank the 33rd, 38th, and 153rd among 155 countries, respectively in terms of size of the formal sector. They rank the 1st, 23rd, and 146th, respectively for relative fiscal capacity, controlling for the level of development as in Equation (22), which we introduce later.

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 4: Political stability and corruption, three countries, 1996–2017

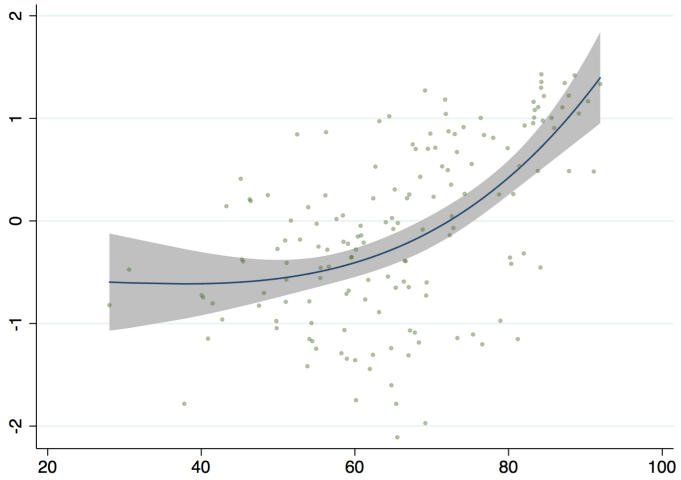
4.2 The Main Results

We now go beyond this illustrative example and test more formally the predictions of our model. We first examine Prediction 1 in Corollary 3 on the correlation between fiscal capacity and political stability by estimating

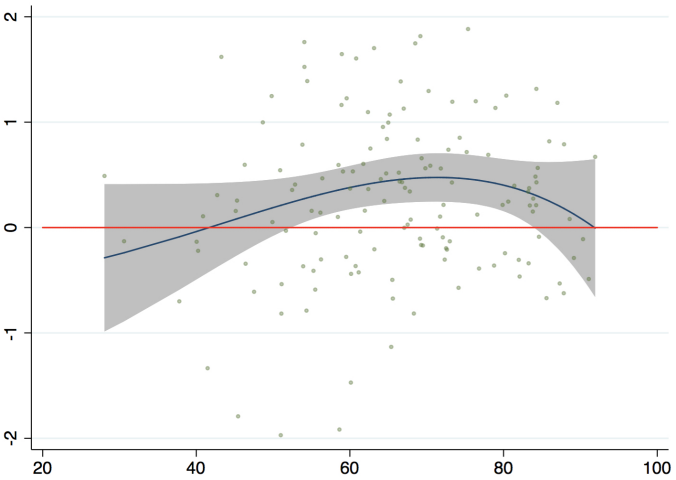
$$\text{Mean of Political Stability}_i = g\left(\text{Fiscal Capacity}_i\right) + u_i, \tag{18}$$

where Mean of Political Stability$_i$ is the average of country i's WGI "political stability and absence of violence/terrorism" index, $g(\cdot)$ has a flexible, non-parametric specification, Fiscal Capacity$_i$ is country i's 1995 share of the formal economy in GNP, and u_i is the error term.

Panel 5a in Figure 5 shows the result of this estimation when we use the benchmark data and specify $g(\cdot)$ as a fractional polynomial. In the panel, the relationship between political stability and fiscal capacity is generally increasing. This is consistent with Prediction 1 in Corollary 3.



(a) Political stability as a function of fiscal capacity



(b) Correlation between control of corruption and higher political stability as a function of fiscal capacity

The horizontal axes indicate fiscal capacity, measured by the 1995 share of the formal economy in GNP. In the upper panel, the vertical axis indicates the country average of WGI "political stability and absence of violence/terrorism" index; in the lower panel, the vertical axis indicates the estimate of β_i in Equation (19). In both panels, each dot represents a country; the best estimated fractional polynomials fitted to all scattered dots and their 95% confidence intervals are shown by the blue lines and the shaded areas, respectively.

Figure 5: Political stability and corruption for different levels of fiscal capacity, 1996–2017

We then come to Prediction 2, the main prediction of our model on the correlation between corruption control and political stability for different levels of fiscal capacity.

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 $\text{Political Stability}_{it}$ is country i's WGI "political stability and absence of violence/terrorism" index in year t, $\text{Corruption Control}_{it}$ 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, and v_i is the error term.

Panel 5b in Figure 5 shows the result of this procedure when we use the benchmark data and specify $g(\cdot)$ as a fractional polynomial. In the figure, the best fitted fractional polynomial to the within-country correlations between control of corruption and higher political stability is statistically significantly positive only when the country has medium fiscal capacity, and the correlation is statistically insignificant when fiscal capacity is either weak or strong. This is consistent with Prediction 2 in Corollary 3.

