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

Weijia Li† Gérard Roland‡ Yang Xie§

August 4, 2020

Abstract

Motivated by history, we model how corruption erodes state power. Under general assumptions about fat-tailed risk, we show that given strong fiscal capacity, the head of the state apparatus' will control local corruption at such a level that its power is secured; given weaker capacity, the state will over-tolerate corruption to retain officials, risking control in crises. Stylized facts from recent cross-country panel-data show indeed that in countries with strong fiscal capacity, political stability is uncorrelated with less corruption; for fiscally weaker states, the less corruption–higher stability correlation is significant only given medium, not too weak fiscal capacity.

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

JEL codes: D73; H12; D02.

*We thank Chong-En Bai, Liang Bai, Ying Bai, Michael Bates, Dan Bogart, Jean-Paul Carvalho, Jackie Chan, Jiahua Che, Cheng Chen, Jidong Chen, Shuo Chen, Cheng Chou, Andrew Clausen, Mike Elsby, Leonardo Felli, Patrick Francois, Jan Grobovšek, Sergei Guriev, Bård Harstad, Guojun He, Ed Hopkins, Hanwei Huang, Ruixue Jia, Urmee Khan, Tatiana Kornienko, David Lagakos, Yu-Hsiang Lei, Ernest Liu, Peter Lorentzen, Xi Lu, Ramsay MacMullen, John Moore, Monika Nalepa, Barry Naughton, Anh Nguyen, Albert Park, Di Pei, Grigore Pop-Eleches, Yingyi Qian, Xue Qiao, Abdulaziz Shifa, Victor Shih, Stergios Skaperdas, Michael Song, Eik Swee, Teck Yong Tan, Ina Taneva, Francesco Trebbi, Harald Uhlig, Jin Wang, Shaoda Wang, Shang-Jin Wei, Brian Wright, Yanhui Wu, Yinxi Xie, Daniel Xu, Guo Xu, Yiqing Xu, Bernard Yeung, Weijie Zhong, Li-An Zhou, Xueguang Zhou, and participants in seminars and workshops at BOFIT Finland, Columbia, Edinburgh, Fudan, NTU, NUS, NYU Shanghai, Princeton, SJTU, Tsinghua, UC Irvine, UCSD, and USC and the 2018 CESI, CM ES, NAM ES, NBER EASE, and WPSA and 2019 AM ES, ASSA, and SIOE Meetings for their valuable comments.

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

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

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

1 Introduction

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Besides providing historical narratives and contemporary examples, we explore on the basis of our model recent cross-country panel-data from various sources. The model first implies that for fiscally strong countries, corruption should have been controlled in a way that it would not threaten political stability. In other words, corruption should be uncorrelated with political stability. Second, when extending the view to fiscally weaker countries, countries with medium-level capacity are able to over-tolerate corruption not too much and thus survive in not too severe crises, implying a correlation between less corruption control and lower political stability; too weak countries, however, are in general unable to control corruption and vulnerable to even the least severe crises, implying political stability and corruption control to be uncorrelated, but for a different reason from the case of fiscally strong countries. These implications are consistent with the stylized facts that emerge from the data. This shows that our answers to the three questions above are not only relevant when looking at historical and contemporary cases, but can also be relevant in the current world.

The paper is organized as follows. Section 2 introduces and discusses the setup of the

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

model. Section 3 analyzes the model, derives the theoretical results, and discusses their implications. Section 4 brings the theoretical analysis to data. Section 5 concludes.

2 Setup of the Model

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

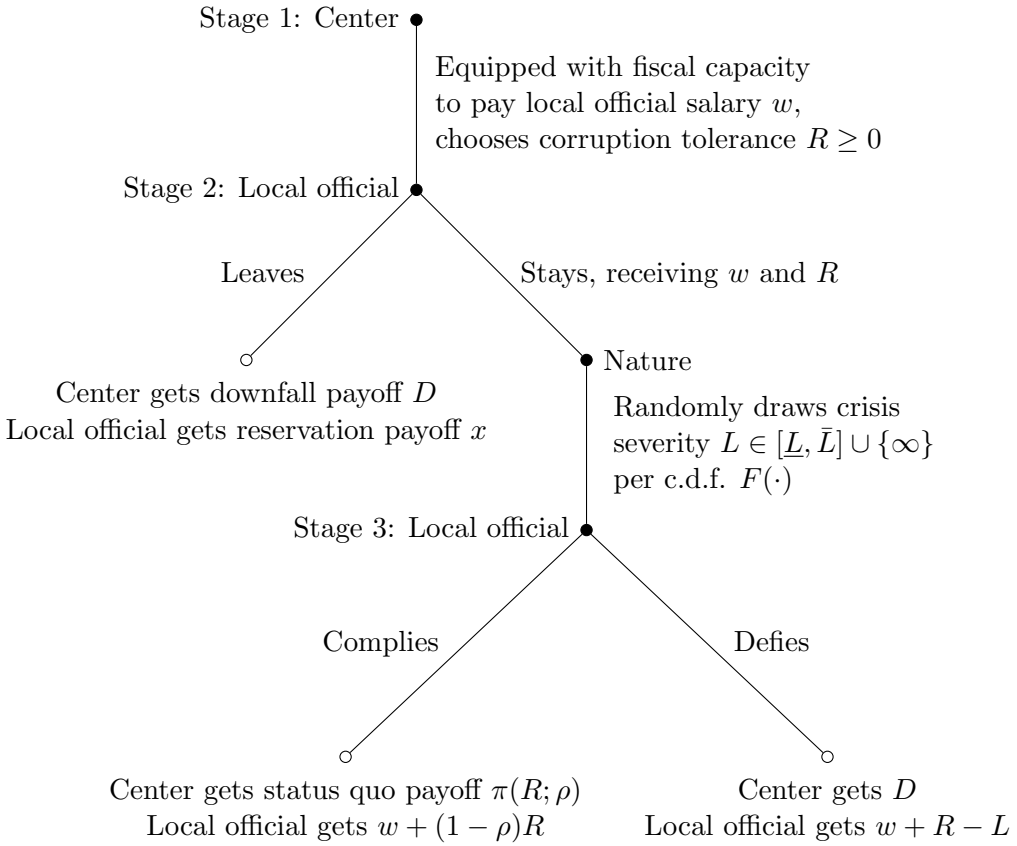


Figure 1: Extensive form of the game

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

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

payoff x.

If the local official chooses to stay, he will receive the salary $w > 0$ and also obtain the corruption rents. Nature will then randomly draw a crisis severity level L from an exogenous distribution. The crisis of this severity will then strike the Center, and the game will move into Stage 3.

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

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

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

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

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

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

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

Assumption 1 (Distribution of crisis severity)**.** *The cumulative distribution function* $F(\cdot)$ *and probability density* $f(\cdot)$ *of the crisis severity* L *satisfy:*

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

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

In reality, whether a real crisis strikes and how severe it is can be endogenous to existing corruption. We nevertheless keep the distribution of L exogenous. This is because, first, the crisis severity in reality always has an exogenous component and, second, the exogeneity highlights 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. Moreover, in the analysis of Stage 3 in Section 3.1, we show that our result is robust when the distribution of L is endogenous to the level of corruption R; in Appendix A, we extend the model to introducing, in case of defiance, an additional loss to the local official that is dependent on R, and we discuss its implications. Also, note that although the crisis severity is assumed to be exogenous, whether a crisis is consequential or not to the Center is endogenous in our model, as we show below in our analysis.

Finally, in reality, the crisis can affect the local official's salary and corruption rents. In the analysis of Stage 3 in Section 3.1, we show that our result is robust when allowing for such possibility.

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

Status quo payoff. Third, the dependence of the Center's status quo payoff $\pi(R; \rho)$ on the prevalence of corruption R can come from a few sources. First of all, the Center can value the performance of the economy because, for example, better economic performance can

generate greater tax revenues or stronger popular support, and there are arguments for both corruption "greasing" and "sanding the wheels" of the economy (e.g., Leff, 1964; Lui, 1985; Shleifer and Vishny, 1993; Mauro, 1995; Wei, 1999; Guriev, 2004; Méndez and Sepúlveda, 2006; Bai et al., 2014, 2020; Li et al., 2019). Moreover, and perhaps more importantly, the Center can also value the rents ρR that it reaps from the local official. Since the reaped rents ρR also depend on ρ, the status quo payoff also depends on the rent-sharing arrangement ρ, which is a parameter in $\pi(R;\rho)$.

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

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

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

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

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

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

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

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

Fiscal capacity. Finally, the Center's fiscal capacity is modeled as its ability to pay and retain the local official without allowing him to take bribes. It is measured by the relative amount of the local official's reservation payoff x and salary w. In the analysis of the model, we refer to the difference $x - w \in (-\infty, \infty)$ as the measure of the Center's fiscal capacity; the higher this difference, the weaker the capacity.[11]

3 Analysis of the Model

3.1 Stage 3

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

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

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

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

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

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

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

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

[11] One can argue that the level of corruption R can affect the Center's fiscal capacity through economic performance, which can be captured by $\pi(R; \rho)$. How this effect would complicate the Center's decision in Stage 1 would depend on the micro-foundation of $\pi(R; \rho)$. As we have kept $\pi(R; \rho)$ in reduced form, we keep fiscal capacity exogenous in this paper.

- *when* $\bar{R} \leq R < \infty$, $1 - F(\hat{L}(R)) = 1 - p$.

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

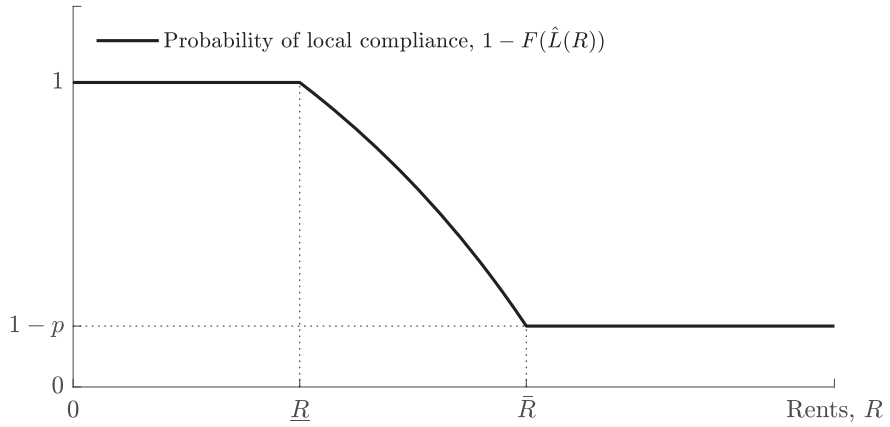


Figure 2: Corrosive impact of corruption on Center's crisis control

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

Although derived from a simple setting, the intuition behind Proposition 1 is robust to alternative settings. First, instead of rent-sharing, the status quo could require the local official to submit a fixed fee. In this setting, the probability that the local official will defy would still weakly increase with the corruption rents.[12]

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

Second, one can argue that corruption can shift the distribution of crisis severity in the wrong direction by creating more social discontent, or through other channels generating similar effects. In that case, the corruption rents would further decrease the probability of crisis control, but from an additional channel, and would not modify the thrust of our result.

