Crony Capitalism, the Party-State, and Political Boundaries of Corruption*

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Abstract

What is the connection between crony capitalism, corruption, and the state apparatus in an autocracy? How much does corruption help the economy and when does it undermine state power? We investigate those questions by building a model that, instead of looking at the state as a black box, analyzes the link between various positions in the hierarchy of an autocratic state. The model is inspired by the party-state in China where crony capitalism and corruption play a central role in the economy. We show how the state's distortionary role in the economy encourages corruption between local officials and businesses, and how this corruption creates vertical corruption chains in the party-state hierarchy that threaten loss of political control by the Center over the hierarchy. We show the trade-off between the incentive effects of corruption and the danger of loss of control, leading *de facto* to define boundaries of corruption. The response by the Center to too high corruption depends on the power distribution within the Center and the *de facto* dependence of central leaders on support by provincial officials. Our results are consistent with recent developments in China.

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1 Introduction

The coexistence of inefficient economic institutions and very high economic growth in China in recent decades has been a puzzle to economists (e.g., Brandt and Rawski, 2008; Xu, 2011; Qian, 2017).[1] Bai et al. (2014) argue that corruption between officials and businesses has been a big part of China's growth miracle, as corruption protects productive cronies from the inefficiency of economic institutions, while damages of classic crony capitalism are alleviated by certain "Chinese characteristics," such as competition between local governments.

Further questions about crony capitalism and corruption have been raised in light of the anti-corruption campaign launched by Xi Jinping since 2012. The Central Commission for Discipline Inspection (CCDI) of the Chinese Communist Party (CCP) reported in 2017 that by then more than 1.5 million officials had been disciplined under the Party rules and 58 thousands officials had been charged with crimes. Besides this impressive scale of the campaign, Lu and Lorentzen (2016) also provide evidence that "even [corrupt officials'] personal ties to top leaders have provided little protection," considering the campaign to be a "sincere" effort to crack down on corruption.[2] If corruption between firms and officials was so instrumental in promoting economic growth, how could the CCP leaders be so determined to carry out such a serious crackdown, given that the

[1] China's economic development has been impressive since the market economy was introduced 40 years ago, but economic institutions in China are still widely considered inefficient. For example, barriers to entry and mobility abound, protection of private property rights is weak, and commitment to policies is fragile at best – the World Bank's "starting a business" indicator measuring institutional friendliness to the private economy ranks China barely above Iraq and Ethiopia. Brandt and Rawski (2008, front matter) summarize the puzzle as "China's remarkable mixture of high-speed growth and deeply flawed institutions."

[2] Given that a few officials with personal ties to Xi have ascended quickly since 2012 (Li, 2016; Lam, 2018), it is difficult to rule out power-grabbing motives behind the anti-corruption campaign (e.g., Jiang and Xu, 2015). That said, it would also be difficult to argue that this campaign were only about political fights within the Party, since the highest leaders of the CCP have always recognized that corruption poses an existential threat to the Party's power. For example, only two years after the Party assumed power in mainland China, Mao Zedong warned in a famous editorial of People's Daily (1952): "if we cannot thoroughly eliminate the phenomenon of corruption ... there will be the danger that our Party, regime, and cadres will be ruined." During the post-Mao transition, Deng Xiaoping (1994, orignally 1982) alerted that "if our Party does not take corruption extremely seriously, ... then whether our Party and regime will mutate will indeed become a realistic question;" Chen Yun (1995, originally 1980–1984) advocated "executing some officials who committed outrageous [economic] crimes" to "correct the Party's manners," because "mismanners of the ruling party are an existential problem to the Party." Right before retiring, Hu Jintao alarmed in his report to the 18th National Congress of the Party (2012): "[i]f we cannot solve the problem [of corruption], it will fatally wound the Party, ruining the Party and the regime."

CCP rule's legitimacy relies crucially on economic growth (Zhao, 2009)?[3] Moreover, why did the Center not carry out similar campaigns in earlier years, before 2012?

Besides the pervasive official–business cronyism, the anti-corruption campaign has also exposed the widespread vertical collusive corruption among officials along the personnel hierarchy of the party-state, including buying and selling of positions. Pei (2016) thoroughly analyzes this type of corruption in China since the 1990s. Lu and Lorentzen (2016) document how all probed officials form a large network of patron–client relationships. The CCDI report (2017) also stated publicly that eliminating the "systematic, landslide-like" collusive corruption among officials in Shanxi Province exemplifies the spirit of the anti-corruption campaign. Using data on corruption indictments collected by Lu and Lorentzen (2016), Table 1 shows a vertical correlation between corruption indictments at higher levels (provincial party secretary and governors) and lower ranks across provinces.

Fundamental questions are raised about China's institutions as well as the role of corruption: What is the institutional reason behind the pervasive corruption, e.g., how do crony capitalism and the party-state shape the boundaries of corruption? What is the Center's trade-off between tolerating and cracking down on corruption, i.e. how much corruption would be tolerated, and under what conditions would the Center crack down? What role does each ladder of the party-state hierarchy play? Are there any institutional solutions to corruption in China, and, if so, what are they?

To answer these questions, we build a highly stylized model of corruption and its role within the hierarchy of the Chinese party-state system. The model has three modules.

The first module focuses on crony capitalism, in the spirit of Bai et al. (2014), where distortionary regulation drives businesses and local officials to collude to circumvent regulations and to seek rents, respectively, given a level of corruption tolerated by the Party Center. The mechanism corresponds to a large body of empirical literature in sociological, statistical, and anthropological approaches (e.g., Lin, 2001; Sheng et al., 2011; Osburg, 2013; Fisman and Wang, 2015; Kung and Ma, 2018). We show that higher tolerance of corruption leads to higher economic output but also higher rents for local officials.

The second module depicts how the rents flow through the hierarchy of the party-state, where provincial officials capitalize on their political power, including by selling

[3]On the side effects of the anti-corruption campaign, for example, Premier Li Keqiang harshly criticized in a 2014 State Council executive meeting that many local officials had been shirking their duties, evading being suspected of corruption.

Table 1: Vertical chains: Correlation between higher and lower rank corruption

	(1)	(2)	(3)	(4)	(5)
	Rank 3–4 (provincial secretary or governor) indictments				
Rank 5–6 indictments	0.078***			0.071***	0.050***
	(0.016)			(0.021)	(0.024)
Rank 7–8 indictments		0.191***			0.096
		(0.054)			(0.060)
Rank 5–8 indictments			0.067***		
			(0.013)		
Number of cities				−0.001	0.002
				(0.031)	(0.030)
Number of counties				0.004	0.005
				(0.007)	(0.007)
Constant	0.925*	1.923***	0.874*	0.809	0.668
	(0.478)	(0.395)	(0.453)	(0.627)	(0.615)
N	31	31	31	30	30

A larger rank number denotes a lower level in the hierarchy; cross-province regression; data from Lu and Lorentzen (2016); standard errors in parentheses; *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$.

positions to local officials. We show that the official–business corruption finances vertical inter-official corruption. Provincial officials can reap almost all rents from local officials. Moreover, a certain degree of corruption has to be tolerated to retain local officials in the party-state. These results resonate with the scholarly consensus in sociology and political science (e.g., Zhou, 2013; Pei, 2016).