4.3 Tests Addressing Empirical Concerns

Within-country variation in the measure of political stability at strong fiscal capacity. Propositions 2 and 3 primarily argue that the Center adjusts the corruption tolerance such that corruption does not threaten political stability, if fiscal capacity makes this possible. This argument is consistent with the empirical result that, given strong fiscal capacity, corruption and political stability are uncorrelated in equilibrium. This empirical result could, however, be driven by a potential lack of within-country variation in the measure of political stability given strong fiscal capacity. To address this concern, we implement a placebo test: for each country, instead of Equation (19), we estimate

$$\text{Political Stability}_{it} = \beta_i \cdot X_{it} + \delta_i + u_{it}, \tag{21}$$

where X_{it} is a variable different from corruption, in country i; we then use the estimates of β_i in Equation (21) to estimate Equation (20). If there exists X_{it} such that β_i in Equation (21) is significantly different from zero at strong levels of fiscal capacity, we can then argue that the lack of within-country correlation between corruption and

political stability at strong levels of fiscal capacity is less likely to be driven by a lack of within-country variation in the political stability measure.

Figure 6 shows three examples of the estimated non-parametric relationship in Equation (20) in this placebo test. In Panel 6a, the alternative variable X_{it} is the polity score in the Polity IV data (Marshall et al., 2018, p. 16–17), measuring where the country is located in the democracy–autocracy spectrum; in Panel 6b, X_{it} is the "regime durability" measure, i.e., "the number of years since the most recent regime change ... or the end of ... the lack of stable political institutions," in the Polity IV data (Marshall et al., 2018, p. 17); in Panel 6c, X_{it} is the "executive constraints" measure, i.e., "the extent of institutionalized constraints on the decision-making powers of chief executives," in the Polity IV data (Marshall et al., 2018, p. 24). In all the panels, the within-country correlation between political stability and X_{it} is significantly different from zero at the higher end of fiscal capacity. Our empirical result that political stability and corruption are uncorrelated at strong fiscal capacity is, therefore, less likely driven by a lack of variation in the political stability measure.

Controlling for the level of economic development. Another concern about the empirical analysis is that, in addition to fiscal capacity, the state's ability to retain local officials can also depend on their outside options, which in turn depend on the level of economic development.

To address this concern, for Prediction 1 in Corollary 3, we first regress for each country

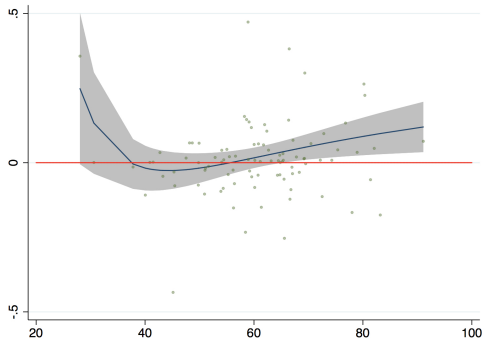
$$\text{Fiscal Capacity}_i = \alpha_0 + \alpha_1 \cdot \ln(\text{GDP per capita}_i) + \text{Relative Capacity}_i, \tag{22}$$

where GDP per capita_i is from 1995, $\text{Relative Capacity}_i$ is the error term and measures country i's fiscal capacity relative to its level of economic development, and

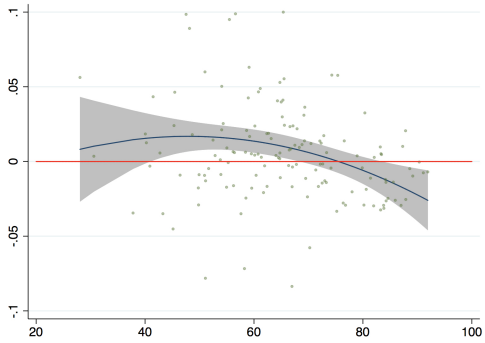
$$\text{Mean of Political Stability}_i = \beta_0 + \beta_1 \cdot \ln(\text{GDP per capita}_i) + \text{Relative Stability}_i, \tag{23}$$

where $\text{Relative Stability}_i$ is the error term and measures country i's political stability relative to its level of economic development. We then estimate a non-parametric model that is equivalent to Equation (18) while controlling for the level of economic development:

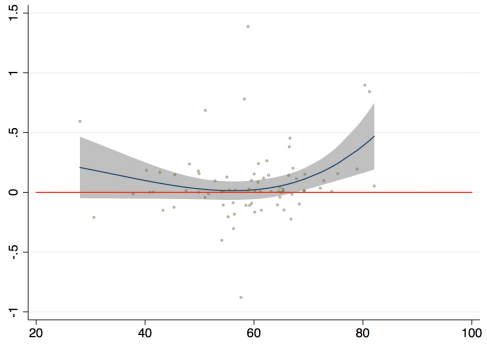
$$\widehat{\text{Relative Stability}}_i = g\left(\widehat{\text{Relative Capacity}}_i\right) + u_i, \tag{24}$$



(a) "Polity score" in Polity IV as X_{it}



(b) "Regime durability" in Polity IV as X_{it}



(c) "Executive constraints" in Polity IV as X_{it}

The horizontal axes indicate fiscal capacity, measured by the 1995 share of the formal economy in GNP; the vertical axes indicate the estimate of β_i in Equation (21), where X_{it} denotes an different variable than corruption; each dot represents a country; the best estimated fractional polynomials fitted to all scattered dots and their 95% confidence intervals are shown by the blue lines and the shaded areas, respectively.

Figure 6: Placebo test: Correlations between political stability and different variables than corruption as functions of fiscal capacity, 1996–2017

where $\widehat{\text{Relative Stability}}_i$ is the estimate of Relative Stability$_i$ in Equation (23) and $\widehat{\text{Relative Capacity}}_i$ is the estimate of Relative Capacity$_i$ in Equation (22).