Third, one can imagine that as the crisis shocks the regime, a more severe crisis could lower the local official's rents or affect her salary. In that case, as long as the post-crisis and pre-crisis rents are positively correlated given the crisis severity, the corrosive effect of corruption will still hold.[13]

Fourth, one can argue that during the collapse of the status quo the local official might lose a share of the corruption rents. As shown in Appendix A, the corrosive effect of corruption will hold, as long as this share is not too large. Appendix A further provides justifications for this condition.

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

3.2 Stage 2

The local official will stay if and only if

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

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

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

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

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

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

[13]To see this point, suppose that the salary is $w(L)$, a function of the crisis severity L, and the post-crisis rents are $R'(R, L)$, a function of the pre-crisis rents R and the crisis severity L. The defiance condition would become $w(L) + (1-\rho)R'(R, L) \leq w(L) + R'(R, L) - L$, i.e., $R'(R, L) \geq L/\rho$. Therefore, if $R'(R, L)$ is increasing in R, then the local official will defy only when R is sufficiently high.

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

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

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

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

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

1. *when $x - w \leq 0$, the local official will always stay in the state apparatus at Stage 2 regardless of the Center's choice of $R \in [0, \infty)$;*
2. *when $x - w > 0$, the local official will stay if and only if $R \geq r$, where $r > 0$ uniquely solves $X(r) = x - w$ and increases with $x - w$.*

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

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

3.3 Stage 1, Scenario 1 (No Retention Problem)

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

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

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

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

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

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

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

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

perfect crisis control first, status quo payoff second.

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

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

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

Proof. First, by Assumptions 2 and 3 and Proposition 1, the Center must prefer any $R \in [0, \underline{R}]$ to any $R \in (\bar{R}, \infty)$, because the former would secure perfect crisis control and the latter would make the Center lose any crisis control. Second, by $\hat{L}(R) = \rho R$, the Center's

expected payoff will be strictly decreasing over $R \in \big(\underline{R}, \bar{R}\big)$, if and only if the marginal gain from additional security brought by a slightly lower corruption tolerance dominates the marginal sacrifice in the status quo payoff, i.e.,

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

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

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

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

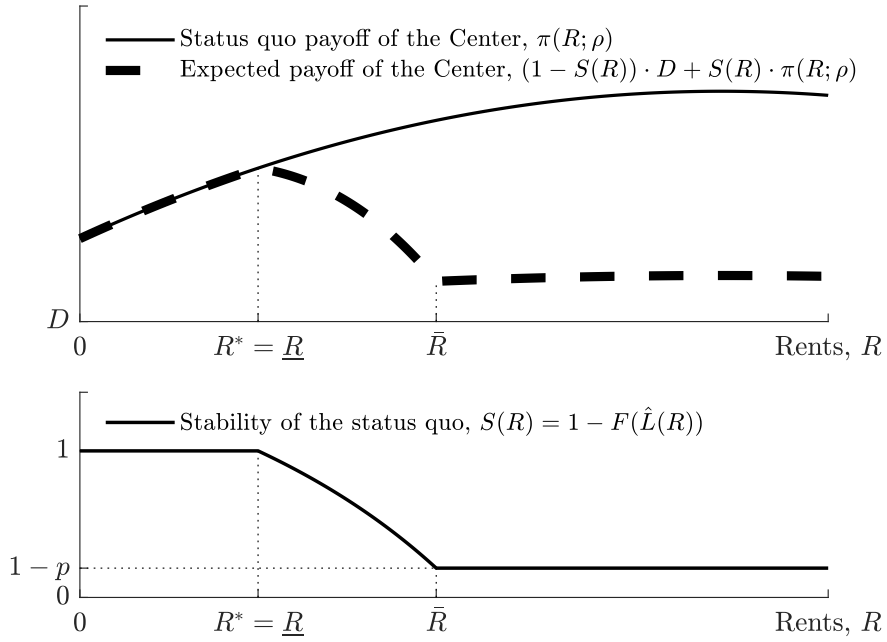


Figure 3: Center's choice of corruption tolerance (R^*) in Scenario 1 given crisis risk fat-tailed ($\epsilon > \bar{\epsilon}$) and status quo payoff increasing ($\pi_R(R;\rho) > 0$) over $R \in \big[0, \bar{R}\big]$

Figure 3 illustrates the intuition of Proposition 3 for the case where the status quo payoff increases with corruption ($\pi_R(R;\rho) > 0$) over $R \in \big[0, \bar{R}\big]$. Under Assumptions 2 and 3, the Center will prefer to avoid a total loss of crisis control, which means that it will never tolerate corruption without limit (i.e. $R^* \leq \bar{R}$). The key trade-off is that higher corruption tolerance raises the status quo payoff while weakening control in a crisis. When the crisis risk distribution is sufficiently fat-tailed or thick-ended ($\epsilon > \bar{\epsilon}$), a severe crisis is sufficiently

likely on the margin, so the gain from any additional control by lowering the corruption tolerance will always dominate the marginal sacrifice in the status quo payoff. Therefore, the Center will prefer to secure perfect control first ($R^* \leq \underline{R}$). Given that, the Center will tolerate corruption as much as possible to raise the status quo payoff, without sacrificing any control ($R^* \in [0, \underline{R}]$).

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

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

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

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

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

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

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

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

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

Finally, the fat-tailed condition $\epsilon \equiv L \cdot f(L)/(1 - F(L)) > \bar{\epsilon}$ is hardly controversial and arguably general. It suggests that the Center's perceived probability of extremely bad situations does not decrease too quickly. This is consistent with the etymology of the word *crisis* – it comes from the Greek word *κρίσις,* which means *decision,* and describes "a state of affairs in which a decisive change for ... worse is imminent" (OED2, 1989); it is consistent with the notion that "crises are difficult to learn about because they are by definition infrequent, low-probability events" (Taylor, 2009, p. 1243), often described by practitioners of power as "black swans" (e.g., Xi in People's Daily, 2019); it is also consistent with the common approach to modeling crises in the literature across disciplines (e.g., Burroughs and Tebbens, 2001; Aban et al., 2006; Barro, 2006; Resnick, 2007; Taleb, 2007; Bremmer and Keat, 2009; Taylor, 2009; Weitzman, 2009, 2011; Barro and Jin, 2011; Pindyck, 2011; Nakamura et al., 2013; Cooke et al., 2014; Ackerman, 2017).[14] Therefore, one can argue that, under sufficiently strong fiscal capacity as in Scenario 1 (no retention problem), the endogenous lexicographic rule is quite general.

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

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

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

[14]The measure we use for the tail fatness or end thickness, i.e., $\epsilon \equiv L \cdot f(L)/(1 - F(L))$, is asymptotically equivalent to the tail index in the literature (e.g., Cooke et al., 2014, p. 2) and can also apply to the finite case (e.g., Aban et al., 2006). For example, suppose L follows a uniform distribution between $\underline{L}$ and $\bar{L}$. The condition that $\epsilon > \bar{\epsilon}$ for any $L \in (\underline{L}, \bar{L})$ is thus equivalent to $\underline{L}/(\bar{L} - \underline{L}) > \bar{\epsilon}$, which means the distribution of the crisis severity is sufficiently heavy at the more severe end, consistent with the notion of catastrophic risk.

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.[15]

As another example, in Brezhnev's Soviet Union, corruption "in many cases ... [was] necessary for even the meagre levels of growth enjoyed by the state economy" (Clark, 1993, p. 278). When Moscow faced increasing economic, social, and demographic challenges in the post-Brezhnev era (Staples, 1993), however, Yuri Andropov cracked down on corruption in the Central Asian republics as "a bid ... to recapture maverick party and state organs in the republics from partial control" (Critchlow, 1988, p. 142), also consistent with Corollary 1.[16]

The paradoxical role of the Center's share of corruption rents. Second, Corollary 1 focuses on another important parameter in the model – the rent-sharing arrangement ρ. As discussed, a higher ρ proxies a more corrupt Center and a more dominant Center in the central–local relationship in the status quo. Its role in the Center's political–economic trade-off can be counterintuitive, however. On the one hand, although not modeled explicitly, the more dominant the Center is (higher ρ), the more rents it can reap from the local official (higher ρR), and the higher the status quo payoff of the Center. On the other hand, our analysis of Stage 3 shows that precisely because the Center can reap more rents from the local official (higher ρR), the local official has more vested interests to secure in a crisis. The local

[15]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).

[16]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."

official is more likely to defy the Center and end the status quo (higher $F(\hat{L}(R))$ and lower $S(R)$), and the Center has to control local corruption more tightly to secure perfect control (lower $\underline{R}$). Therefore, this paradoxical role of ρ presents a fundamental conflict between crisis control and payoffs in normal times:

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

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

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

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

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

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

Complementarity between personalistic rule and corruption. Finally, Corollary 1 can shed light on the relationship between personalistic rule and corruption. In recent years the world has seen a rising trend of personalistic regimes (e.g., Kendall-Taylor et al.,

2017; Geddes et al., 2018). The common view is that corruption is more severe in these regimes compared to other types of non-democratic regimes and in democracies (e.g., Chang and Golden, 2010); in Appendix B, we confirm this view using cross-country panel-data that cover 134 countries over 1996–2010. 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.[17] 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, shouldn't the ruler tolerate less, not more, corruption when the officials are personally tied or intrinsically more loyal to the ruler and, therefore, easier for the ruler to retain?

Our Corollary 1 explains the complementarity between personalistic rule and corruption. When the local official is personally tied to the ruler, the Center has arguably more personal leverage and, therefore, a stronger ability to force the local official to comply, suggesting a greater $\underline{L}$. One can also interpret ρ as the net share of rents that the local official will gain by defying, and a local official who is personally tied to the ruler can be assumed to incur an additional loss of rents when the ruler loses power, suggesting a smaller ρ.[18] As seen above, a smaller ρ suggests that any given level of corruption R becomes less corrosive to the Center's control, since ρR becomes smaller; a greater $\underline{L}$ also suggests that, given any ρR, the critical threshold of these interests for the Center to just start losing control in crises becomes higher. Both effects imply that, while still covering the worst possible crisis, the Center can now tolerate more corruption R^*. In other words, personalistic rule tolerates more corruption because corruption poses a lesser threat to personalistic rule.

3.4 Stage 1, Scenario 2 (Weaker Fiscal Capacity)

Proposition 3 in Scenario 1 predicts that the Center chooses corruption tolerance so that corruption does not threaten the Center's control at all. As discussed above, this result is

[17] 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.

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

quite general if one accepts the fat-tailed condition of the crisis risk. Indeed, MacMullen (2015, pref., p. 10–11) once remarked: "[a]lthough corruption has been pervasive in all times of history and even in the most powerful empires, more than often it has been under control and has not led to disastrous consequences comparable to the case of the Roman Empire."[19] That said, in many historical examples, such as those cited in the introduction, state power was not fully shielded from the corrosive effect of corruption on state power, and in "a handful of examples in human history" corruption was "as consequential as in the case of the Roman Empire" (MacMullen, 2015, pref., p. 10). Why would the Center deviate from the lexicographic rule and over-tolerate corruption?