The final module delineates the Party Center's trade-off in determining tolerance of corruption. On the one hand, higher tolerance of corruption leads to higher economic growth in ordinary times. On the other hand, corruption undermines the Center's ability to respond to exceptional situations, i.e., crises, which political philosophers consider to be a fundamental attribute of state power (e.g., Schmitt, 1921 and 1985, originally 1922 and Agamben, 2005). The importance of the crisis management ability has been well recognized by the highest leaders of the Party, and they have also well realized that the Center's crisis management ability depends crucially on its ability to mobilize provincial resources and to lead with a well coordinated response or reform (e.g., Xi Jinping, 2014; 2017a; 2018).[4] This ability is jeopardized by tolerance of corruption, because the more rents created by crony capitalism that eventually flow to provincial officials the more the latter have an incentive to resist resource mobilization during crises. This trade-off between growth and threat of loss of control (and more generally between routine performance and arbitrary power) is consistent with the understanding of China scholars (e.g., Will, 1980; Huang, 1981; Kuhn, 1990; Zhou, 2008; Zhou, 2012). Our model shows that, under general conditions, the Center's optimal corruption tolerance is to fully secure crisis management ability while promoting the economy as much as possible. Any perceived serious risk of crisis would thus push the Center to crack down on corruption.

To better understand the role of the party-state hierarchy, e.g., why local rents flow up exactly to the provincial level but not further, we then analyze the collective decision making within the Party's Center, and we examine the relationship between members of

[4]For example, Xi (2014, 2017a) has emphasized repeatedly that always preparing for crises is "a significant principle" in the party-state rule, guaranteeing state security is among "the top priorities" for the power of the Party, and "responding to significant challenges" and "defend against significant risks" are among the Party's primary objectives. Xi (2018) stated recently: "The international context is extremely complex, our surroundings are complicated and sensitive, and the job to reform, develop, and stabilize our country is difficult and complicated. Facing all these, we must be capable of preparing for, responding to, and solving crises, and we must be capable of managing crises with good preparation and transform crises into opportunities with strategic initiatives." Xi (2014) has also stated clearly that responding to crises requires "centralized decision making" and "coordinated action" throughout the party-state.

the Politburo Standing Committee (PSC) and their provincial protégés. We show that it is the combination of 1) the reciprocal accountability between the Center and provincial officials, first analyzed by Shirk (1993), and 2) the lack of it between the provincial and local officials, facilitated by the 1984–1995 cadre management reform (*People's Daily,* 1984; Burns, 1987, 1994; Central Committee of the Party, 1995; Pei, 2016, p. 35), that leads to substantial rents being captured at the provincial level, threatening the power of the Center. Following the analysis, we also show how corruption within the Center would corrupt the Center's *de facto* personnel power over officials at the lower level, and why power centralization within the Center complements anti-corruption campaigns, as observed in recent Chinese politics (Li, 2016; Fewsmith, 2018; McGregor et al., 2018; Shirk, 2018).

All the analyses show that, given the current institutions in China, where the state has great economic power and where there is no reciprocal accountability between the local and provincial levels, pervasive corruption in ordinary times is inevitable, leading to regular initiations of anti-corruption campaigns in anticipation of a looming crisis.

We unfold the paper as follows. Section 2 presents the three modules of the model. Section 3 analyzes collective decision-making inside the Center under reciprocal accountability, and the corruption and power distribution within the Center. Section 4 concludes.

2 The Model

We analyze the interaction between business firms and the party-state. When examining interactions inside the party-state, we model the behavior of three levels of players: local officials (e.g., the municipality and county levels), provincial officials (e.g., officials in the Central Committee), and the Party's Center (the Politburo Standing Committee, PSC). We start from the interaction between businesses and local officials, and then move to the interaction between local officials and provincial officials, taking the former interaction as given. We then move to the interaction between provincial officials and the Center, taking all the former interactions as given. In this section, we model the Center as one agent, but in a later section we focus on the distribution of power within the Center, which turns out to be important in understanding decisions on fighting corruption.

2.1 Cronyism between Businesses and Local Officials

Assume a continuum of firms with a mass of 1 in a local official's jurisdiction, each with a potential productivity of 1. Given the persistent appearance of barriers to firm mobility and prevalence of local protectionism in China (e.g., Wedeman, 2003; Bai et al., 2004, 2014; Zhou, 2004; Barwick et al., 2017), we assume that these firms are immobile. Because of existing economic distortions (e.g., red tape, institutional weaknesses, and lack of access to credit), assume that only an exogenously given share $\alpha \in (0, 1)$ of potential productivity will be realized. Each firm has an opportunity to give an exogenously given bribe b to the local official, in exchange for the full productivity potential – the realized productivity will be lifted from α to 1 *ad hoc* by privileges that non-crony firms would not enjoy (e.g., barriers to entry for other firms, privileged access to government contracts, discounts on utility prices, and tax breaks). Lower α then denotes more distortionary regulation and a greater influence that the local official can have upon the local economy. A reason why b can be seen as exogenous to the firm is that it can be interpreted as the highest level of bribes tolerated by the Center, and, since there is an infinite number of firms, they can bid up the price of bribes up to its maximum tolerated level b.

This setting highlights the institutional origin of crony capitalism:

Lemma 1. *The firms will bribe the local official only when the existing regulation is sufficiently distortionary, i.e.,* $\alpha \leq 1 - b$.

Proof. For a firm, the productivity gain from being a crony is $1 - \alpha$, while the bribe to pay is b. The firm will try to build connections with the local official only when the bribe is worthy, i.e., $1 - \alpha \geq b$. The result then follows. □

This lemma suggests that crony capitalism is institutionally founded on distortionary regulations, and on the government's economic power cultivated by the distortion. As the Chinese economic institutions suffer from severe inefficiency and crony capitalism is prevalent in China, we assume hereafter that $\alpha \leq 1 - b$ so that all firms want to pay the bribe.[5] Given this assumption, the local official is assumed to choose

[5]For example, sociologist Lin (2001, p. 6) argues that "[i]n the reform era, effective manipulation of state action – i.e., making gains from ad hoc favorable treatment by the state – constitutes a necessary condition for the success of firms." On the ubiquity of firms trying to bribe local officials in China, anthropologist Osburg (2013, p. 52) quotes a Chinese government contractor: "[e]ven if you're just a county head (*xianzhang*), there are literally thousands of businessmen lining up at your door to give you money."

the share of businesses, $\theta \in (0, 1]$, from which to accept the bribe so as to maximize his bribe earnings, θb, net of the total cost of breaking rules and closing deals:

$$\max_{\theta \in (0,1]} \quad U_L(\theta; b, c) = \theta b - \frac{c}{2}\theta^2, \tag{1}$$

where $c > 0$ is an exogenous parameter, and the total cost is assumed to be convex in θ, because the local officials' time, energy, and other resources that can be devoted to crony capitalism are limited.