For Prediction 2, following the regression of Equation (19) for each country, instead of Equation (20), we estimate the relationship between the stability–corruption correlation and the fiscal capacity relative to the level of economic development:

$$\hat{\beta}_i = h\left(\widehat{\text{Relative Capacity}}_i\right) + v_i. \tag{25}$$

Figure 7 plots the results. In Panel 7a, political stability is still increasing in fiscal capacity when the level of economic development is controlled for, except only when the relative fiscal capacity measure is at its lowest level; in Panel 7b, the control of corruption–higher political stability correlation is still positive only when the relative fiscal capacity is at the medium level. These results are consistent with our main results in Figure 5.

Capacity-group specification. To test the robustness of the main results with respect to the non-parametric specification, we examine the benchmark data with an alternative flexible specification where we group the countries by their fiscal capacity. Specifically, for Prediction 1, we run the following regression instead of Equation (18):

$$\text{Mean of Political Stability}_i = \sum_k \alpha_k \cdot \text{Capacity Group}_i^k + u_i, \tag{26}$$

where Capacity Group$_i^k$ is a dummy variable that is equal to one if country i's fiscal capacity is in group k; for Prediction 2, we run the following regression instead of Equations (19) and (20):

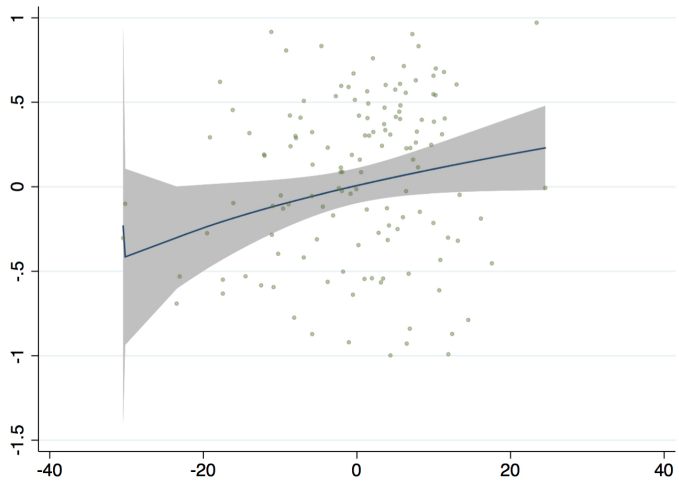
$$\text{Political Stability}_{it} = \sum_k \beta_k \cdot \text{Corruption Control}_{it} \cdot \text{Capacity Group}_i^k + \delta_i + \gamma_t + u_{it}, \tag{27}$$

where γ_t is the year-fixed effect, and, to further control for the group-specific dynamics in political stability that is not correlated with corruption, we also run

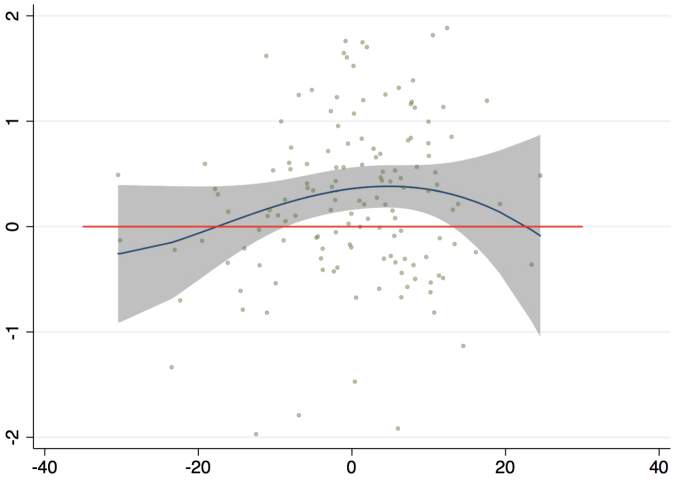
$$\text{Political Stability}_{it} = \sum_k \beta_k \cdot \text{Corruption Control}_{it} \cdot \text{Capacity Group}_i^k + \delta_i + \gamma_t^k + u_{it}, \tag{28}$$

where we replace γ_t with the group-year-fixed effect γ_t^k.

Also reported in Appendix F's Table 2, the results of these regressions are plotted in



(a) Political stability as a function of fiscal capacity, controlling for the level of economic development

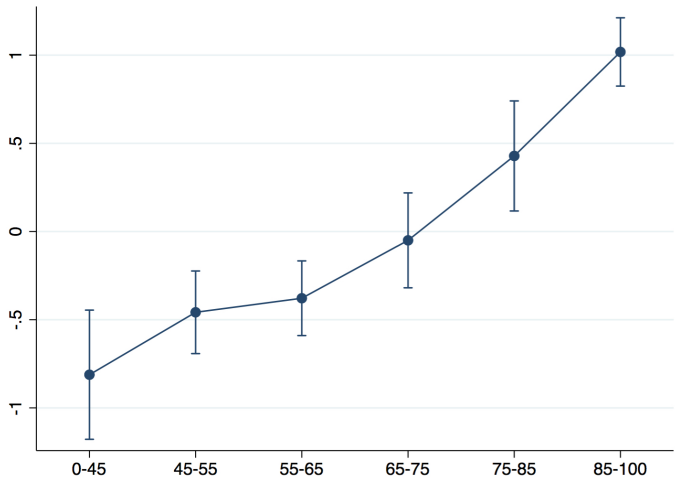


(b) Correlation between control of corruption and higher political stability as a function of relative fiscal capacity to the level of economic development