Scenario 2 of our model helps us investigate whether fiscal capacity could play a role in the over-tolerance, since the weaker fiscal capacity in this scenario ($x - w > 0$) makes retaining the local official a real challenge for the Center. In this scenario, by Proposition 2, the Center's program at Stage 1 is

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

where

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

in which

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

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

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

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

where

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

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

We then have the following result:

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

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

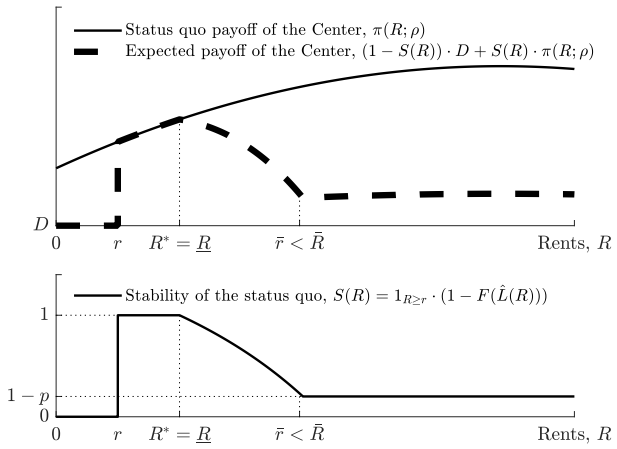
Mathematically, if $x - w > 0$, and if, for any $L \in (\underline{L}, \bar{L})$, $\epsilon > \bar{\epsilon}$, then the Center's optimal choice R^* follows:

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

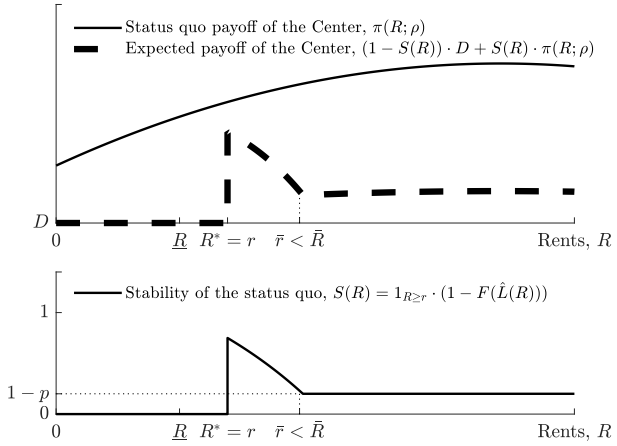
where $\bar{r} \equiv \bar{R}$, if $\pi(\bar{R}; \rho) \geq \sup_{R > \bar{R}} \pi(R; \rho)$; if otherwise, $\bar{r} \in (\underline{R}, \bar{R})$ uniquely solves

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

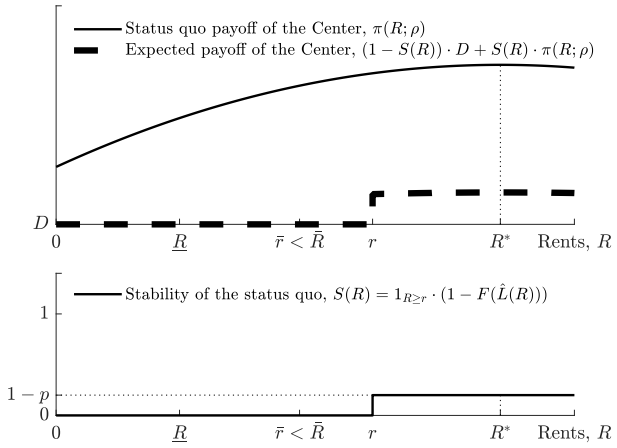
We leave the proof of Proposition 5 to Appendix C and only discuss the intuition here. Figure 4 illustrates the case where the status quo payoff increases with corruption over $R \in \big[0, \bar{R}\big]$ and $\pi(\bar{R}; \rho) < \sup_{R > \bar{R}} \pi(R; \rho)$ holds. In Panel 4a, when the state is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



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



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



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

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

that would imply a total loss of crisis control. In Panel 4c, the fiscal capacity is so weak ($x - w \geq X(\bar{r})$, i.e., $r \geq \bar{r}$) that the Center has to over-tolerate corruption so much that it will not have control in any real crisis. This yields a choice $R^* \in \arg\max_{R \geq \max\{r, \bar{R}\}} \pi(R; \rho)$.

For the case where $\pi(\bar{R}; \rho) \geq \sup_{R > \bar{R}} \pi(R; \rho)$, $\bar{r}$ will be differently defined, and all the intuitions spelled out above go through. For the case where the status quo payoff does not always increase with corruption over $R \in \left[0, \bar{R}\right]$, 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 other intuitions go through.

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

3.5 Two Scenarios Combined

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

Corollary 3 (Corruption and political stability in a fiscally strong state)**.** *In equilibrium, higher political stability and less corruption are uncorrelated when fiscal capacity is strong.*

[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 between the size of the shadow economy and the amount of corruption is strong and consistent, as different measures show."

Mathematically, when $x - w < X(\underline{R})$, $S'(R^*) = 0$.

Corollary 4 (Corruption and political stability in a fiscally weaker state)**.** *In equilibrium, higher political stability and less corruption are correlated when fiscal capacity is at an intermediate level, while uncorrelated when fiscal capacity is too weak. Mathematically, when* $X(\underline{R}) \leq x - w < X(\bar{r})$, $S'(R^*) < 0$*;* $x - w \geq X(\bar{r})$, $S'(R^*) = 0$.

4 Exploration of Stylized Facts

When bringing the model to the data, one may want to directly test the comparative statics of our model in Corollary 1 by exploiting exogenous changes in the Center's perception of crisis risk, extent of personalistic rule, and Center–local power structure in the status quo. It is, however, difficult to locate these changes in a setting that is more general than a case study. We therefore explore cross-country panel-data to check, first, whether empirical patterns are consistent with Corollary 3, which is about states that are fiscally strong. We then extend the exploration to other countries that have weaker fiscal capacities, checking whether we find stylized facts consistent with Corollary 4.

4.1 From Model to Data

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.[21]

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

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

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

To apply the notion of fiscal capacity in our model to data, we consider two reduced-formed relationships

$$w_i = \ln\left(\alpha_w \cdot \text{Formal Economy Size}_i\right) \text{ and } x_i = \ln\left(\alpha_x \cdot \ln\left(\text{GDP per capita}_i\right)\right). \tag{19}$$

In the first relationship, w_i is the salary that the state can pay the local official in our model for country i; $\alpha_w > 0$ is a constant; Formal Economy Size$_i$ is the share of the formal economy of a country in its GNP in 1995, which is estimated by Medina and Schneider (2018). This characterization is consistent with Besley and Persson (2011)'s adoption of an early version of Medina and Schneider (2018)'s estimates (Schneider, 2002) as a primary measure of fiscal capacity in their analysis. The coverage of 158 countries in Medina and Schneider (2018) yields a balanced set of panel data that covers as many countries as possible, and the year 1995 is chosen to be one year before 1996, the year the WGI data start.

In the second relationship, x_i is the reservation payoff of the local official in our model; $\alpha_x > 0$ is a constant; GDP per capita$_i$ is purchasing power parity adjusted, in 1995, and from the World Bank. This describes the officials' outside options as depending on the level of economic development. The difference between w_i and x_i is thus

$$w_i - x_i = \ln\left(\frac{\alpha_w}{\alpha_x}\right) + \ln\left(\frac{\text{Formal Economy Size}_i}{\ln\left(\text{GDP per capita}_i\right)}\right), \tag{20}$$

which is increasing in the ratio of the formal economy size over the natural logarithm of GDP per capita. We can then use this ratio

$$\text{Fiscal Capacity}_i \equiv \frac{\text{Formal Economy Size}_i}{\ln\left(\text{GDP per capita}_i\right)} \tag{21}$$

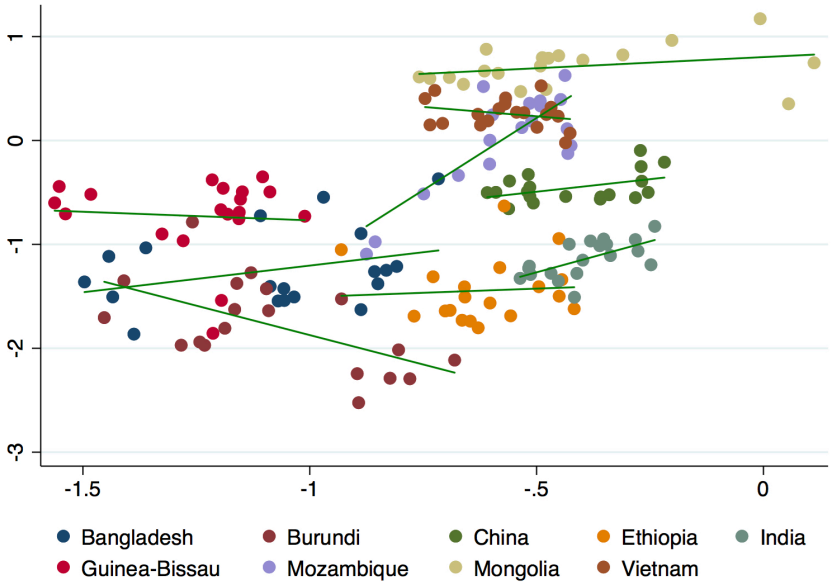
to measure the fiscal capacity in our model, where a higher value suggests stronger fiscal capacity.

Merging all these data, we use in our benchmark empirical analysis the WGI panel-data of political stability and corruption across 150 countries over the 1996–2017 period and these countries' 1995 proxies of their fiscal capacity. As we go along, we will also incorporate other data, including a series of country characteristics and alternative measures for political stability and fiscal capacity.

4.2 Exploration of Countries with the Strongest Fiscal Capacities

A main insight from our model is that given strong fiscal capacity, the state will control corruption so that it will not threaten its political stability; Corollary 3 suggests that political

stability and corruption are uncorrelated within these fiscally strong states. To examine whether this is the case, we explore the data of those countries that, by our measure, have the strongest fiscal capacities among all the countries in the data, i.e., they have the largest shares of formal economy in their GNP in 1995 relative to their levels of economic development at that time.



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. The nine countries have the strongest fiscal capacity, measured by the 1995 ratio of the share of formal economy in GNP over log-GDP per capita. A linear fit is shown for each country.

Figure 5: Political stability and corruption, 1996–2017, countries with the strongest fiscal capacities

We start with plotting in Figure 5 the raw data of political stability and corruption for these countries. As plotting too many countries would make the figure less readable, we plot the top-nine countries in the data by their fiscal capacities. Figure 5 first shows that within each of the nine countries, there is generally considerable variation in the level of corruption over time. Second, and more importantly, only for Mozambique is less corruption strongly correlated with higher political stability, and only for Burundi is less corruption strongly correlated with lower political stability, while the corruption–stability correlation is generally flat for the other seven countries. This pattern is largely consistent with Corollary 3.

To check whether this pattern survives more rigorous statistical analysis, we run the

following regression using the panel data of these nine countries:

$$\text{Political Stability}_{it} = \beta \cdot \text{Corruption Control}_{it} + \delta_i + \gamma_t + u_{it}, \tag{22}$$

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, γ_t is the year-fixed effect, and u_{it} is the error term. Column (1) in Table 1 shows the result: the estimate of β is insignificantly different from zero, which is consistent with Corollary 3.