The first-order condition is

$$b - c\theta = 0, \tag{2}$$

while the second-order condition, $-c < 0$, holds trivially. Since in reality not all firms are cronies, we assume that the cost intensity of the local official to close deals is so high ($c > b$) that an interior solution is reached in equilibrium. The equilibrium share of firms that become cronies is

$$\theta = \frac{b}{c}, \tag{3}$$

which is increasing in b and decreasing in c. Local economic output is then given by

$$y = (1 - \theta)\alpha + \theta = \alpha + \theta(1 - \alpha), \tag{4}$$

which is increasing in α and θ, or just

$$y = \alpha + (1 - \alpha)\frac{b}{c} = \alpha\left(1 - \frac{b}{c}\right) + \frac{b}{c}, \tag{5}$$

which is increasing in α and b and decreasing in c. In equilibrium, the local official's net earning is then

$$I_L(b, c) \equiv U_L^* = \frac{b}{c} \cdot b - \frac{c}{2} \cdot \left(\frac{b}{c}\right)^2 = \frac{b^2}{2c}, \tag{6}$$

which is increasing in b and decreasing in c, too. We can thus formulate the following proposition:

Proposition 1. *The prevalence of crony capitalism θ, economic output y, and rents of local officials I_L increase with the corruption tolerance b.*

Proposition 1 is in line with Bai et al. (2014) on the complementarity between corruption and economic growth under crony capitalism in China. Since the existing distortion is severe, crony firms and local officials are willing to engage in corruption,

because it benefits them, respectively, with output gainings from the privileged relationship and rents from bribery. As exempting the crony firms from inefficient regulations, the corruption reduces the distortion that effectively applies to the economy, enhancing economic performance. In other words, following the tradition of Leff (1964) and Huntington (1968), corruption "greases the wheels."

Several features of this complementarity deserve attention. First, this complementarity does not mean that more distortionary regulations would promote economic growth. On the contrary, as Equation (5) shows, economic output (y) increases with regulatory efficiency (α).

Second, this complementarity exists only when the efficiency of the existing regulation is sufficiently distortionary ($\alpha \leq 1 - b$). By Lemma 1, if the existing regulation is sufficiently efficient ($\alpha > 1 - b$), any corruption between the local official and firms would be detrimental to the economy.[6]

Third, it might be tempting to argue by Equations (3) and (6) that, in equilibrium, the prevalence of corruption (θ) and the rents of local officials (I_L) do not depend on the efficiency of the existing regulations (α). This is not true, however, since Equations (3) and (6) describe only the equilibrium given that the existing regulation is sufficiently distortionary. By Lemma 1, no corruption or rent will be created if the existing regulation is sufficiently efficient.

Finally, this complementarity between corruption and economic growth would not be affected if heterogeneity in firm productivity were introduced, as in Bai et al. (2014). That said, if heterogeneity among firms were introduced, the model would be able to predict the characteristics of the firms that the local official would choose as his cronies.

This module of the model illustrates how crony capitalism works in China and creates official–business corruption. To understand the full effects of corruption, we need to consider the interactions inside the party-state. The bribes received by local officials can be used to bribe provincial officials, e.g., to obtain promotion, and thus create a vertical chain of corruption that may eventually lead to loss of control of the Center over the party-state.

[6]For a more detailed discussion on different channels through which corruption can affect the economy, see Ding et al. (2017).

2.2 Collusive Corruption between Local and Provincial Officials

We now consider the relation between the local official and the provincial official, who is his direct superior in the party-state hierarchy, and has the power to remove him from his post. We assume that if the local official is removed, he will lose his opportunity to extract bribes from business firms and receives instead a reservation payoff, r_L, which is assumed to be exogenous. It can be related to possibilities of getting jobs in the private sector, e.g., the higher the development of the private sector, the higher the reservation payoff. The local official is assumed to have a chance to give a political gift, g, to the provincial official, in the hope of not being removed. If he is not removed, he will be able to use bribes received from business firms to finance this gift, and enjoy the residual amount for his own private consumption. We assume, for simplicity, that there is no commitment problem in the local–provincial interaction.

Because the provincial official has the power to remove the local official, he can thus demand a gift up to $g = b^2/2c - r_L$. If kept in office, the local official enjoys $I_L(b,c) - g = b^2/2c - g$. If $g = b^2/2c - r_L$, the provincial official will enjoy $R_P = b^2/2c - r_L$ and the local official $R_L = r_L$. In that case, if $I_L(b,c) = b^2/2c \geq r_L$, the rents of the local official and the provincial official and their sum are, respectively,

$$R_L = r_L, \qquad R_P = \frac{b^2}{2c} - r_L, \qquad R_L + R_P = \frac{b^2}{2c}; \tag{7}$$

if on the other hand, $\frac{b^2}{2c} < r_L$, the local official will prefer to quit his position and gets r_L, while the provincial official gets 0.

Therefore, to keep the local official in the party-state system, the level of bribes needs to be above a lower bound, i.e.,

$$b \geq \sqrt{2cr_L} \equiv \underline{b}. \tag{8}$$

We then have the following proposition:

Proposition 2. *To keep local officials in the party-system, the corruption tolerance b must be above $\underline{b}$. This lower bound increases with c and r_L.*

Higher outside options that arise with the introduction of the market economy increase the lower bound on corruption. Some minimum corruption between business

firms and local officials is thus necessary to maintain the party-state alive. If r_L is correlated with the general economic situation, then the Center's tolerance for corruption would be procyclical, consistent with the view of political scientists that the market reform, rapid economic growth, and rising overall corruption in China have been generally correlated since the 1980s (e.g., Gong, 1994; Sun, 2004; Wedeman, 2012).

In equilibrium, compared to other members in the party-state system, officials at a lower rank are living a modest life, since most of their rent would be reaped by their supervisors via *political* rent seeking. This is consistent with observations from China: personnel power of the direct supervisor in the party-state hierarchy generates huge rents, as discussed by sociologists and political scientists, such as Zhou (2013) and Pei (2016). On how corruption tolerance affects these rents, we have the following corollary:

Corollary 1. *Rents of provincial officials R_p increase with the corruption tolerance b.*

The intuition is as follows: corruption rents of local officials are captured by provincial officials because of their power to remove local officials; rents go up through the vertical corruption chain along the personnel hierarchy; therefore, higher tolerance of corruption, i.e., higher b, feeds the provincial official, leading to a higher R_P. This corollary will be instrumental in examining the Center's decisions.

2.3 Crisis Management and the Center's Decisions

In contrast to the provincial officials, the Center has the ultimate responsibility over actions at the national level. In particular, the Center must react to crises that may occur unexpectedly, and corruption inside the party-state may prevent the Center from responding appropriately to crises. We assume that the Center cares for economic growth, i.e. wants to maximize output, but also wants to be able to respond to unexpected crises that may occur, such as earthquakes or natural catastrophes, a large-scale epidemic, a war, internal revolts, economic crisis, etc. Both objectives stem from the same goal, which is to stay in power and perpetuate the power of incumbent communist leaders. Higher growth leads to more popularity and therefore stronger incumbent power, whereas bad responses to crises may jeopardize the incumbent's position.

Assume that crises that challenge the survival of the party-state can occur randomly. Denote random variable, $\gamma \in [0, \bar{\gamma}]$, as the severity of occurring crises, where the Center will need to mobilize resources and expropriate share γ of the rents from provincial and local officials to respond to the crisis or implement an urgent reform. The highest

possible severity is denoted by $\bar{\gamma} \leq 1$.[7] We also denote the cumulative distributive and probability density functions of γ as $F(\cdot)$ and $f(\cdot)$, respectively.