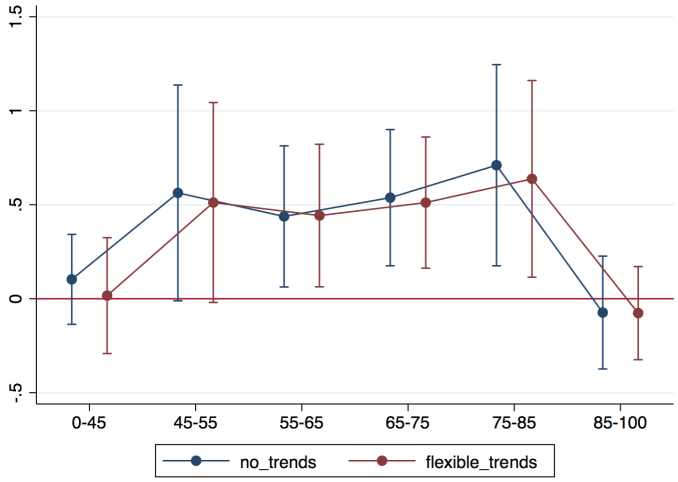
The horizontal axes indicate the estimate of Relative Capacity$_i$ in Equation (22). In the upper panel, the vertical axis indicates the estimate of Relative Stability$_i$ in Equation (23); in the lower panel, the vertical axis indicates the estimate of β_i in Equation (19). In both panels, each dot represents a country; the best estimated fractional polynomials fitted to all scattered dots and their 95% confidence intervals are shown by the blue lines and the shaded areas, respectively.

Figure 7: Political stability and corruption across fiscal capacity, 1996–2017, controlling for the level of economic development

Figure 8 here. In Panel 8a, group k of stronger fiscal capacity has a higher estimate of α_k; in Panel 8b, only the groups of medium fiscal capacity have statistically significantly



(a) Political stability across different levels of fiscal capacity



(b) Correlation between control of corruption and higher political stability across different levels of fiscal capacity

The horizontal axes indicate levels of fiscal capacity, measured by the 1995 share of the formal economy in GNP. In the upper panel, the vertical axis indicates the estimates of α_k in Equation (26), and standard errors are heteroskedasticity-robust in the regression; in the lower panel, the vertical axis indicates the estimates of β_k in Equations (27, "no trends," controlling for year-fixed effect) and (28, "flexible trends," controlling for group-year-fixed effect), and standard errors are clustered at the country level in the regressions. Both panels also plot the 95% confidence intervals of the estimates. See Table 2 in Appendix F for detailed results.

Figure 8: Political stability and corruption across fiscal capacity, 1996–2017, capacity-group specification

positive estimates of β_k, while the estimates are indistinguishable from zero for the

groups of either weak or strong fiscal capacity. The main results are thus robust.

Irregular turnovers at the top leadership for political instability. To test the robustness of the empirical pattern with respect to the measure of political stability, we now use the number of irregular turnovers at the top leadership level from Goemans et al. (2015)'s Archigos data for political instability.

On Prediction 1 in Corollary 3, Panel 9a in 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.

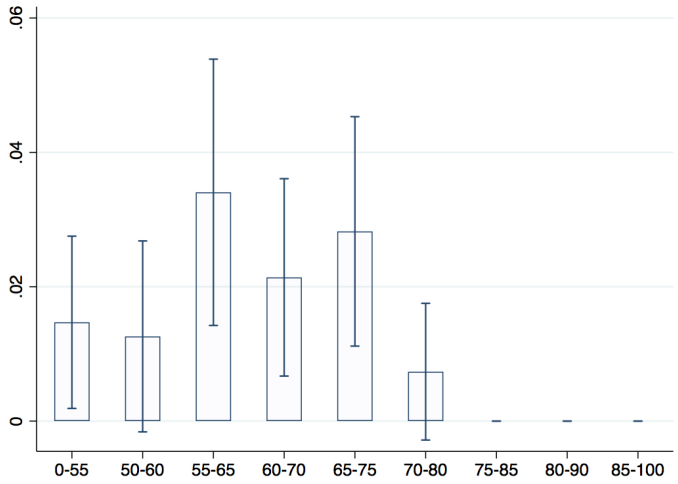
On Prediction 2, we run the regression

$$\text{Irregular Exits}_{it} = \sum_k \beta_k \cdot \text{Corruption Control}_{i,t-1} \cdot \text{Capacity Group}_i^k + \delta_i + \gamma_t + u_{it}, \quad (29)$$