Table 1: Within-country stability–corruption correlations, 1996–2017, countries with the strongest fiscal capacity

	(1)	(2)	(3)	(4)
	Top-9-capacity countries		Top-18-capacity countries	
	Political Stability			
Corruption control	0.155	−0.241	0.502	−0.082
	(0.389)	(0.338)	(0.336)	(0.247)
Rule of law		0.856*		0.962***
		(0.448)		(0.223)
Year-fixed effect	Y	Y	Y	Y
Country-fixed effect	Y	Y	Y	Y
N	171	171	342	342
R^2	0.065	0.215	0.106	0.296

Columns (1) and (3) report estimates of Equation (22); Columns (2) and (4) report estimates of Equation 23, where Z_{it} is the WGI "rule of law" index; Columns (1) and (2) are obtained from the data of the top-nine countries that have the strongest fiscal capacities, measured by the 1995 ratio of the share of formal economy in GNP over log-GDP per capita; Columns (3) and (4) are obtained from the data of the top-18 countries that have the strongest fiscal capacities. 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.

One may wonder whether the lack of within-country correlation between corruption and stability is robust with respect to the size of the sample. To address this concern, we double the size of the sample by running the same regression using the panel-data of the top-18 countries that have the strongest fiscal capacities. The result in Column (3) in Table 1 shows that the within-country correlation between corruption and political stability is still insignificant, consistent with Corollary 3.

One may also argue that the lack of within-country correlation between corruption and

stability may be driven by a potential lack of within-country variation in the political stability measure. To address this concern, we conduct a placebo test: for the countries that have the strongest fiscal capacity, we run the following regression:

$$\text{Political Stability}_{it} = \beta \cdot \text{Corruption Control}_{it} + \zeta \cdot Z_{it} + \delta_i + \gamma_t + u_{it}, \tag{23}$$

where Z_{it} is a different variable from $\text{Corruption Control}_{it}$ and $\text{Political Stability}_{it}$. If there exists Z_{it} such that the estimate of ζ is significantly different from zero, we can then argue that the lack of within-country correlation between corruption and stability is unlikely to be driven by a lack of within-country variation in the political stability measure.

Columns (2) and (4) in Table 1 show an example of the placebo test, in which Z_{it} is the WGI "rule of law" index, using the panel-data of the top-nine-capacity countries and the top-18-capacity countries, respectively. In both columns, the within-country correlation between political stability and Z_{it}, i.e., rule of law, is significantly different from zero, and the stability–corruption correlation is still insignificant. This suggests that the lack of within-country correlation between corruption and stability is unlikely to be driven by a lack of within-country variation in the political stability measure.

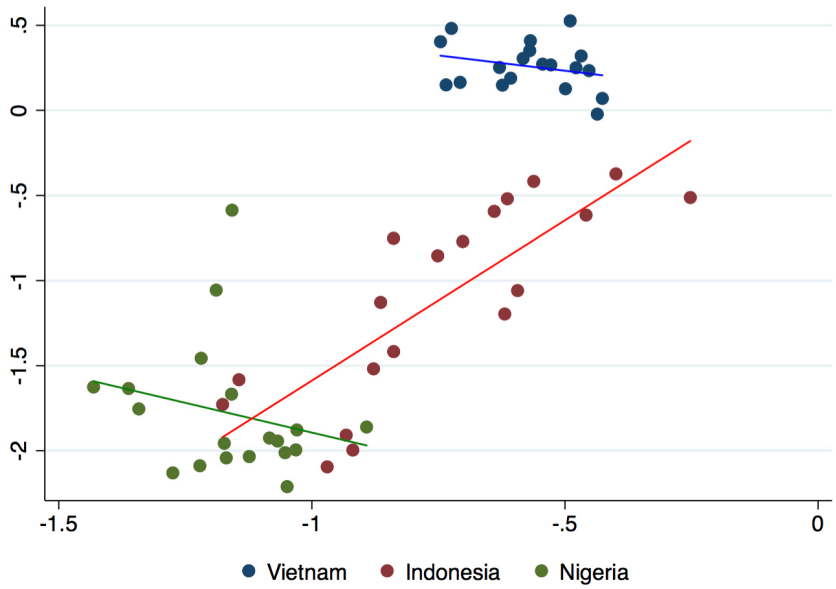
The above exploration suggests the existence of a stylized fact within the countries that, by our fiscal capacity measure, have the strongest fiscal capacity: the correlation between political stability and the level of corruption is insignificant. This stylized fact is consistent with Corollary 3 and the main insight from our model.

4.3 Extension to Countries with Weaker Fiscal Capacities

The other main insight from our model, reflected in Corollary 4, is that when fiscal capacity cannot support the full-security control of corruption, the state has to over-tolerate corruption; how this over-tolerance would erode political stability depends on how short fiscal capacity falls. We now extend our exploration to countries that have weaker fiscal capacities.

We still start with plotting the raw data of political stability and corruption, but this time we focus in Figure 6 on an illustrative example including only three representative countries: Vietnam, Indonesia, and Nigeria, representing countries with strong, medium, and weak fiscal capacities, respectively, by our measure; indeed, Vietnam, Indonesia, and Nigeria rank the 1st, 23rd, and 146th, respectively, among 150 countries by their 1995 ratios of the share of formal economy in GNP over log-GDP per capita.

In Figure 6, as we have shown in Figure 5, Vietnam does not exhibit much correlation between corruption and political stability. Not only that, for Indonesia, less corruption and higher political stability are significantly correlated; for Nigeria, corruption does not correlate



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 ratio of the share of formal economy in GNP over log-GDP per capita, Vietnam has strong fiscal capacity, Indonesia has medium fiscal capacity, and Nigeria has weak fiscal capacity. A linear fit is shown for each country.

Figure 6: Political stability and corruption, 1996–2017, three representative countries,

with stability, again. This observation is consistent with Corollary 4.

We interpret this example according to our model: a fiscally strong state like Vietnam would control corruption to the extent that corruption would not threaten political control; a fiscally weaker state like Indonesia has to tolerate some corruption, sacrificing its control; a fiscally too weak state like Nigeria has to tolerate corruption to the extent that the state apparatus would become extremely vulnerable, losing control almost surely in crises. Admittedly, for each of the three ranges of fiscal capacity, one may propose alternative explanations to the within-country corruption–stability correlation or the lack of it, but it appears difficult to us that one single alternative theory could explain the three-phase pattern as a whole.

We now go beyond this illustrative example and explore whether this pattern generally holds among all the 150 countries in our data. To do so, we first run the following regression for each country:

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

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. After obtaining the estimated within-country corruption–stability correlation $\hat{\beta}_i$ for each country, we then estimate across all the countries

$$\hat{\beta}_i = h(\text{Fiscal Capacity}_i) + v_i, \tag{25}$$

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

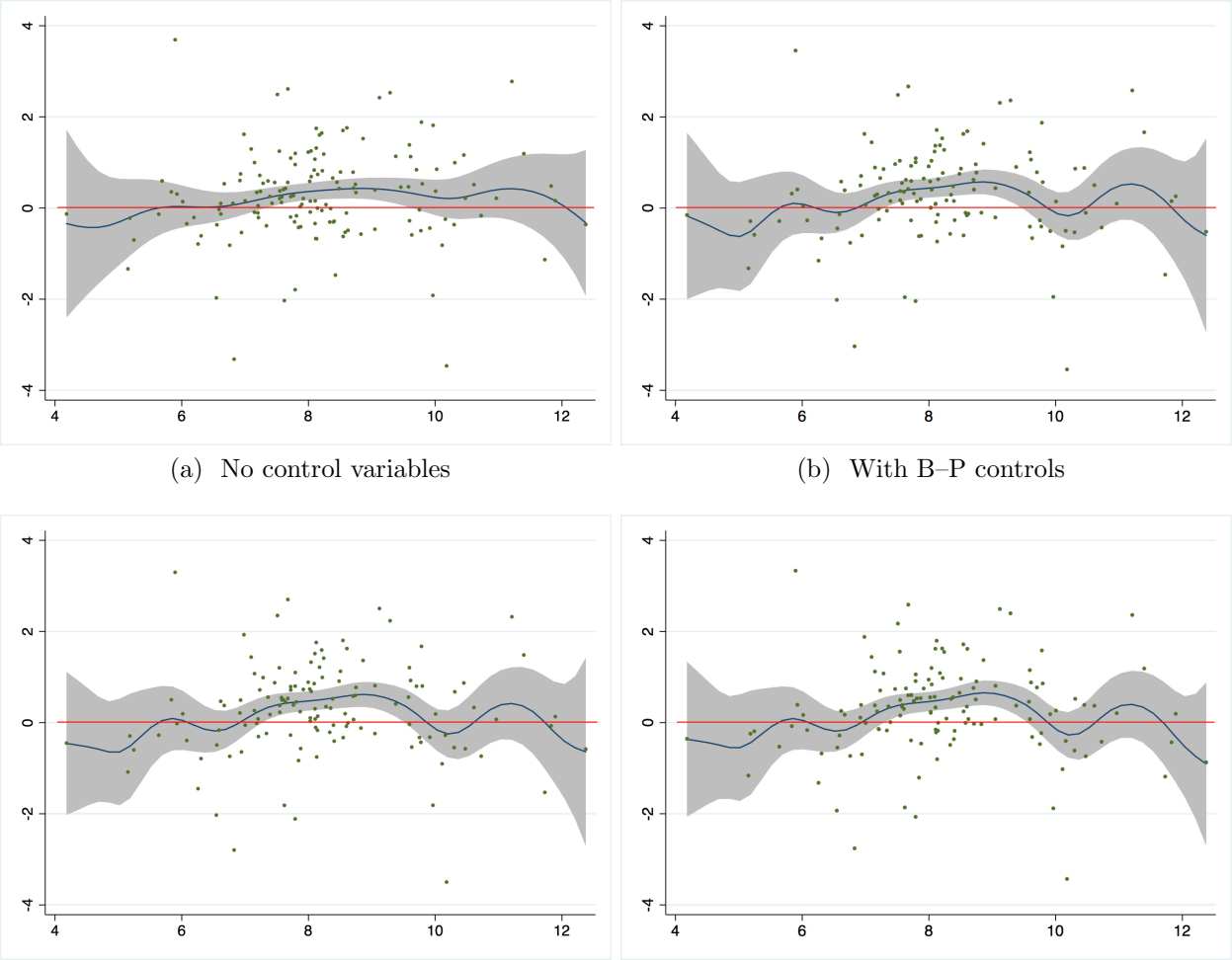
Panel (a) in Figure 7 shows the result. In the figure, the predicted within-country correlation between control of corruption and higher political stability is statistically insignificant when fiscal capacity is strong, consistent with Corollary 3; consistent with Corollary 4, the predicted correlation is statistically significant when fiscal capacity is at an intermediate level, and becomes insignificant again when fiscal capacity is weak. The three-phase pattern in Figure 6 then holds beyond the three representative countries.

Although it appears difficult to us to think of a specific variable that would drive this three-phase relationship between fiscal capacity and the corruption–stability correlation, we further examine whether this pattern is robust to adding more control variables when estimating Equation (25). We add three sets of control variables, step by step. First, we introduce the six "B–P controls" that Besley and Persson (2011) use to proxy factors that their conceptual framework lists as affecting fiscal capacity while not being affected by it (Besley and Persson, 2011, Fig. 1.7).[22] We then add six "WGI controls," i.e., all six WGI indices, including "voice and accountability," "political stability," "government effectiveness," "regulatory quality," "rule of law," and "control of corruption." Finally, since Panel (a) in Figure 7 depicts a non-monotonic relationship, we add the square terms of all the B–P–WGI controls. There are thus 24 control variables in total.

Panels (b), (c), and (d) in Figure 7 plot the results of this robustness check. The pattern in Panel (a) is always robust: the predicted correlation between less corruption and higher stability is significantly positive only when fiscal capacity is at the medium level, while insignificantly different from zero when fiscal capacity is strong or weak.