Call L_L and L_P the losses for respectively the local and the provincial official if the Center cannot successfully manage the crisis. The net payoff in case of a crisis without successful response is $R_i - L_i$ for the official $i = L, P$. This will also be the payoff if officials refuse to surrender the resources they received through corruption. If instead they decide to submit and surrender resources, their payoff will be $R_i - \gamma R_i$. When $\gamma > 0$, each official at level $i = L, P$, would like to resist orders of resource mobilization from the Center, if and only if

$$R_i - L_i > R_i - \gamma R_i, \quad \text{i.e.,} \quad \gamma > \frac{L_i}{R_i}. \tag{9}$$

For simplicity, assume $L_L = 0$, so that local officials always want to resist, as long as $\gamma > 0$. Then, there will be joint resistance of local and provincial officials if and only if the provincial official wants to resist, i.e., if and only if

$$\gamma > \frac{L_P}{R_P} = \frac{L_P}{\frac{b^2}{2c} - r_L} \equiv \hat{\gamma}, \tag{10}$$

where $\hat{\gamma}$ denotes the critical level of γ above which the officials will resist resource mobilization by the Center. Corruption can thus threaten crisis response by the Center due to resistance from the corrupt party-state machine, because higher tolerance of corruption (higher b) will increase the provincial officials' rents (R_P), as stated in Corollary 1, lowering critical level ($\hat{\gamma}$) and making crisis management more likely to fail. In other words, corruption creates incentive misalignment between the Center and the provincial official when a crisis happens. This incentive misalignment is widely considered as one of the primary problems that corruption can cause (e.g., Pei, 2016) and has been recognized by the highest leaders of the Party (e.g., Xi, 2015, 2016).[8]

Now consider the Center's decision to regulate corruption by choosing b, leaving c exogenous. Assume that the Center is risk-neutral and benefits from economic output when crises are successfully managed ($\gamma \in [0, \hat{\gamma}]$) and gets a "downfall payoff," D, if a crisis leads the Center to lose control. As before, we also assume that the existing

[7] This setting of a *relative* severity of crisis γ provides tractability without losing the spirit that, given any crisis, the *absolute* amount of rents that the Center would need to appropriate to respond to the crisis increases with the total amount of the rents captured by the provincial and local officials.

[8] For example, Xi (2015, 2016) warned repeatedly that high-level officials in the Party must not violate the central directives, cultivate "independent kingdoms," or act independently.

regulation is so distortionary that crony capitalism will emerge ($\alpha \leq 1-c$) and that the local official's cost to close deals is so high that not all firms will be selected as cronies ($c > 2\left(\frac{L_P}{\bar{\gamma}} + r_L\right)$). The Center's program is then

$$\max_b \; F(\hat{\gamma}) \cdot y + (1 - F(\hat{\gamma})) \cdot D, \quad \text{i.e.,} \quad \max_b \; F(\hat{\gamma}) \cdot (y - D), \quad \text{s.t.} \tag{11}$$

$$b \geq \sqrt{2cr_L}, \quad \hat{\gamma} = \frac{L_P}{\frac{b^2}{2c} - r_L}, \quad y = \alpha + (1-\alpha)\frac{b}{c}. \tag{12}$$

As we can see, as long as surviving a crisis is better than losing power ($y > D$), which can be guaranteed when the downfall payoff is lower than the lowest possible economic output ($D < \alpha$), the Center always faces a fundamental trade-off between regime stability and economic performance: a higher b will lead to a higher output level y but with a higher probability of loss of control when challenged by a large crisis ($1 - F(\hat{\gamma})$). We can then formulate the following proposition:

Proposition 3. *Given a sufficiently low downfall payoff ($D < \alpha$), a sufficient condition for the Center's optimal choice of corruption tolerance to involve zero loss of control, i.e. $\hat{\gamma}^* = \bar{\gamma}$ and $F(\hat{\gamma}^*) = 1$, is that the elasticity of $F(\gamma)$, $\frac{\gamma \cdot f(\gamma)}{F(\gamma)} > \frac{1}{2}$, for any $\gamma \in (0, \bar{\gamma})$. The optimal choice of corruption tolerance is then $b^* = \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$.*

Proof. Note first that if $\hat{\gamma} \geq \bar{\gamma}$, i.e., if $b \in \left(\sqrt{2cr_L}, \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}\right]$, regime stability is never compromised and b reaches a local maximum at $b = \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$. If, however, $\hat{\gamma} \in (0, \bar{\gamma})$, i.e., $b > \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$, then there is a non zero probability of regime breakdown. If the objective function is decreasing in b when $b > \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$, then we can conclude that $b^* = \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$.

Now consider the first-order derivative of the objective function with respect to b when $b > \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$, which, after some algebra, is

$$\frac{1-\alpha}{c} \cdot F(\hat{\gamma}) - \frac{L_P}{\left(\frac{b^2}{2c} - r_L\right)^2} \cdot \frac{b}{c} \cdot f(\hat{\gamma}) \cdot (y - D). \tag{13}$$

It will be negative, given $\hat{\gamma} = \frac{L_P}{\frac{b^2}{2c} - r_L}$ and $y = \alpha + (1-\alpha)\frac{b}{c}$, if

$$\hat{\gamma} \cdot \frac{f(\hat{\gamma})}{F(\hat{\gamma})} \cdot \left(\frac{(1-\alpha)b}{c} + \alpha - D \right) > \frac{(1-\alpha)b}{2c} - \frac{1-\alpha}{b} r_L, \tag{14}$$

which, when $D < \alpha$, is equivalent to

$$\hat{\gamma} \cdot \frac{f(\hat{\gamma})}{F(\hat{\gamma})} > \frac{1}{2} \cdot \frac{(1-\alpha)b - 2cr_L\frac{1-\alpha}{b}}{(1-\alpha)b + c(\alpha - D)}. \tag{15}$$

Note that, when $D < \alpha$,

$$\frac{1}{2} \cdot \frac{(1-\alpha)b - 2cr_L\frac{1-\alpha}{b}}{(1-\alpha)b + c(\alpha - D)} < \frac{1}{2}. \tag{16}$$

Therefore, we can conclude that given $D < \alpha$, if $\frac{\gamma \cdot f(\gamma)}{F(\gamma)} > \frac{1}{2}$ for any $\gamma \in (0, \bar{\gamma})$, then the government's objective function is decreasing in b when $b > \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$. Then $b^* = \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$ and the rest of the results follow. □

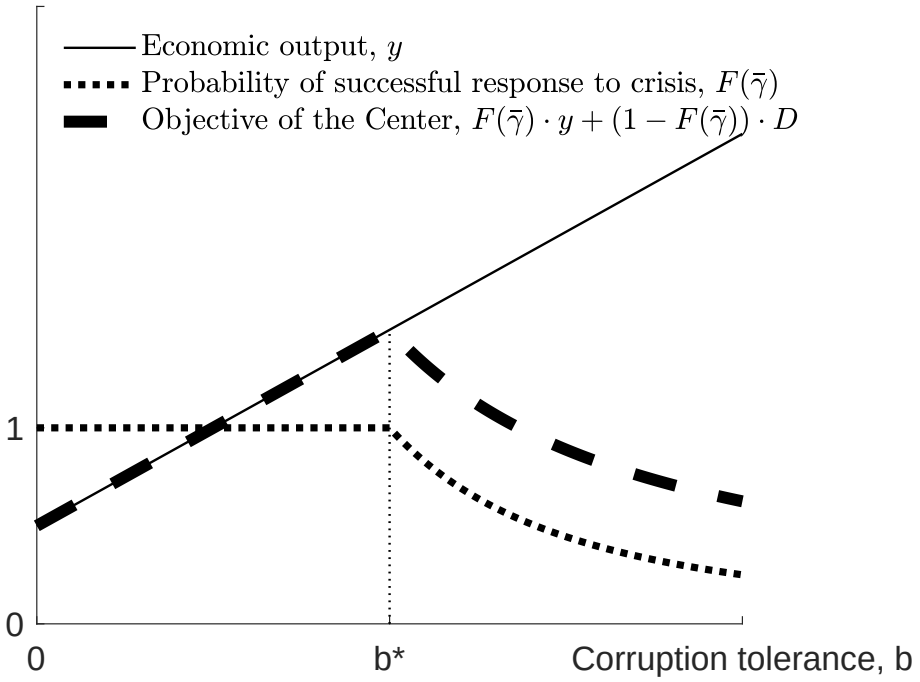

Figure 1: Optimal choice of corruption tolerance when the right tail of the crisis risk distribution is not extremely thin