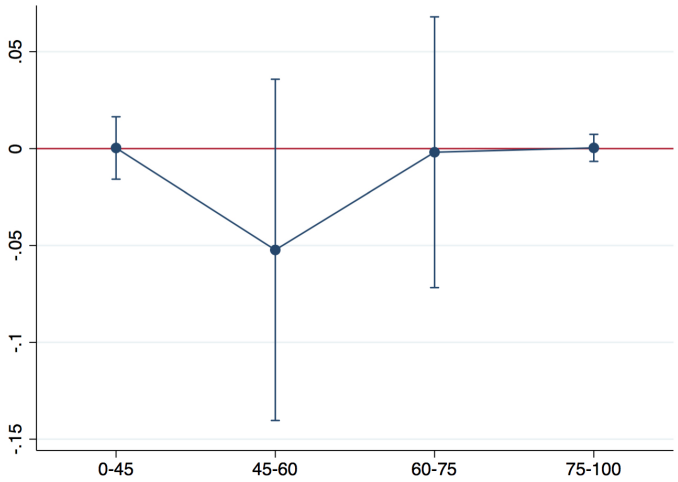
where $\text{Irregular Exits}_{it}$ is the number of irregular exits in country i in year t, and we use the lagged variable of corruption control, considering that the WGI corruption data in the year of irregular turnovers could be less indicative because of political turmoil.

As shown in Panel 9a in Figure 9, irregular turnovers are such rare events that, for a more meaningful group analysis, we need to partition the data coarsely. Panel 9b in Figure 9 reports the result when we partition the countries into only four fiscal capacity groups. In the panel, 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 Prediction 2 in Corollary 3.

Tax revenue/GDP ratio for fiscal capacity. To test how sensitive the empirical pattern is with respect to our use of the size of the formal sector to measure fiscal capacity, we examine the benchmark data by using the Baunsgaard and Keen (2005)–Besley and Persson (2011) data of the 1999 tax revenue/GDP ratio instead to measure



(a) Average of frequencies of irregular turnovers of the top leadership (times per country-year) for different levels of fiscal capacity



(b) Correlation between control of corruption and irregular turnovers for different levels of fiscal capacity

The horizontal axes indicate levels of fiscal capacity, measured by the 1995 share of the formal economy in GNP. In the upper panel, the vertical axis indicates the group average of frequencies of irregular turnovers at the top leadership level; in the lower panel, the vertical axis indicates the estimates of β_k in Equation (29). Standard errors are clustered at the country level in the regressions. Both panels also plot the 95% confidence intervals of the estimates.

Figure 9: Irregular turnover and corruption control across fiscal capacity, 1996–2014

fiscal capacity. For Prediction 1 in Corollary 3, instead of Equation (18), we estimate

$$\text{Mean of Political Stability}_i = g\left(\frac{\text{Tax Revenue}_i}{\text{GDP}_i}\right) + u_i; \tag{30}$$

for Prediction 2, following the regression of Equation (19) for each country, instead of Equation (20), we estimate

$$\hat{\beta}_i = h\left(\frac{\text{Tax revenue}_i}{\text{GDP}_i}\right) + v_i. \tag{31}$$

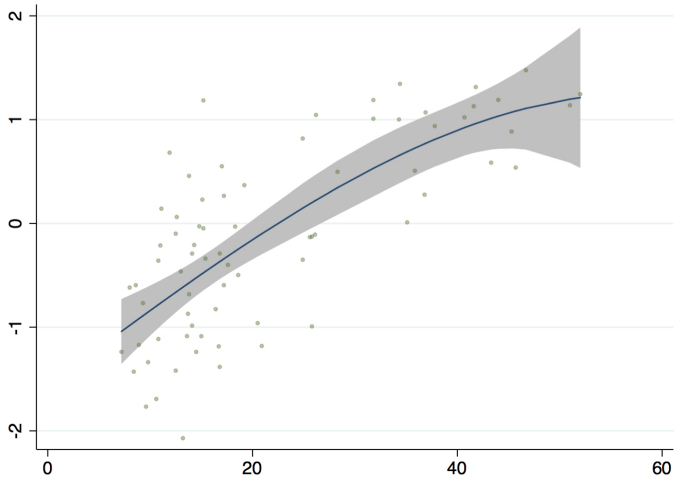
Figure 10 reports the results. The pattern is similar to Figure 5 and consistent with Corollary 3. We conclude that our main results are robust with respect to the tax revenue/GDP ratio as an alternative measure for fiscal capacity.

5 Conclusion

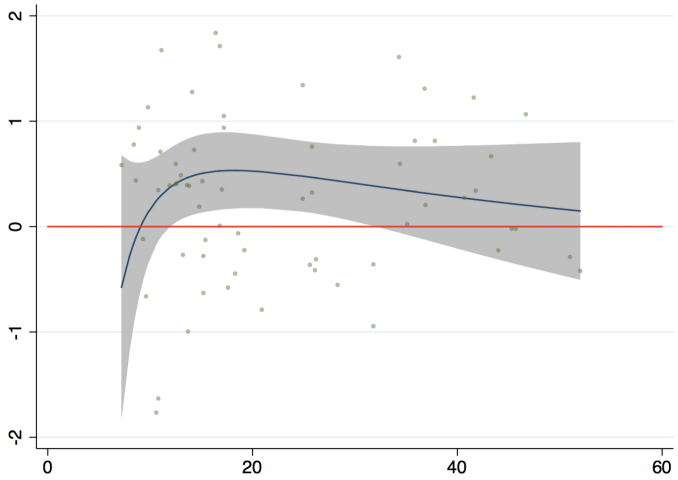
Motivated by historical observations, we focus in this paper on the corrosive effect of corruption on power within the state apparatus. We build a model to analyze its implications. We demonstrate that the head of the state apparatus can face a fundamental political–economic trade-off when deciding how 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 low fiscal capacity can be a major reason behind observed over-tolerance of corruption. Predictions of our model on the relationship between political stability, corruption, and fiscal capacity are supported by recent cross-country panel-data: political stability and fiscal capacity are in general positively correlated, while political stability and corruption are negatively correlated only at a medium level of fiscal capacity. This shows a complementarity between fiscal capacity and state power via control of corruption.