We have thus shown in our benchmark data that there exist robust stylized facts that are consistent with Corollaries 3, 4, and the main insights from our model.

[22]The six variables are the proportion of years in external conflict up to 2000 and ethnic fractionalization; average executive constraints up to 2000 and high executive constraints; aid/GDP ratio; and average non-open executive recruitment up to 2000. These variables proxy four factors, respectively, i.e., common versus redistributive interests, cohesiveness of political institutions, aid independence, and competitiveness of executive recruitment. For the sources of these data, see Besley and Persson (2011).



(a) No control variables

(b) With B–P controls

(c) With B–P and WGI controls

(d) With B–P and WGI controls and their squares

Panel (a) plots the result of estimating Equation (25); Panel (b) to (d) plot the results when the B–P controls, the WGI controls, and their square terms are added to Equation (25), step by step. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1995 ratio of the share of formal economy in GNP over log-GDP per capita; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in Equation (25); the blue line plots the prediction of $h(\cdot)$ and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 7: Within-country correlation between control of corruption and higher political stability, as a function of fiscal capacity, 1996–2017

4.4 Further Exploration with Alternative Measures

4.4.1 Alternative Measure of Political (In)stability

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

(Goemans et al., 2009, p. 273).

As irregular turnovers are such rare events, we cannot obtain estimates of β_i in Equation (24) for most countries that lack any irregular turnover. We estimate instead

$$\text{Irregular Exits}_{it} = \sum_k \beta_k \cdot \text{Corruption Control}_{i,t-1} \cdot \text{Capacity Group}_i^k + \delta_i + \gamma_t + u_{it} \quad (26)$$

using the panel-data, where $\text{Irregular Exits}_{it}$ is the number of irregular exits in country i in year t; we use the lagged variable of corruption control, considering that the WGI corruption data in the year of irregular turnovers could be less indicative because of political turmoil; $\text{Capacity Group}_i^k$ is a dummy variable that is equal to one if country i's fiscal capacity is in group k; γ_t is the year-fixed effect.

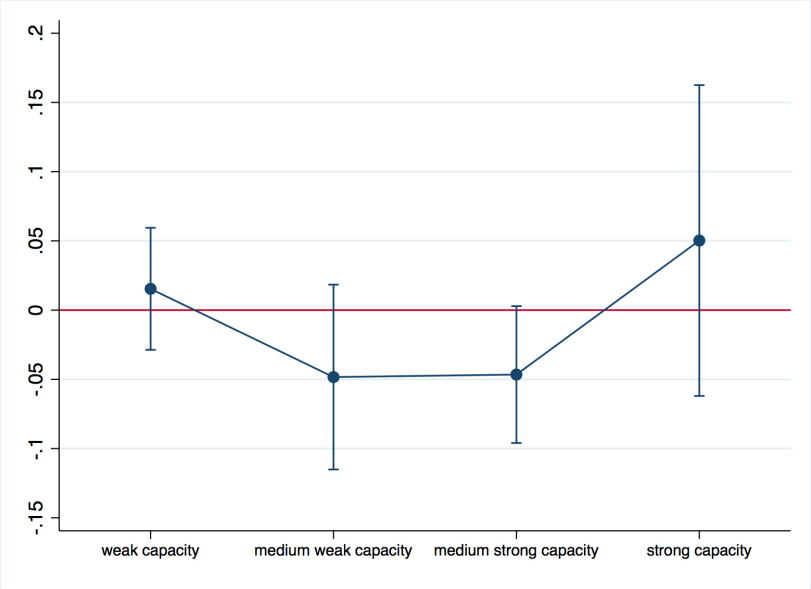
Appendix D reports examples of the results when we divide all countries into capacity-groups in alternative ways, and Figure 8 plots them. In Panel (a), the estimated within-country correlation between control of corruption and irregular turnovers is insignificantly different from zero for the strong-capacity group, consistent with Corollary 3; the estimated correlation is also insignificantly different from zero for the weak-capacity group, consistent with Corollary 4. The estimates for the two medium-capacity groups are negative; although both are insignificant at the 0.05 level, the one for the medium-strong capacity group in Appendix D is significant at the 0.1 level. The significance is fully restored in Panel (b) when we merge the two medium-capacity groups into one group: for the medium-capacity group, less corruption and fewer irregular turnover are significantly correlated, consistent with Corollary 4.[23] Overall, the stylized facts in Sections 4.2 and 4.3 largely survive when we measure political instability by counts of irregular turnovers.

4.4.2 Alternative Measures of Fiscal Capacity

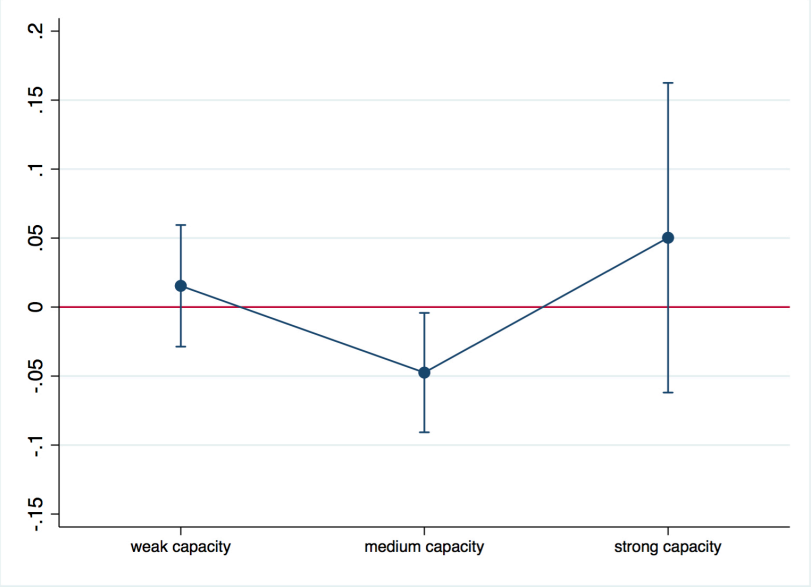
To explore how sensitive our main empirical result is to our use of the size of formal economy relative to the level of economic development as the primary measure of fiscal capacity, we examine two alternative measures of fiscal capacity.

Size of formal economy. First, as Besley and Persson (2011) use Schneider (2002)'s estimates of the share of formal economy in GNP to measure fiscal capacity, we use directly the updated estimates in Medina and Schneider (2018) for 1995 without dividing them by the level of economic development.

[23] In the exercise we exclude Georgia, the outlier that has the weakest fiscal capacity by our measure: its level of fiscal capacity is 2.7 times the standard deviation away from the sample mean. The result for the lowest-capacity group is sensitive to whether Georgia is excluded; all results are insensitive to whether any



(a) Four capacity-groups

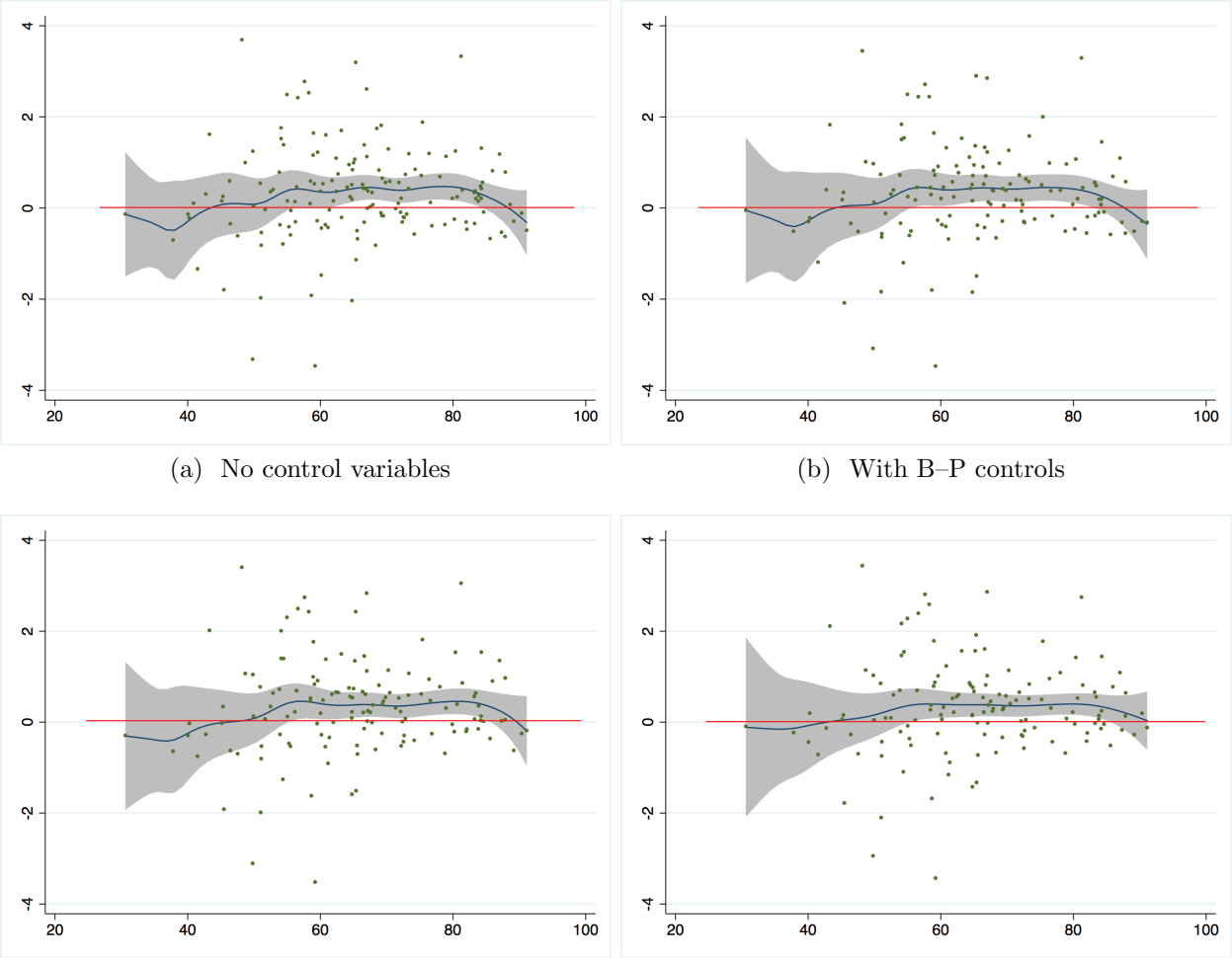


(b) Three capacity-groups

Panel (a) plots the result of estimating Equation (26) when countries are divided into four capacity-groups, i.e., Fiscal Capacity$_i \leq 7$, $7 <$ Fiscal Capacity$_i \leq 8$, $8 <$ Fiscal Capacity$_i \leq 9.5$, and Fiscal Capacity$_i > 9.5$, where fiscal capacity is measured by the 1995 ratio of the share of formal economy in GNP over log-GDP per capita; Panel (b) plots the result when the two medium-capacity groups are merged into one group. In each panel, the horizontal axis indicates fiscal-capacity groups; the vertical axis indicates the estimates of β_k in Equation (26); the 95% heteroskedasticity-robust confidence intervals of the estimates are plotted. In the regressions, standard errors are clustered at the country level, and the results are reported in Appendix D.

Figure 8: Within-country correlation between control of corruption and irregular turnovers, across different levels of fiscal capacity, 1996–2014

other single country is excluded.