The intuition of Proposition 3 is as follows. As illustrated in Figure 1, higher corruption tolerance raises economic output, while lower tolerance increases the Center's control in crises until the Center will never lose control in any crisis. Therefore, on the one hand, when the tolerance is so low that that full security is reached, the Center can always raise the tolerance to gain more economic output without sacrificing any security. On the other hand, the elasticity condition means that the right tail of the crisis risk distribution is not extremely thin, which is consistent with empirical evidence on crises and the general approach to model them in risk management (e.g., Taleb, 2007).[9] This condition suggests that, when corruption tolerance is still too high to secure control in all possible crises, a lower tolerance would lead to a smaller output loss compared to the larger gain in regime stability. Therefore, the optimal solution for the Center is to set the corruption tolerance at such a level that crisis management ability remains always fully secured while output is maximized as much as possible.

The solution in Proposition 3 follows a lexicographic order: stability comes first, and output is maximized under the condition that full stability be secured. It is important to note that this lexicographic preference is *endogenous* in our model, rather than *exogenous.* Proposition 3 thus provides a micro-foundation of the Party's "repeatedly emphasized" principle in developing the Chinese economy – "[social and political] stability overrides everything, and we must not relax the People's democratic dictatorship," as coined by Deng Xiaoping (1993, orignally 1990, p. 364). It also explains Xi (2014)'s obsession for "security" – "[we] must insist on a holistic view on national security, acknowledging the people's security as our mission, political security the fundamental, economic security the basic, military, cultural, and social security the safeguard, and international security the support, paving a path to national security with Chinese characteristics."

A corollary of Proposition 3 suggests that a higher crisis risk will push the Center to crack down on corruption:

Corollary 2. *Corruption tolerance b^* is decreasing in the crisis risk, represented by the greatest possible crisis severity $\bar{\gamma}$.*

This corollary is consistent with the Party narratives since 2012. For example, in his report to the 19th National Congress of the Party, Xi (2017b) stated: "confronting the

[9]The probability distribution of a random variable, X, is often considered to be fat-tailed if $\mathbf{P}[X > x] \sim x^{-\eta}$ when x is large, where $\eta > 0$ is the tail index (e.g., Cooke et al., 2014, p. 2). The elasticity, $\frac{xf(x)}{F(x)}$, would then converge to η. If we followed this convention, Proposition 3 would require $\eta > \frac{1}{2}$.

crucial tests of enormous risks faced by the Party ... we cracked down on corruption, wiping out significant hidden hazards from the inside of the party-state ...." Taken at face value, this quote suggests that the risk faced by the Party was a primary motivation behind Xi's anti-corruption campaign. Beyond Xi's era, Jiang and Xu (2015) recognize that over 1988–2014 "[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 pervious year, which they interpret as signs of greater social pressure and higher risk of political instability. All these observations are consistent with Corollary 2.

We conclude this section with another two remarks. First, if the Center could choose the efficiency of the existing regulation α, then the optimal decision would be to raise α to 1, with which no corruption would happen and the Center would be able to realize the full potential of the economy without any loss of control during crises. In the analysis above, however, we have assumed that, when choosing the corruption tolerance b, the Center takes α as given. This assumption is consistent with the observation that the Center often finds it extremely difficult to improve institutional efficiency without first reducing corruption. For example, in 2014, Premier Li Keqiang openly complained that many directives that the State Council had issued to cut red tape (raising α in our model) were "obstructed in transmission" and could not be implemented at the local level. In the 2015 State Council report, not only did he emphasize the severity of the "systemic, institutional ... problems" in the economy (low α in our model), he also drew an analogy between these problems and "tigers in the road," admitting the enormous difficulty in overcoming them.

This difficulty is also consistent with our theory, where a coordinated crisis response will fail if provincial and local officials have a substantial vested interest originated from inefficient institutions and corruption. Correspondingly, as Li Keqiang warned in the 2015 State Council report, "deepening reform" to tackle the "systemic, institutional ... problems" (raising α in our model) is exactly the urgent response required by the alarming risk that the state "will have a difficult time sustaining steady and sound development." In 2013, he also likened the reform to "assaulting a fortified position," because it "must touch vested interests," which, in his words, "is even more difficult than to touch a soul." Consistently, the Central Party School has been advocating that cracking down on corruption will effectively clear the way for the institutional reform

by expropriating vested interests from corrupt officials (e.g., Li, 2013; Xie, 2014).

Second, we have also assumed that, when the Center chooses a corruption tolerance, it is able to enforce it. In Appendix A, we explore the possibility of cover-up by local and particularly provincial officials, and explicitly model corruption detection by the Center. We recognize that the Center can use a plea bargain to motivate any official who is caught corrupt to expose all other officials in the same corruption case. Therefore, a dilemma of corruption detection emerges: to limit corruption, the detection intensity has to be sufficiently high to discipline officials; a too high detection intensity, however, will encourage officials to cover each other up, making corruption detection extremely difficult. Realizing this dilemma, the Center has to carefully choose the detection intensity when enforcing its optimal corruption tolerance.

3 Decision Making inside the Center

3.1 Reciprocal Accountability

In the analysis above, higher corruption tolerance weakens the Center's crisis management ability because the rents flow along the hierarchy of the party-state and are captured by the provincial officials. A natural question then emerges: why is the Center, higher up in the hierarchy, *not* able to use its power to discipline non-compliant provincial officials into surrendering their rents?

The key to this question is reciprocal accountability between the central leaders and provincial officials. As documented by Shirk (1993), not only do the central leaders hold provincial officials accountable through the party hierarchy, but provincial officials also hold the central leaders accountable, because, in political struggles inside the Center, each leader counts on his support base among provincial leaders. This is not surprising, given that 1) provincial officials occupy about half of the Central Committee of the Party, which elects the Politburo and its Standing Committee, 2) central leaders are at the very top of the party hierarchy so they have no higher authority to appeal to, other than their direct subordinates, i.e., the provincial officials.[10] As Shirk (2018, p. 32) states, "[u]nder reciprocal accountability, these [provincial] officials [in the Central Committee] are not mere agents of the Party center," so the Center would not be able

[10]Shirk (1993) documents how provincial officials can wield power over central leaders. For example, Deng Xiaoping withdrew his proposal to promote Zhu Rongji to the PSC after he met strong resistance from the Central Committee.

to discipline non-compliant provincial officials whenever it wants.