The coexistence of the trade-off and the complementarity display a subtle relationship between the *economic* dimension of state capacity in *ordinary times,* for example, the state's ability to extract rents and properly pay its affiliates, and the *political* dimension of state capacity during *states of exception,* which requires absolute control



(a) Political stability as a function of the tax revenue/GDP ratio (%)



(b) Correlation between corruption control and political stability as a function of the tax revenue/GDP ratio (%)

The horizontal axes indicate the 1999 tax revenue/GDP ratio. In the upper panel, the vertical axis indicates the country average of WGI "political stability and absence of violence/terrorism" index; in the lower panel, the vertical axis indicates the estimate of β_i in Equation (31). In both panels, each dot represents a country; the best estimated fractional polynomials fitted to all scattered dots and their 95% confidence intervals are shown by the blue lines and the shaded areas, respectively.

Figure 10: Political stability and corruption control across tax revenue/GDP ratios, 1995–2017

over the state apparatus in order to respond to crises. Corruption is at the core of this relationship.

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Appendix to "Erosion of State Power, Corruption Control, and Political Stability"

A Endogenous Component in the Center's Ability to Enforce the Status Quo

We can extend Stage 2 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 2; since R will eventually be 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

$$R - tR \leq R - sR - L, \quad \text{i.e.,} \quad L \leq (t - s)R \equiv \hat{L}(R). \tag{32}$$

Following this extension, all results from the model will hold, with t replaced by $t - s$, 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., $s < t$. Our model in the main text is a special case in which $s \equiv 0$. If $s \geq t$ otherwise, given the positive corruption rents $R \geq 0$ and exogenous status quo-enforcing loss $L > 0$, 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 problem will become trivial.

We can further provide at least two justifications for the assumption that $s < t$. 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 impose a punishment on the local official at that time. This means that s can be relatively small and even zero.

Second, given that our focus of corruption is on bribes and other exchanges of interests between the local official and the population and firms in his jurisdiction through relational building, the local official's control over the rent generation process can be relatively independent of the status quo, and the Center can be in an especially weak position 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 other 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 totally destroy the source of the rents, suggesting a relatively high s.[22] 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. This distinguishes our model of corruption tolerance from fiscal decentralization.[23]

B Thin-ended Risk of Crisis

To show the significance of the fat-tailed condition, we prove a result where a thin-ended risk of crisis can push the Center to tolerate local corruption, leaving its control in crises compromised.

Proposition 4 (Thin-ended crisis risk and compromised control)**.** *Assume $D < \bar{D}$ and $\pi_R(R;t) \geq 0$ over $R \in [0, \underline{R}]$. If there exists $\underline{L}' > \underline{L}$ such that $\epsilon < \underline{\epsilon} \equiv \min_{R \in [\underline{R}, \frac{\underline{L}'}{t}]} \frac{\pi_R(R;t) \cdot R}{\pi(R;t) - D}$ for any $L \in (\underline{L}, \underline{L}')$, then the Center's optimal choice $R^* \notin [0, \bar{R}]$, implying $S^* < 1$.*

Proof. By $\pi_R(R;t) \geq 0$ over $R \in [0, \underline{R}]$, we know that the objective function is increasing in R over $R \in [0, \bar{R}]$. By $D < \bar{D}$, $\epsilon < \underline{\epsilon}$ for any $L \in (\underline{L}, \underline{L}')$, and the proof of Proposition 2, we know that the objective function is strictly increasing in R over $R \in \left[\underline{R}, \frac{\underline{L}'}{t}\right]$. Therefore, the Center will prefer $R = \frac{\underline{L}'}{t}$ to any $R \in [0, \bar{R}]$. The proposition then follows. □

C Corruption Across Political Regimes

We run the regression

$$\text{Corruption Control}_{it} = \kappa_k \cdot \text{Regime Type}_{it}^{k} + \ln(\text{GDP per capita}_{it}) + \delta_i + \gamma_t + u_{it}, \quad (33)$$

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

[23] 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.

where Corruption Control$_{it}$ is the "control of corruption" index in the Worldwide Governance Indicators (Kaufmann and Kraay, 2018), as in Section 4, denoting how little corruption country i sees in year t; Regime Type$_{it}^{k}$ is a series of dummy variables indicating the regime type, and the data are from Geddes et al. (2014); δ_i is the country-fixed effect; γ_t is the year-fixed effect; u_{it} is the error term. The data cover 134 countries over the period 1996–2010.

Table 1 reports the results of the regression, using democracy as the benchmark, with and without the fixed effects. We see first that the variation in corruption is largely explained by cross-country variation; second, personalistic rule and corruption are correlated: when controlling for the country and year-fixed effects, two most personalistic regime types, i.e., non-monarchic personalistic rule and monarchy, are the only regime types where corruption is statistically significantly more severe than under democracy.