(a) No control variables

(b) With B–P controls

(c) With B–P and WGI controls

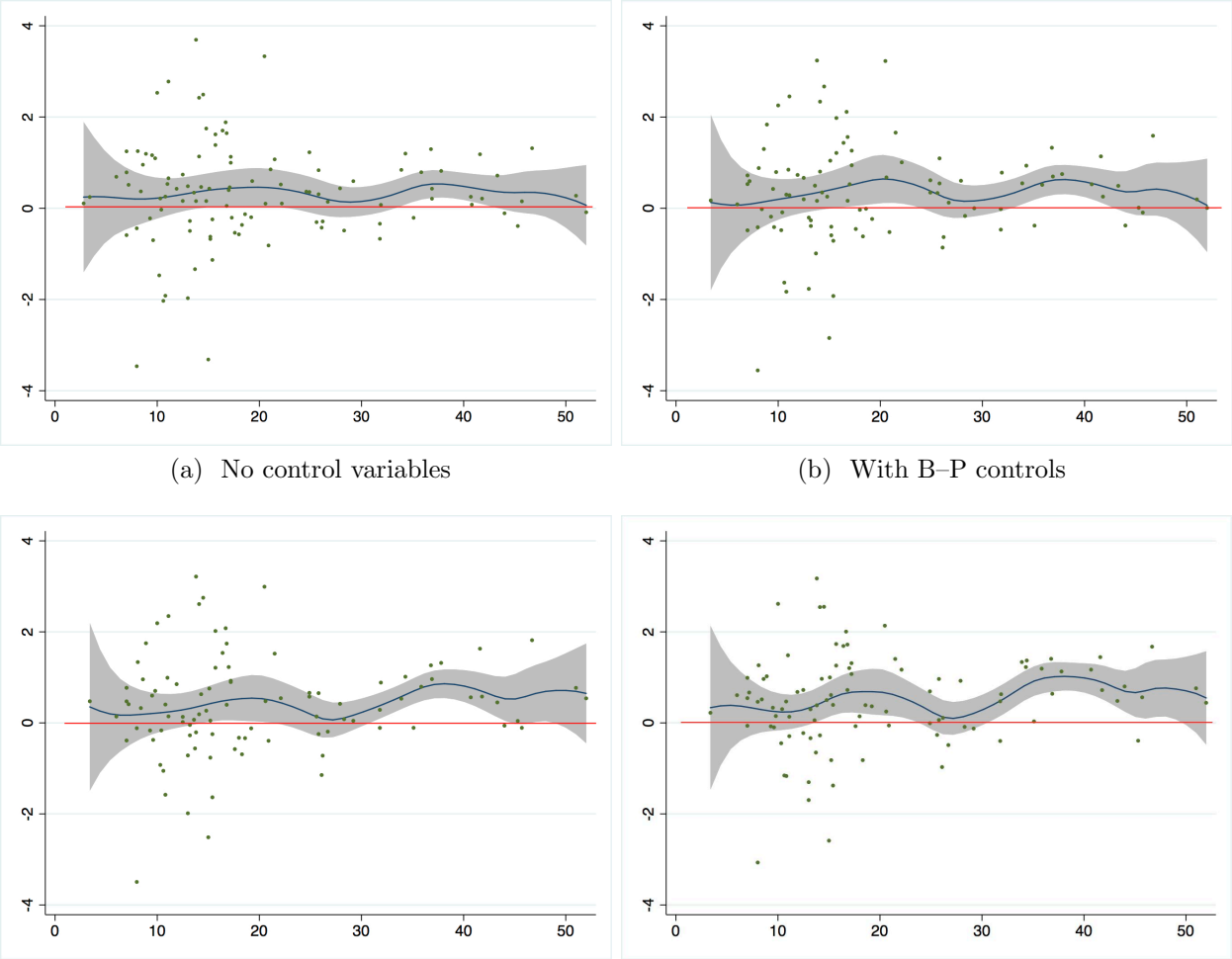
(d) With B–P and WGI controls and their squares

Panel (a) plots the result of estimating Equation (25); Panel (b) to (d) plot the results when the B–P controls, the WGI controls, and their square terms are added to Equation (25), step by step. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1995 share of formal economy in GNP; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in Equation (25); the blue line plots the prediction of $h(\cdot)$ and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 9: Within-country correlation between control of corruption and higher political stability, as a function of fiscal capacity, 1996–2017, fiscal capacity alternatively measured by the 1995 share of formal economy in GNP

Figure 9 reports the result when we redo the analysis in Figure 7 while using this alternative measure of fiscal capacity. Still, in all four panels, the within-country correlation between corruption and political stability is predicted to be insignificant when fiscal capacity is strong; it becomes significant when fiscal capacity is medium, while becomes insignificant again when fiscal capacity becomes weak. This pattern is consistent with the stylized facts shown in Sections 4.2 and 4.3.

Tax revenue/GDP ratio. Second, we use instead Besley and Persson (2011)'s data of the 1999 tax revenue/GDP ratio of the countries from Baunsgaard and Keen (2005), where a higher ratio indicates stronger fiscal capacity.



(a) No control variables

(b) With B–P controls

(c) With B–P and WGI controls

(d) With B–P and WGI controls and their squares

Panel (a) plots the result of estimating Equation (25); Panel (b) to (d) plot the results when the B–P controls, the WGI controls, and their square terms are added to Equation (25), step by step. In each panel, the horizontal axis indicates fiscal capacity, measured by the 1999 tax revenue/GDP ratio; each dot represents a country and its vertical value indicates the estimate of $h(\text{Fiscal Capacity}_i) + v_i$ in Equation (25); the blue line plots the prediction of $h(\cdot)$ and the grey area plots the 95% heteroskedasticity-robust confidence interval of the prediction.

Figure 10: Within-country correlation between control of corruption and higher political stability, as a function of fiscal capacity, 1996–2017, fiscal capacity alternatively measured by the 1999 tax revenue/GDP ratio

Figure 10 reports the result: the predicted correlation is insignificantly different from zero when the tax revenue/GDP ratio is sufficiently high or low, and it is still generally significantly positive at the medium level of the ratio, except for a dip into the insignificant

area when the tax revenue/GDP ratio is slightly lower than 30%. This pattern is mostly consistent with the stylized facts shown in Sections 4.2 and 4.3, again.

5 Conclusion

Motivated by historical observations, we focus in this paper on the corrosive effect of corruption on power within the state apparatus. We build a model to analyze its implications and the role of fiscal capacity in dealing with state erosion. 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, securing perfect control in crises. Comparative statics further sheds light on the impact of additional crisis risk on corruption control, the complementarity between personalistic rule and corruption, and implications of corruption within the Center and the dominance of the Center in the status quo. This lexicographic rule is, however, not always feasible, and weak fiscal capacity can be a major reason behind the over-tolerance of corruption.

Our model primarily implies that political stability and corruption are uncorrelated in a fiscally strong country, which is consistent with the stylized fact that emerges from the recent cross-country panel data. When extending the empirical exploration to countries that are fiscally weaker, we find that political stability and more corruption are generally negatively correlated in countries of medium-level fiscal capacity, while generally uncorrelated in fiscally very weak countries. Both findings are consistent with the model, too.

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

References

Aban, Inmaculada B., Mark M. Meerschaert, and Anna K. Panorska. 2006. Parameter estimation for the truncated Pareto distribution. *Journal of the American Statistical Association* **101**: 270–277.

Acemoğlu, Kamer Daron. 2005. Politics and economics in weak and strong states. *Journal of Monetary Economics* **52**: 1199–1226.

Acemoğlu, Kamer Daron, Camilo Garcia-Jimeno, and James A. Robinson. 2015. State capacity and economic development: A network approach. *American Economic Review* **105**: 2364–2409.

Acemoğlu, Kamer Daron, Davide Ticchi, and Andrea Vindigni. 2011. Emergence and persistence of inefficient states. *Journal of the European Economic Association* **9**: 177–208.

Acemoğlu, Kamer Daron, and Thierry Verdier. 1998. Property rights, corruption and the allocation of talent: A general equilibrium approach. *Economic Journal* **108**: 1381–1403.

Acemoğlu, Kamer Daron, and Thierry Verdier. 2000. The choice between market failures and corruption. *American Economic Review* **90**: 194–211.

Ackerman, Frank. 2017. *Worst-Case Economics: Extreme Events in Climate and Finance*. London: Anthem Press.

Agamben, Giorgio. 2003. *Stato di Eccezione*. Torino: Bollati Boringhieri.

Aidt, Toke S. 2003. Economic analysis of corruption: A survey. *Economic Journal* **113**: F632–F652.

Aidt, Toke S. 2009. Corruption, institutions, and economic development. *Oxford Review of Economic Policy* **25**: 271–291.

Allen, Franklin, Jun Qian, and Lin Shen. 2018. Corruption and competition. Working paper, Center for Economic and Policy Research.

Ammianus, Marcellinus. c. 391. *Res Gestae*.

Anderson, Christopher J., and Yuliya V. Tverdova. 2003. Corruption, political allegiances, and attitudes toward government in contemporary democracies. *American Journal of Political Science* **47**: 91–109.

Bai, Chong-En, Chang-Tai Hsieh, and Zheng Michael Song. 2014. Crony capitalism with Chinese characteristics. Working paper, May 2014.

Bai, Chong-En, Chang-Tai Hsieh, and Zheng Michael Song. 2020. Special deals with Chinese characteristics. In Eichenbaum, Martin S., Erik Hurst, and Jonathan A. Parker (eds.) *NBER Macroeconomics Annual 2019*, volume 34 of *NBER Macroeconomics Annual*. Chicago: University of Chicago Press.

Banfield, Edward C. 1967. *The Moral Basis of a Backward Society*. New York: Free Press.

Barbero, Alessandro. 2008. *The Day of the Barbarians: The Battle That Led to the Fall of the Roman Empire*. New York: Walker & Company. Translated by John Cullen from *9 Agosto 378: Il Giorno dei Barbari*. 2005. Roma: Giuseppe Laterza & Figli.

Bardhan, Pranab. 1997. Corruption and development: A review of issues. *Journal of Economic Literature* **35**: 1320–1346.

Barro, Robert J. 2006. Rare disasters and asset markets in the twentieth century. *Quarterly Journal of Economics* **121**: 823–866.

Barro, Robert J., and Tao Jin. 2011. On the size distribution of macroeconomic disasters. *Econometrica* **79**: 1567–1589.

Baunsgaard, Thomas, and Michael Keen. 2005. Tax revenue and (or?) trade liberalization. International Monetary Fund Working Paper WP/05/112.

Bertrand, Marianne, Simeon Djankov, Rema Hanna, and Sendhil Mullainathan. 2007. Obtaining a driver's license in India: An experimental approach to studying corruption. *Quarterly Journal of Economics* **122**: 1639–1676.

Besley, Timothy, and Torsten Persson. 2008. Wars and state capacity. *Journal of the European Economic Association* **6**: 522–530.

Besley, Timothy, and Torsten Persson. 2009. The origins of state capacity: Property rights, taxation, and politics. *American Economic Review* **99**: 1218–1244.

Besley, Timothy, and Torsten Persson. 2010. State capacity, conflict, and development. *Econometrica* **78**: 1–34.

Besley, Timothy, and Torsten Persson. 2011. *Pillars of Prosperity: The Political Economics of Development Clusters*. Princeton: Princeton University Press.