To understand the role of reciprocal accountability, we now open up the collective decision making process inside the Party Center, i.e., the Politburo, its Standing Committee, and retired leaders who are still influential. We start from the hypothetical case in which provincial officials do not hold central leaders accountable, and compare it with the more realistic case in which they do hold them accountable.

Take first the situation of absence of reciprocal accountability. We assume that each central leader has his *de jure* power, $p_i > 0$, which is determined by the official ranking in the Party, and we denote $P \equiv \sum_i p_i$. We assume that the Center enjoys an exogenous rent, R, and that each leader's share of the rent is determined, hypothetically, only by $\frac{p_i}{P}$. Given that decisions at the Center are assumed to be taken by unanimity, would each leader inside the Center be willing to remove an non-compliant provincial official, bringing in his rent, $\frac{b^2}{2c} - r_L$, to share among the leaders at some removal cost, k?

Each central leader would support the removal, if and only if the payoff from doing so is higher than the status quo payoff, i.e.,

$$\frac{p_i}{P}\left(\frac{b^2}{2c} - r_L - k + R\right) > \frac{p_i}{P}R. \tag{17}$$

This condition will always hold, as long as the removal cost is not too high, i.e., $k < \frac{b^2}{2c} - r_L$. Therefore, all leaders in the Center would always support disciplining any non-compliant provincial official, and most rents created by crony capitalism would eventually flow to the Center.

Assume now reciprocal accountability between provincial officials and central leaders. More specifically, we now assume that each central leader i has $m_i > 0$ provincial officials as his protégés, where we denote the total number of provinces as $M \equiv \sum_i m_i$. His *de facto* power in the Center is then $p_i + m_i$, and his share of the central rent is then $\frac{p_i+m_i}{P+M}$. This central leader will then block disciplining one of his own protégés, if and only if

$$\frac{p_i + m_i - 1}{M + P}\left(\frac{b^2}{2c} - r_L - k + R\right) \leq \frac{p_i + m_i}{M + P}R. \tag{18}$$

Comparing this condition with Condition (17), without reciprocal accountability, each central leader cares only about his *de jure* power, and disciplining provincial officials will not affect that power, i.e., $\frac{p_i}{P}$ appears on both sides of Condition (17); when reciprocal accountability does exist, each leader depends additionally on his provincial support, so removing one of his protégés will weaken his *de facto* power, decreasing his

share of the Center's rents from $\frac{p_i+m_i}{M+P}$, which appears on the right-hand side of Condition (18), to $\frac{p_i+m_i-1}{M+P}$, which appears on the left-hand side. Therefore, with reciprocal accountability, the leader has an incentive to protect his protégés.

To see this point even more clearly, Condition (18) is equivalent to

$$R \geq (p_i + m_i - 1)\left(\frac{b^2}{2c} - r_L - k\right) \equiv \bar{R}. \tag{19}$$

This condition can hold, even if the removal cost is not too high, i.e., $k < \frac{b^2}{2c} - r_L$, a condition under which the removal would have always happened if reciprocal accountability did not exist. We then have the following result:

Proposition 4. *Without reciprocal accountability, central leaders will always discipline non-compliant provincial officials. With reciprocal accountability, each central leader will protect his protégés, if and only if the Center's rent is sufficiently large, i.e., $R \geq \bar{R}$, where $\bar{R}$ is increasing in the leader's de jure power p_i, his de facto power $p_i + m_i$, and each provincial official's rents to surrender $\frac{b^2}{2c} - r_L$, and is decreasing in the Center's cost to remove each provincial official k.*

This proposition implies that the weaker the leader is inside the Center, the more actively he would protect his own protégés. This implication is consistent with the fact that Zhou Yongkang, who was the lowest in the official ranking of the Politburo Standing Committee, actively protected Bo Xilai, who had gained enormous popularity across the country as the Party secretary of Chongqing.[11]

The analysis above explains how reciprocal accountability between the Center and provincial officials prevents the Center from using personnel power to reap rents from provincial officials. It also illustrates why provincial officials can reap rents from local officials. Announced in *People's Daily* (1984), the 1984 cadre management reform "replaced the two-level down principle with one-level down," granting provincial and local officials personnel authority over their immediate subordinate (Burns, 1987, p. 49). After some back-and-forth over 1985–1994 (e.g., Burns, 1994 on the 1990 adjustment), "the full institutionalization of this far-reaching reform" was settled by the Central Committee in 1995, as observed by Pei (2016, p. 35). Each level of the party organization along the hierarchy then behaved like the hypothetical case we discussed where the subordinates cannot hold their supervisors accountable, so the supervisors

[11] Zhou Qiang (2015), the Chief Justice and President of the Supreme People's Court, wrote publicly that Zhou Yongkang and Bo Xilai engaged in "political activities beyond the Party organization."

can force the subordinates to surrender their rents, and the rents are eventually reaped along the party hierarchy up to the provincial level. The combination of 1) eciprocal accountability between the Center and provincial officials and 2) the lack of it below the provincial level in the hierarchy then causes most rents created by crony capitalism to be captured at the provincial level, while threatening the Center's power.

3.2 A Corrupt Center

So far we have analyzed corruption below the top of the hierarchy, assuming that central leaders are clean. This assumption can be challenged, especially in light of the indictment of Zhou Yongkang, a member of the Politburo Standing Committee between 2007 and 2012, who protected corrupt officials in exchange for a great amount of wealth. How would corruption in the Center affect the disciplining ability of the Center, and its interaction with provincial officials?

Assume that the central leader i receives a bribe, $e > 0$, from each of his protégés, that is not shared with other leaders. Disciplining one of his protégés will, however, force him to submit this protégé's bribe and share it within the Center given the pressure from other central leaders. The leader will then protect the protégé if and only if

$$\frac{p_i + m_i - 1}{M + P}\Big(\frac{b^2}{2c} - r_L - k + R\Big) + (m_i - 1)e \leq \frac{p_i + m_i}{M + P}R + m_i e. \tag{20}$$

This condition differs from Condition (18) only in the appearance of the bribe that is not shared, i.e., $(m_i - 1)e$ and $m_i e$, respectively, on each side.

This condition can be rewritten in the following way:

$$R \geq (p_i + m_i - 1)\Big(\frac{b^2}{2c} - r_L - k\Big) - (M + P)e \equiv \bar{R}_{\text{Corrupt Center}}. \tag{21}$$

Comparing Condition (21) with the condition without corruption, i.e., Condition (19),

$$R \geq \big(p_i + m_i - 1\big)\Big(\frac{b^2}{2c} - r_L - k\Big) \equiv \bar{R}_{\text{Uncorrupt Center}}, \tag{22}$$

we can formulate the following proposition.

Proposition 5. *$\bar{R}_{Corrupt\ Center} < \bar{R}_{Uncorrupt\ Center}$. Therefore, corruption in the Center make it more difficult for the Center to discipline non-compliant provincial officials.*

The intuition of this result is that the central leader has to sacrifice his private gain

of bribes during removal of his protégés, which makes the removal less attractive to him.

Given that important decision makings in the Party Center usually require consensus (Shirk, 1993; Huang, 2000; Vogel, 2005; Xie and Xie, 2017), corruption in the Center can greatly damage the disciplining ability of the Center, because one corrupt leader can almost on his own block disciplining measures towards his protégés.[12] This is consistent with the observation that it needed only one corrupt Zhou Yongkang to paralyze the Politburo Standing Committee away from any serious disciplining measures against officials.