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 (33). 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.

D Details of the Extension with Fiscal Capacity

Figure 11 details the setup of the extended model with fiscal capacity as a retention constraint against an outside option of $x \equiv \mathbf{E}_L\left[\max\{r - tr, r - L\}\right]$ for the local official. Assuming the local official will stay when he is indifferent between staying and leaving, the local official will stay if and only if $R \geq r$.

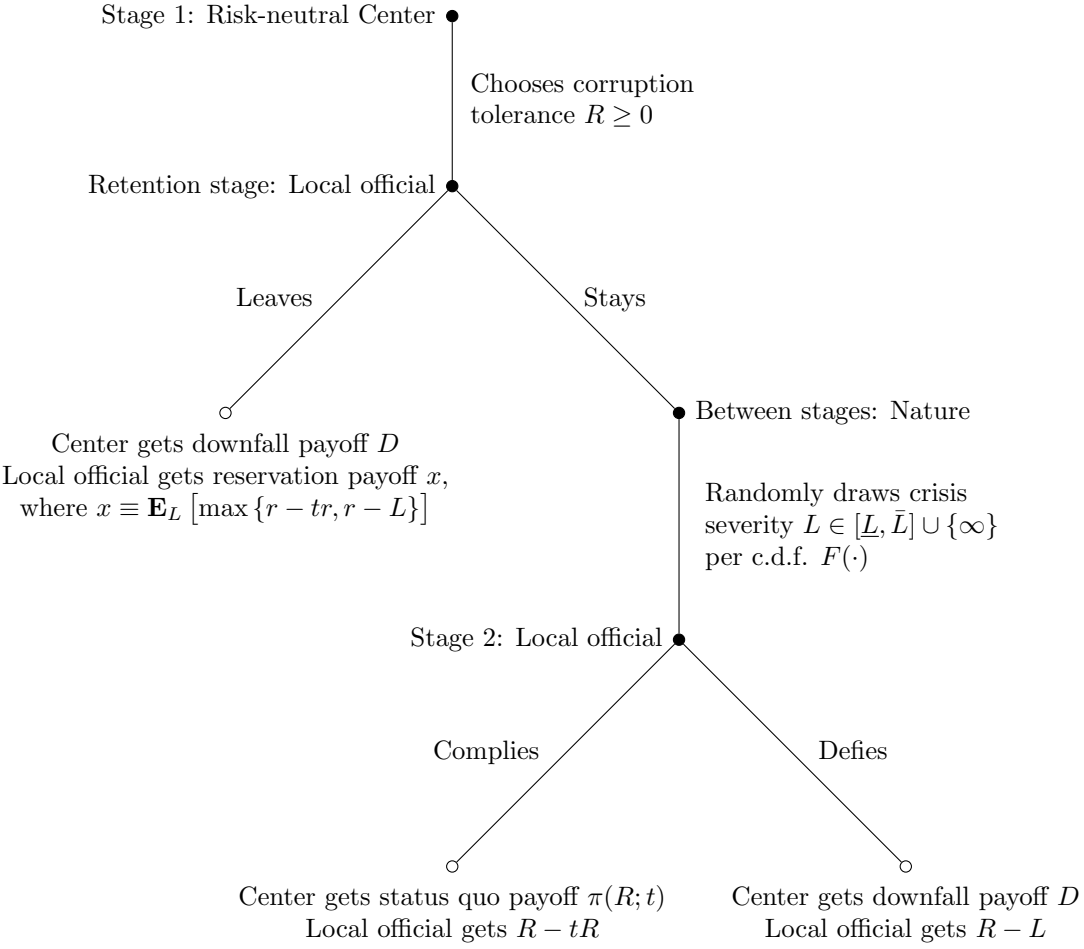

Figure 11: Setup of the extended model with fiscal capacity as a retention constraint

E Proof of Proposition 3

Proof. First, consider the case in which $r < \underline{R}$. When $R \in [0, r)$, the objective function becomes D; when $R \in [r, \underline{R}]$, the objective function becomes $\pi(R;t)$; when $R \in (\underline{R}, \bar{R})$, the objective function becomes $F\left(\hat{L}(R)\right) \cdot D + \left(1 - F\left(\hat{L}(R)\right)\right) \cdot \pi(R;t)$; when $R \geq \bar{R}$,

the objective function becomes $pD+(1-p)\,\pi(R;t)$. By $D<\bar{D}$ and $\epsilon>\bar{\epsilon}$, the objective function is decreasing in $R\in(\underline{R},\bar{R})$, so the Center will not choose $R\in(\underline{R},\bar{R})$; since $D<\bar{D}\leq\pi(\underline{R};t)\leq\max_{R\in[r,\underline{R}]}\pi(R;t)$, the Center will prefer some $R\in[r,\underline{R}]$ to any $R\in[0,r)$. The Center will then choose some $R\in[r,\underline{R}]$, instead of some $R\geq\bar{R}$, if $\max_{R\in[r,\underline{R}]}\pi(R;t)>pD+(1-p)\,\underline{D}$. This condition will hold for any $r<\underline{R}$ if $\pi(\underline{R};t)>pD+(1-p)\,\underline{D}$, i.e., $p>\bar{p}$, given $D<\underline{D}$. Note that

$$\bar{p}\equiv\frac{\underline{D}-\pi(\underline{R};t)}{\underline{D}-D}\in\left[\frac{\underline{D}-\max_{R\in[0,\underline{R}]}\pi(R;t)}{\underline{D}-D},\frac{\underline{D}-D}{\underline{D}-D}\right)=\left[\underline{p},1\right). \tag{34}$$

Therefore, under the assumptions of the proposition, if $r<\underline{R}$, the Center will always choose $R^*\in[r,\underline{R}]$ such that $R^*\in[r,\underline{R}]$ and $S^*=1$.