Bremmer, Ian, and Preston Keat. 2009. *The Fat Tail: The Power of Political Knowledge in an Uncertain World*. New York: Oxford University Press.

Bueno de Mesquita, Bruce, Alastair Smith, James D. Morrow, and Randolph M. Siverson. 2003. *The Logic of Political Survival*. Cambridge: MIT Press.

Burroughs, Stephen M., and Sarah F. Tebbens. 2001. Upper-truncated power laws in natural systems. *Pure and Applied Geophysics* **158**: 741–757.

Cai, Hongbin, Hanming Fang, and Lixin Colin Xu. 2011. Eat, drink, firms, government: An investigation of corruption from the entertainment and travel costs of Chinese firms. *Journal of Law and Economics* **54**: 55–78.

Chang, Eric C. C., and Yun-han Chu. 2006. Corruption and trust: Exceptionalism in Asian democracies? *Journal of Politics* **68**: 259–271.

Chang, Eric C. C., and Miriam A. Golden. 2010. Sources of corruption in authoritarian regimes. *Social Science Quarterly* **91**: 1–20.

Ch'ü, T'ung-tsu. 1962. *Local Government in China under the Ch'ing*. Cambridge: Harvard University Press.

Cingolani, Luciana. 2013. The state of state capacity: A review of concepts, evidence and measures. Working paper, United Nations University–Maastricht Economic and Social Research Institute on Innovation and Technology.

Clark, William A. 1993. Crime and punishment in Soviet officialdom, 1965–90. *Europe–Asia Studies* **45**: 259–279.

Colonnelli, Emanuele, and Mounu Prem. 2017. Corruption and firms: Evidence from randomized audits in Brazil. Working paper.

Cooke, Roger M., Daan Nieboer, and Jolanta Misiewicz. 2014. *Fat-Tailed Distributions: Data, Diagnostics and Dependence*. London: John Wiley & Sons, Inc.

Critchlow, James. 1988. 'Corruption', nationalism, and the native elites in Soviet Central Asia. *Journal of Communist Studies* **4**: 142–161.

Dal Bó, Ernesto, Frederico Finan, and Martín A. Rossi. 2013. Strengthening state capabilities: The role of financial incentives in the call to public service. *Quarterly Journal of Economics* **128**: 1169–1218.

Della Porta, Donatella. 2000. Social capital, beliefs in government, and political corruption. In Pharr, Susan J., and Robert D. Putnam (eds.) *Disaffected Democracies: What's Troubling the Trilateral Countries*. Princeton: Princeton University Press, 202–228.

Dincecco, Mark, and Mauricio Prado. 2012. Warfare, fiscal capacity, and performance. *Journal of Economic Growth* **17**: 171–203.

Downs, Anthony. 1957. An economic theory of political action in a democracy. *Journal of Political Economy* **65**: 135–150.

Egorov, Georgy, and Konstantin Sonin. 2011. Dictators and their viziers: Endogenizing the loyalty–competence trade-off. *Journal of the European Economic Association* **9**: 903–930.

Etzioni-Halevy, Eva. 1983. *Bureaucracy and Democracy: A Political Dilemma*. Boston: Routledge.

Ezrow, Natasha M., and Erica Frantz. 2013. *Failed States and Institutional Decay: Understanding Instability and Poverty in the Developing World*. New York: Bloomsbury.

Fan, C. Simon, Chen Lin, and Daniel Treisman. 2010. Embezzlement versus bribery. National Bureau of Economic Research Working Paper 16542.

Finer, Samuel Edward. 1997a. *The History of Government from the Earliest Times, Volume I: Ancient Monarchies and Empires*. New York: Oxford University Press.

Finer, Samuel Edward. 1997b. *The History of Government from the Earliest Times, Volume II: The Intermediate Ages*. New York: Oxford University Press.

Finer, Samuel Edward. 1997c. *The History of Government from the Earliest Times, Volume III: Empires, Monarchies, and the Modern State*. New York: Oxford University Press.

Fisman, Raymond, and Jakob Svensson. 2007. Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics* **83**: 63–75.

Francois, Patrick, Francesco Trebbi, and Kairong Xiao. 2016. Factions in nondemocracies: Theory and evidence from the Chinese Communist Party. National Bureau of Economic Research Working Paper No. 22775.

Frantz, Erica, Andrea Kendall-Taylor, Joseph Wright, and Xu Xu. 2018. Personalization of power and repression in dictatorships. Working paper, Pennsylvania State University.

Fukuyama, Francis. 2011. *The Origins of Political Order: From Prehuman Times to the French Revolution*. New York: Farrar, Straus and Giroux.

Geddes, Barbara, Joseph Wright, and Erica Frantz. 2014. Autocratic breakdown and regime transitions: A new data set. *Perspectives on Politics* **12**: 313–331.

Geddes, Barbara, Joseph Wright, and Erica Frantz. 2017. A measure of personalism in dictatorships. Data description, Pennsylvania State University.

Geddes, Barbara, Joseph Wright, and Erica Frantz. 2018. *How Dictatorships Work: Power, Personalization, and Collapse*. New York: Cambridge University Press.

Gennaioli, Nicola, and Hans-Joachim Voth. 2015. State capacity and military conflict. *Review of Economic Studies* **82**: 1409–1448.

Gibbon, Edward. 1781. *The History of the Decline and Fall of the Roman Empire: Volume the Second*. London: William Strahan and Thomas Cadell.

Gilley, Bruce. 2006. The determinants of state legitimacy: Results for 72 countries. *International Political Science Review* **27**: 47–71.

Goemans, Henk E., Kristian Skrede Gleditsch, and Giacomo Chiozza. 2009. Introducing Archigos: A dataset of political leaders. *Journal of Peace Research* **46**: 269–283.

Goemans, Henk E., Kristian Skrede Gleditsch, and Giacomo Chiozza. 2015. Archigos, version 4.1. Dataset, University of Rochester.

Guriev, Sergei. 2004. Red tape and corruption. *Journal of Development Economics* **73**: 489–504.

Guriev, Sergei, and Daniel Treisman. 2018. Informational autocrats. Working paper.

Heidenheimer, Arnold J., Michael Johnston, and Victor T. Le Vine (eds.). 1989. *Political Corruption: A Handbook*. New Brunswick: Transaction Publishers.

Hobbes, Thomas. 1651. *Leviathan or the Matter, Forme and Power of a Common-wealth Ecclesiasticall and Civil*. London: Andrew Crooke.

Huang, Ray. 1974. *Taxation and Governmental Finance in Sixteenth-Century Ming China*. Cambridge: Cambridge University Press.

Huang, Ray. 1981. *1587, a Year of No Significance: The Ming Dynasty in Decline*. New Haven: Yale University Press.

Huntington, Samuel P. 1968. *Political Order in Changing Societies*. New Haven: Yale University Press.

Itzkowitz, Norman. 1972. *Ottoman Empire and Islamic Tradition*. Chicago: University of Chicago Press, Phoenix 1980 edition.

Jain, Arvind K. 2001. Corruption: A review. *Journal of Economic Surveys* **15**: 71–121.

Jiang, Junyan, and Yan Xu. 2015. Popularity and power: The political logic of anticorruption in authoritarian regimes. Working paper.

Jones, Arnold Hugh Martin. 1964. *The Later Roman Empire, 284–602: A Social Economic and Administrative Survey*. Oxford: Basil Blackwell.

Kaufmann, Daniel, and Aart Kraay. 2018. Worldwide Governance Indicators. Dataset, World Bank.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2007a. Growth and governance: A reply. *Journal of Politics* **69**: 555–562.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2007b. Measuring corruption: Myths and realities. World Bank Findings Report No. 273.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2007c. The Worldwide Governance Indicators project: Answering the critics. World Bank Policy Research Working Paper 4149.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2010a. Response to "The Worldwide Governance Indicators: Six, one, or none". Worldwide Governance Indicators document, World Bank.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2010b. Response to "What do the Worldwide Governance Indicators measure?". *European Journal of Development Research* **22**: 55–58.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2011. The Worldwide Governance Indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law* **3**: 220–246.

Kendall-Taylor, Andrea, Erica Frantz, and Joseph Wright. 2017. The global rise of personalized politics: It's not just dictators anymore. *The Washington Quarterly* **40**: 7–19.

Kreike, Emmanuel, and William Chester Jordan (eds.). 2004. *Corrupt Histories*. Rochester: University of Rochester Press.

Krueger, Anne O. 1974. The political economy of the rent-seeking society. *American Economic Review* **64**: 291–303.

Kuhn, Philip A. 1990. *Soulstealers: The Chinese Sorcery Scare of 1768*. Cambridge: Harvard University Press.

Laffont, Jean-Jacques, and Jean Tirole. 1991. The politics of government decision-making: A theory of regulatory capture. *Quarterly Journal of Economics* **106**: 1089–1127.

Leff, Nathaniel H. 1964. Economic development through bureaucratic corruption. *American Behavioral Scientist* **8**: 8–14.

Li, Weijia, Gérard Roland, and Yang Xie. 2019. Crony capitalism, the party-state, and political boundaries of corruption. Working paper, University of California, Riverside.

Lincoln, Abraham. 1953, originally 1861. Message to Congress in special session, July 4, 1861. In Basler, Roy P., Marion Dolores Pratt, and Lloyd A. Dunlap (eds.) *The Collected Works of Abraham Lincoln, Volume 4*. New Brunswick: Rutgers University Press, 422–441.

Lu, Xi, and Peter L. Lorentzen. 2018. Personal ties, meritocracy, and China's anti-corruption campaign. Working paper.

Lui, Francis T. 1985. An equilibrium queuing model of bribery. *Journal of Political Economy* **93**: 760–781.

MacMullen, Ramsay. 1988. *Corruption and the Decline of Rome*. New Haven: Yale University Press.

MacMullen, Ramsay. 2015. *Corruption and the Decline of Rome*. Beijing: China Fangzheng Press. Translated by Houliang Lü from *Corruption and the Decline of Rome.* 1988. New Haven: Yale University Press.

Martindale, John Robert. 1980. *Prosopography of the Later Roman Empire: Volume II, A.D. 395–527*. London: Cambridge University Press.

Mauro, Paolo. 1995. Corruption and growth. *Quarterly Journal of Economics* **110**: 681–712.

Medina, Leandro, and Friedrich Schneider. 2018. Shadow economies around the world: What did we learn over the last 20 years? International Monetary Fund Working Paper WP/18/17.

Méndez, Fabio, and Facundo Sepúlveda. 2006. Corruption, growth and political regimes: Cross country evidence. *European Journal of Political Economy* **22**: 82–98.

Merton, Robert King. 1968. *Social Theory and Social Structure*. New York: Free Press.

Morris, Stephen D., and Joseph L. Klesner. 2010. Corruption and trust: Theoretical considerations and evidence from Mexico. *Comparative Political Studies* **43**: 1258–1285.

Muralidharan, Karthik, Paul Niehaus, and Sandip Sukhtankar. 2016. Building state capacity: Evidence from biometric smartcards in India. *American Economic Review* **106**: 2895–2929.

Nakamura, Emi, Jón Steinsson, Robert Barro, and José Ursúa. 2013. Crises and recoveries in an empirical model of consumption disasters. *American Economic Journal: Macroeconomics* **5**: 35–74.

OED2. 1989. crisis, n. In Simpson, John Andrew, and Edmund S. C. Weiner (eds.) *The Oxford English Dictionary, Second Edition*. Oxford: Oxford University Press.