One corollary of the proposition concerns the case an extremely corrupt Center, i.e., when e is sufficiently large:

Corollary 3. *If* $e \geq \bar{e}$ *where* $\bar{e} \equiv \frac{(\max_i\{p_i+m_i\}-1)\left(\frac{b^2}{2c}-r_L-k\right)}{M+P}$, *then* $R \geq \bar{R}_{Corrupt\ Center}$ *will always hold and the central leaders will always protect their own protégés.*

This result comes from the fact that the extreme corruption in the Center implies $\bar{R}_{\text{Corrupt Center}} \leq 0$ for any central leader. In this case, given the consensus requirement for personnel disciplining, the Center will lose all of its *de facto* personnel power. To summarize, absolute corruption in the Center corrupts its power absolutely.

3.3 Power Distribution within the Center

Besides the anti-corruption campaign, the most prominent development in Chinese politics since 2012 has been the streamlining of the Center in two directions. First, the number of members of the Politburo Standing Committee has decreased from nine under Hu Jintao (2002–2012) to seven in Xi's era (since 2012). Second, as Shirk (2018, p. 32) observes, "[u]nder Hu, the general secretary was only first among equals," while Xi has successfully carried out a series of institutional reforms within the Center to consolidate his own power (Li, 2016). Due to this streamlining, the Center's power has become much less fragmented, and personalistic rule has almost been achieved (Shirk, 2018). How would the power distribution within the Center shape the boundaries of corruption, and why did Xi carry out the two major projects – one to streamline the Center, the other to crack down on corruption – at the same time?

[12]The consensus requirement is instrumental in building a united image of the Party leadership, legitimizing the single-party authority. The disastrous outcomes in Mao's last years also reminded the leaders of the danger of personalistic rule. For more discussions on the consensus requirement, see Shirk (1993) and Huang (2000).

The answer lies in how the power distribution within the Center would affect its ability to respond to crises. Notably, for a crisis response to succeed, not only must the mobilization of local resources succeed, but the central leaders must in the first place agree upon an urgent response plan. If the Center were so fragmented, however, the Center could be paralyzed without any response plan, losing all its crisis response ability. This risk created by central fragmentation was extremely evident during the two most challenging political crises that the Party has faced since the end of the Cultural Revolution – the political unrest in 1989 and the Bo Xilai scandal in 2012.[13] Therefore, any effort to limit corruption, which helps resource mobilization during crises, will be meaningful only when the Center is sufficiently streamlined.

We can formalize this answer in the following setting: facing a crisis of severity γ, the Center has a short time window to decide whether to expropriate the γ-share of the rents from all provincial and local officials, to manage the crisis. The crisis response will succeed 1) if every central leader agrees and 2) if provincial and local officials cooperate. When the response succeeds, the rents to be shared within the Center is $R(b)$, which is increasing in the economic output and thus the corruption tolerance, b. When the response fails, each leader will receive a downfall payoff, D. Also, for simplicity, we assume that the *de facto* power is equally shared among all central leaders, i.e., each leader gets $\frac{1}{N}$ of the central rents, where $N \geq 1$ is the number of central leaders. A decrease in N is then equivalent to streamlining the Center, and the extreme case $N = 1$ means the power is so concentrated within the Center that a dictatorship emerges.

This setting imposes another constraint about power distribution on successful responses to crises:

Lemma 2. *A crisis will be successfully managed if and only if it is not so severe and the Center is sufficiently streamlined, i.e.,* $\gamma \leq \hat{\gamma}$ *and* $N < \frac{R(b)}{D}$.

Proof. The provincial and local officials will cooperate the crisis response if and only if the crisis is not so severe, i.e., $\gamma \leq \hat{\gamma}$. Given that, each central leader will support the crisis response plan if and only if his slice of the central rents is sufficiently large, i.e., $\frac{R(b)}{N} > D$, which is equivalent to having the Center sufficiently streamlined, i.e., $N < \frac{R(b)}{D}$. The lemma then follows. □

[13] As Shirk (2018, p. 30 and 33) states, in the spring and summer of 1989, the Party leaders "split on how to respond" to "the widespread unrest," and "open divisions at the top drove the political system to the brink of collapse;" "on the eve of Xi's 2012 ascension to power," "[t]he leadership split ... under collective leadership," and "[n]either Hu nor the Standing Committee as a whole had the gumption to stop Bo's open campaigning for power," which eventually failed only thanks to the dramatic turn around the murder of Neil Heywood (Gracie, 2017).

Given this constraint, how would a paramount leader set the corruption tolerance and the Center's size at the same time, if he has the ability to do so? His program is

$$\max_{b,\, N} \left(F(0) + \big(F(\hat{\gamma}(b)) - F(0)\big) \cdot \mathbf{1}_{N<\frac{R(b)}{D}}\right) \cdot \left(\frac{R(b)}{N} - D\right), \text{ s.t.} \tag{23}$$

$$b \geq \sqrt{2cr_L}, \quad N \geq 1, \quad \hat{\gamma}(b) \equiv \frac{L_P}{\frac{b^2}{2c} - r_L}, \quad R(b) \equiv My(b) \equiv M\left(\alpha + (1-\alpha)\frac{b}{c}\right), \tag{24}$$

where the objective function is the expected additional payoff from survival and M is the total number of provinces. The following proposition describes his solution:

Proposition 6. *Assume that the crisis risk is sufficiently fat-tailed, i.e.,* $\frac{\gamma f(\gamma)}{F(\gamma)} > \frac{1}{2M}$ *for any* $\gamma \in [0, \bar{\gamma})$. *If the downfall payoff is sufficiently low, i.e.,* $D < R(b^*)$, *then the paramount leader should choose the dictatorship, i.e.,* $N = 1$, *and then crack down on corruption, i.e.,* $b = b^*$, *guaranteeing perfect control in crises, where* $b^* = \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$.

Proof. First, note that, given any corruption tolerance $b \geq \sqrt{2cr_L}$, adopting a dictatorship ($N = 1$) is always the optimal choice, because it maximizes the survival payoff by granting the paramount leader all the central rents without sharing with anyone, and because it at the same time maximizes the probability of survival by guaranteeing a response plan to be agreed upon trivially when the Center faces a crisis.

Given that the dictatorship is adopted, and also given the sufficiently low downfall payoff, we can then examine three ranges of b: a high tolerance range in which $D \leq R(b^*) < R(b)$, a moderate range in which $D < R(b) \leq R(b^*)$, and a low range in which $R(b) \leq D < R(b^*)$. Similar to the proof of Proposition 3, given the fat-tail property, the optimal choice of corruption tolerance is then the full-security solution $b = b^*$. □

This result implies that the paramount leader will try to consolidate power within the Center, and if he can do so, he will then crack down on corruption at the same time. Proposition 6 then lends an additional explanation/interpretation to the timing of the recent anti-corruption campaign and the general political development in China since 2012. As Shirk (2018, p. 30) observes, in Xi's first General Secretary term, "Jiang Zemin [was] ... hobbled politically by age," while "Hu Jintao, a far more self-effacing figure than Jiang, [stayed] out of Xi Jinping's way," symbolized by his stepping down from the Central Military Commission of the Party right when Xi took the General Secretary position, and "there [was] no preappointed successor with whom Xi must share the

elite's loyalty." These conditions created a rare window for Xi to consolidate his power, which he has been doing consistently, up to the point that recent developments have clearly suggested he will break the post-1989 norm that one should not serve as the paramount leader for more than ten years (Fewsmith, 2018; McGregor et al., 2018).[14] Starting from the initial window, the recent anti-corruption campaign and this operation of power consolidation have been closely helping each other.