Second, consider the case in which $r\in[\underline{R},\bar{R})$. When $R\in[0,r)$, the objective function becomes D; when $R\in[r,\bar{R})$, the objective function becomes $F\left(\hat{L}(R)\right)\cdot D+\left(1-F\left(\hat{L}(R)\right)\right)\cdot\pi(R;t)$; when $R\geq\bar{R}$, the objective function becomes $pD+(1-p)\,\pi(R;t)$. By $D<\bar{D}$ and $\epsilon>\bar{\epsilon}$, the objective function is decreasing in $R\in[r,\bar{R})$, so the Center will not choose $R\in(r,\bar{R}]$; by $D<\bar{D}\leq\pi(R;t)$, the Center will prefer $R=r$ to any $R\in[0,r)$. The Center will then choose $R=r$ instead of $R\geq\bar{R}$, if and only if

$$F(tr)\cdot D+\big(1-F(tr)\big)\cdot\pi(R;t)\geq pD+(1-p)\,\underline{D}. \tag{35}$$

Note that the right-hand side of this condition is a constant; the left-hand side of the condition is decreasing for $r\in[\underline{R},\bar{R})$, and it becomes $\pi(\underline{R};t)$ at $r=\underline{R}$ and $pD+(1-p)\,\pi(\bar{R};t)$ at $r=\bar{R}$; also, by $p>\bar{p}$, we have $\pi(\underline{R};t)>pD+(1-p)\,\underline{D}$. Therefore, if $\pi(\bar{R};t)\geq\underline{D}$, 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 $S^*=1-F(tr)$, and R^* and S^* are negatively correlated; if $\pi(\bar{R};t)<\underline{D}$, then there exists a unique $\tilde{R}\in(\underline{R},\bar{R})$ such that

$$F(t\tilde{R})\cdot D+\left(1-F(t\tilde{R})\right)\cdot\pi(\tilde{R};t)=pD+(1-p)\,\underline{D}, \tag{36}$$

and the Center will choose $R^*=r$, if $r\in[\underline{R},\tilde{R}]$, and $R^*\geq\bar{R}$, if $r\in(\tilde{R},\bar{R})$. In the latter case, political stability is reduced to $S^*=1-p$.

Finally, consider the case in which $r\geq\bar{R}$. When $R\in[0,r)$, the objective function becomes D; when $R\geq r$, the objective function becomes $pD+(1-p)\,\pi(R;t)$. The Center will then choose some $R\geq r$ if $D<\sup_{R\geq r}\pi(R;t)$. This condition will hold

for any $r \geq \bar{R}$ if $D < \inf_{r \geq \bar{R}} \left(\sup_{R \geq r} \pi(R;t) \right) = \lim_{r \to \infty} \sup_{R \geq r} \pi(R;t) \equiv \underline{\underline{D}}$. Note that $\underline{\underline{D}} \leq \underline{D}$. Therefore, under the assumptions of the proposition, if $r \geq \bar{R}$, the Center will choose $R^* \geq r \geq \bar{R}$, implying $S^* = 1 - p$.

The proposition then follows by collecting the three cases and regroup them by $R^* \in [r, \underline{R}]$, $R^* = r$, and $R^* \geq \max\{r, \bar{R}\}$, respectively. □

F Results of the Capacity-group Specification

Table 2 reports the results of estimating Equations (26), (27), and (28), on which Figure 8 is based.

Table 2: Political stability and corruption across fiscal capacity, 1996–2017, capacity-group specification

	(1)	(2)	(3)
	Political stability	Correlation between less corruption and higher political stability	
Capacity group 1 (the weakest)	-0.812***	0.103	0.017
	(0.185)	(0.121)	(0.156)
Capacity group 2	-0.458***	0.563***	0.512*
	(0.119)	(0.291)	(0.269)
Capacity group 3	-0.378***	0.438***	0.442**
	(0.107)	(0.190)	(0.192)
Capacity group 4	-0.050	0.538***	0.511***
	(0.136)	(0.183)	(0.177)
Capacity group 5	0.429***	0.710***	0.638**
	(0.158)	(0.271)	(0.265)
Capacity group 6 (the strongest)	1.018***	-0.074	-0.077
	(0.098)	(0.152)	(0.125)
Group-specific trends	-	N	Y
N	155	2945	2945
R^2	0.284	0.369	0.380

Column (1) reports the result of estimating Equation (26), on which Figure 8a is based; Columns (2) and (3) report the results of estimating Equations (27) and (28), respectively, on which Figure 8b is based. Capacity groups are ranked from weak to strong fiscal capacity. 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.