Olken, Benjamin A. 2006. Corruption and the costs of redistribution: Micro evidence from Indonesia. *Journal of Public Economics* **90**: 853–870.

Olken, Benjamin A., and Rohini Pande. 2012. Corruption in developing countries. *Annual Review of Economics* **4**: 479–509.

Padró i Miquel, Gerard, and Pierre Yared. 2012. The political economy of indirect control. *Quarterly Journal of Economics* **127**: 947–1015.

Pavarala, Vinod. 2004. Cultures of corruption and the corruption of culture: The East India Company and the Hastings impeachment. In Kreike, Emmanuel, and William Chester Jordan (eds.) *Corrupt Histories*. Rochester: University of Rochester Press, 291–336.

People's Daily. 2019. Strengthen the ability of prevention and control, focus on preventing and resolving major risks, and maintain sustained and healthy economic development and social stability. Pages 1–2, January 22, 2019.

Petry, Carl F. 1998. The military institution and innovation in the late Mamlūk period. In Petry, Carl F. (ed.) *The Cambridge History of Egypt, Volume I: Islamic Egypt, 640–1517*. Cambridge: Cambridge University Press, 462–489.

Pindyck, Robert S. 2011. Fat tails, thin tails, and climate change policy. *Review of Environmental Economics and Policy* **5**: 258–274.

Qian, Yingyi, and Gérard Roland. 1998. Federalism and the soft budget constraint. *American Economic Review* **88**: 1143–1162.

Resnick, Sidney I. 2007. *Heavy-tail Phenomena: Probabilistic and Statistical Modeling*. New York: Springer.

Robinson, Peter M. 1988. Root-N-consistent semiparametric regression. *Econometrica* **56**: 931–954.

Roemer, John E. 1985. Rationalizing revolutionary ideology. *Econometrica* **53**: 85–108.

Rose-Ackerman, Susan. 1978. *Corruption: A Study in Political Economy*. New York: Academic Press.

Rose-Ackerman, Susan. 1999. *Corruption and Government: Causes, Consequences, and Reform*. New York: Cambridge University Press.

Rose-Ackerman, Susan (ed.). 2007. *International Handbook on the Economics of Corruption*. Cheltenham: Edward Elgar.

Rose-Ackerman, Susan, and Bonnie J. Palifka. 2016. *Corruption and Government: Causes, Consequences, and Reform*. New York: Cambridge University Press, 2nd edition.

Rothstein, Bo. 2011. *The Quality of Government: Corruption, Social Trust, and Inequality in International Perspective*. Chicago: University of Chicago Press.

Rougé, Jean. 1966. L'histoire Auguste et l'Iaurie au IVe siècle. *Revue des Études Anciennes* **68**: 282–315.

Rubinstein, Ariel. 1982. Perfect equilibrium in a bargaining model. *Econometrica* **50**: 97–109.

Rycaut, Paul. 1668. *The Present State of the Ottoman Empire*. London: John Starkey and Henry Brome.

Schmitt, Carl. 1921. *Die Diktatur: Von den Anfängen des Modernen Souveränitätsgedankens bis zum Proletarischen Klassenkampf*. Leipzig: Duncker & Humblot.

Schmitt, Carl. 1922. *Politische Theologie: Vier Kapitel zur Lehre von der Souveränität*. Berlin: Duncker & Humblot.

Schneider, Friedrich. 2002. Size and measurement of the informal economy in 110 countries. Workshop of Australian National Tax Centre, Australian National University.

Schneider, Friedrich, and Dominik H. Enste. 2000. Shadow economies: Size, causes, and consequences. *Journal of Economic Literature* **38**: 77–114.

Seligson, Mitchell A. 2002. The impact of corruption on regime legitimacy: A comparative study of four Latin American countries. *Journal of Politics* **64**: 408–433.

Shlapentokh, Vladimir Emmanuilovich. 2013. Corruption, the power of state and big business in Soviet and post-Soviet regimes. *Communist and Post-Communist Studies* **46**: 147–158.

Shleifer, Andrei, and Robert W. Vishny. 1993. Corruption. *Quarterly Journal of Economics* **108**: 599–617.

Sng, Tuan-Hwee. 2014. Size and dynastic decline: The principal-agent problem in late imperial China, 1700–1850. *Explorations in Economic History* **54**: 107–127.

Staples, John. 1993. Soviet use of corruption purges as a control mechanism: The Uzbekistan case. *Past Imperfect* **2**: 29–48.

Svensson, Jakob. 2005. Eight questions about corruption. *Journal of Economic Perspectives* **19**: 19–42.

Svolik, Milan W. 2009. Power sharing and leadership dynamics in authoritarian regimes. *American Journal of Political Science* **53**: 477–494.

Taleb, Nassim Nicholas. 2007. *The Black Swan: The Impact of the Highly Improbable*. New York: Random House.

Tanzi, Vito. 1998. Corruption around the world: Causes, consequences, scope, and cures. *IMF Staff Papers* **45**: 559–594.

Tanzi, Vito, and Hamid Davoodi. 1998. Corruption, public investment, and growth. In Shibata, Hirofumi, and Toshihiro Ihori (eds.) *The Welfare State, Public Investment, and Growth: Selected Papers from the 53rd Congress of the International Institute of Public Finance*, chapter 4. Berlin: Springer-Verlag, 41–60.

Taylor, M. Scott. 2009. Environmental crises: Past, present, and future. *Canadian Journal of Economics* **42**: 1240–1275.

Tilly, Charles. 1990. *Coercion, Capital, and European States, AD 990–1990*. Cambridge: Basil Blackwell.

Tullock, Gordon. 1967. The welfare costs of tariffs, monopolies, and theft. *Economic Inquiry* **5**: 224–232.

Van Rijckeghem, Caroline, and Beatrice Weder. 2001. Bureaucratic corruption and the rate of temptation: Do wages in the civil service affect corruption, and by how much? *Journal of Development Economics* **65**: 307–331.

Verardi, Vincenzo, and Nicolas Debarsy. 2012. Robinson's square root of N consistent semiparametric regression estimator in Stata. *Stata Journal* **12**: 726–735.

von Neumann, John, and Oskar Morgenstern. 1944. *Theory of Games and Economic Behavior*. Princeton: Princeton University Press.

Walder, Andrew G. 2015. *China Under Mao: A Revolution Derailed*. Cambridge: Harvard University Press.

Waterbury, John. 1973. Endemic and planned corruption in a monarchical regime. *World Politics* **25**: 533–555.

Waterbury, John. 1976. Corruption, political stability and development: Comparative evidence from Egypt and Morocco. *Government and Opposition* **11**: 426–445.

Wei, Shang-Jin. 1999. Corruption in economic development: Beneficial grease, minor annoyance, or major obstacle? World Bank Policy Research Working Paper No. 2048.

Weitzman, Martin L. 2009. On modeling and interpreting the economics of catastrophic climate change. *Review of Economics and Statistics* **91**: 1–19.

Weitzman, Martin L. 2011. Fat-tailed uncertainty in the economics of catastrophic climate change. *Review of Environmental Economics and Policy* **5**: 275–292.

Will, Pierre-Étienne. 1980. *Bureaucratie et Famine en Chine au XVIIIe Siècle*. Paris: École des Hautes Études en Sciences Sociales.

Will, Pierre-Étienne. 2004. Officials and money in late imperial China: State finances, private expectations, and the problem of corruption in a changing environment. In Kreike, Emmanuel, and William Chester Jordan (eds.) *Corrupt Histories*. Rochester: University of Rochester Press, 29–82.

Xi, Jinping. 2014. Speech in the Central Leading Group for Inspection Work's report to the Standing Committee of the Central Political Bureau of the Communist Party of China on the Central Inspection Groups' second-round inspections in 2014. October 16, 2014.

Xi, Jinping. 2017. Report to the 19th National Congress of the Communist Party of China by Xi Jinping on behalf of the 18th Central Committee of the Party. October 18, 2017.

Xi, Tianyang, Yang Yao, and Qian Zhang. 2018. Dilemmas of autocratic governance: Theory and evidence from the anti-corruption campaign in China. Working paper.

Zhang, Fan. 2018. *The Institutional Evolution of China: Government vs Market*. Cheltenham: Edward Elgar Publishing.

Zhou, Li-An. 2008. *Local Government in Transition: Official Incentives and Governance*. Shanghai: Truth & Wisdom Press.

Zhou, Xueguang. 2012. Mechanism of campaigning governance: Rethinking the institutional logic of the Chinese state governance. *Open Times* **31**: 105–125.

Zhou, Xueguang. 2017. *The Institutional Logic of Governance in China: An Organizational Approach*. Beijing: SDX Joint Publishing Company.

Zosimus. c. 518. *Historia Nova*.

Appendix

A Endogenous Enforcement of the Status Quo

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

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

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

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

This second justification also links to two remarks on the interpretation of the corruption and rents in our model. First, it is less applicable to corruption such as embezzlement and diversion of public funds, because these rent-generation processes are highly dependent on the status quo, and the ending of the status quo can destroy the source of the rents, suggesting a relatively high s.[24] 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.

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

This distinguishes our model of corruption tolerance from fiscal decentralization.[25]

B Corruption across Political Regimes

We run the regression

$$\text{Corruption Control}_{it} = \kappa_k \cdot \text{Regime Type}_{it}^{k} + \ln(\text{GDP per capita}_{it}) + \delta_i + \gamma_t + u_{it}, \quad (27)$$

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

Table 2: 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 (27). 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.

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

Table 2 reports the results. Personalistic rule and corruption are indeed correlated: when controlling for all the fixed effects, two most personalistic regime types, i.e., non-monarchic personalistic rule and monarchy, are the only ones where corruption is significantly more severe than under a democracy.

C Proof of Proposition 5

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

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

$$F(\rho r) \cdot D + \big(1 - F(\rho r)\big) \cdot \pi(r; \rho) \geq pD + (1-p) \cdot \sup_{R > \bar{R}} \pi(R; \rho). \tag{28}$$

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

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

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

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

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

D Irregular Turnovers and Corruption across Fiscal-Capacity Groups

Table 3 reports the results of the regressions behind Figure 8.

Table 3: Control of corruption and irregular turnovers, across fiscal-capacity groups, 1996–2014

	(1) Irr. exits		(2) Irr. exits
Corr. ctrl × Weak capacity	0.015	Corr. ctrl × Weak capacity	0.015
	(0.022)		(0.022)
Corr. ctrl × Med.-weak capacity	-0.048		
	(0.034)	Corr. ctrl × Med. capacity	-0.048**
Corr. ctrl × Med.-strong capacity	-0.047*		(0.022)
	(0.025)		
Corr. ctrl × Strong capacity	0.050	Corr. ctrl × Strong capacity	0.050
	(0.057)		(0.057)
Year-fixed effect	Y		Y
Country-fixed effect	Y		Y
N	2002		2002
R^2	0.01		0.01

Column (1) reports the result of estimating Equation (26) when countries are divided into four capacity-groups, i.e., Fiscal Capacity$_i \leq 7$, $7 <$ Fiscal Capacity$_i \leq 8$, $8 <$ Fiscal Capacity$_i \leq 9.5$, and Fiscal Capacity$_i > 9.5$, where fiscal capacity is measured by the 1995 ratio of the share of formal economy in GNP over log-GDP per capita; Column (2) reports the result when the two medium-capacity groups are merged into one group. 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. Figure 8 plots the results.