4 Conclusion

Crony capitalism and corruption in China's party-state system have played a key role in the promotion of economic growth. Crony business firms benefited from their privileged relations with local officials, which helped them expand, thereby fostering economic growth in their region, simultaneously feeding corruption inside the party-state system. We built the first model analyzing the interactions between cronyism and corruption at the different ladders of the hierarchy in the party-state system.

Leaders of the CCP face a fundamental trade-off in relation to cronyism and corruption. On one hand, tolerance of some corruption helps to foster growth at the local level, which helps stabilize the political power of the incumbents. On the other hand, a too high level of corruption tolerance will undermine the power of the Center to mobilize resources to face crises that occur regularly, as too greedy local and provincial officials will resist such resource mobilization.

Provincial officials play a key role in this corruption process. On one hand, they are able to use their hierarchical power to extract rents from local officials. On the other hand, they also have power over members of the Politburo Standing Committee (PSC) via a system of reciprocal accountability where PSC members, though hierarchically above provincial officials, need their active support to get elected and to push their agenda inside the PSC. Reciprocal accountability can thus undermine the Center's power to crack down on provincial officials. We find that this is especially the case if there is too much fragmentation of power inside the PSC.

Our analysis shows that corruption is a key ingredient of officials' incentives to help generate economic growth. Because of its corrosive power, regular anti-corruption campaigns are inevitable. Our model has shown how consolidation of power inside the

[14]The 19th Politburo Standing Committee does not include any apparent successor to Xi, and the *2018 Amendment to the Constitution of the People's Republic of China* has abolished the term limit for the Presidency of China.

PSC may work to prevent paralysis of decision-making in the fight against corruption.

Our research also highlights the need to better understand cronyism and corruption in autocracies. Their economic and political effects certainly vary according to the type of autocratic institutions that prevail. Our analysis of the Chinese case is only a first step in that direction.

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Appendix

A Cover-up and Corruption Investigations

Consider the following timing:

1. The Center announces its optimal level of corruption tolerance b^*.

2. The provincial official chooses to implement a level of corruption $\hat{b} \in \{b^*, B\}$ within the province, where B can be large. The Center is assumed not to observe $\hat{b}$.

3. The Center chooses an investigation density d searching in the province for evidence of $\hat{b} = B$. If evidence is found, the Center indicts and replaces the official and reruns steps 1 and 2 with the new official and $b = b^*$. The punished official gets a payoff of 0 payoff as punishment. If the investigation finds no evidence of $\hat{b} = B$, the level $\hat{b}$ chosen by the provincial official is implemented.

One may argue that the Center may have some information about the level of corruption given all the information gathered by the Center on the economy and what is going on in the provinces. There is, however, a difference between having soft information and hard evidence about corruption, which is what this section is about.

The investigation goes as follows. The Center first investigates the two officials (the local official and the provincial official) independently. If $\hat{b} = b^*$, no evidence of $\hat{b} = B$ can of course be found. If $\hat{b} = B$, the provincial official can a) choose to cover himself and the local official up, at a cost, C, so that neither of the officials will be caught, and no evidence of $\hat{b} = B$ is assumed to be found; b) choose no cover-up. In the latter case each official will be caught independently with probability $1 - \sqrt{1-d}$. Once one of them is caught, we assume that evidence will be found of $\hat{b} = B$, because the Center can offer an infinitesimal level of leniency to make one official testify against the other, thereby getting evidence of $\hat{b} = B$. This is a minimalistic way of modeling the information-sharing feature of corruption between officials. Detection of $\hat{b} = B$ then happens with probability $d \in [0, 1]$, where d measures the detection intensity. If neither of them is caught, the investigation will not find any evidence of $\hat{b} = B$. This happens with probability $1 - d$.

After steps 1–3, the crisis severity γ, realizes. For simplicity, we assume $F(0) = 0$, i.e., some crisis, big or small, always happens. If $\hat{b} = B$, the Center will have no

chance to respond because of the loss of control due to too much corruption, thus getting the downfall payoff D. The provincial official will then get $\frac{B^2}{2c} - r_L - L_P$. If, however, $\hat{b} = b^*$, then the Center can try to respond, and the officials can try to resist, just as in the previous section. In this case, the provincial official will get $\max\left\{\frac{b^{*2}}{2c} - r_L - L_P, (1-\gamma)\left(\frac{b^{*2}}{2c} - r_L\right)\right\}$.

We now analyze this setting. Given the optimal corruption tolerance derived in Proposition 3, i.e., $b^* \equiv \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$, how should the Center set the detection intensity to induce either $\hat{b} = b^*$, or no cover-up when $\hat{b} = B$, so that it will never lose control during crises? The answer is given in Proposition 7.

Proposition 7. *Under the condition of Proposition 3, if the cover-up is sufficiently costly, i.e., $C \geq \frac{B^2}{2c} - r_L - L_P - (1-\mu_\gamma)\left(\frac{b^{*2}}{2c} - r_L\right) \equiv \bar{C}$, where μ_γ is the mean of γ, then the Center can induce the provincial official to choose $\hat{b} = b^* \equiv \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$ via a sufficiently high detection rate, i.e., $d \geq \frac{\bar{C}}{\frac{B^2}{2c} - r_L - L_P}$. Otherwise, if $C < \bar{C}$, to guarantee control during crises, the Center should not detect too intensively, i.e., $d \leq \frac{C}{\frac{B^2}{2c} - r_L - L_P}$.*

Proof. If $\hat{b} = b^* \equiv \sqrt{2c\left(\frac{L_P}{\bar{\gamma}} + r_L\right)}$, the crisis response will always succeed, and the provincial official can expect to get

$$\int_0^{\bar{\gamma}} (1-\gamma)\left(\frac{b^{*2}}{2c} - r_L\right) dF(\gamma) = (1-\mu_\gamma)\left(\frac{b^{*2}}{2c} - r_L\right); \tag{25}$$

if $\hat{b} = B$, without cover-up, he can expect to get $(1-d)\left(\frac{B^2}{2c} - r_L - L_P\right)$; if $\hat{b} = B$, with cover-up, he can expect to get $\left(\frac{B^2}{2c} - r_L - L_P\right) - C$.

Therefore, he will choose $\hat{b} = b$ if and only if

$$(1-\mu_\gamma)\left(\frac{b^{*2}}{2c} - r_L\right) \geq \max\left\{(1-d)\left(\frac{B^2}{2c} - r_L - L_P\right), \left(\frac{B^2}{2c} - r_L - L_P\right) - C\right\}, \tag{26}$$

i.e.,

$$d \geq 1 - \frac{(1-\mu_\gamma)\left(\frac{b^{*2}}{2c} - r_L\right)}{\frac{B^2}{2c} - r_L - L_P} \text{ and } C \geq \frac{B^2}{2c} - r_L - L_P - (1-\mu_\gamma)\left(\frac{b^{*2}}{2c} - r_L\right). \tag{27}$$

If these two conditions cannot be satisfied, the provincial official will choose $\hat{b} = B$,

and then he will choose not to cover up, if and only if $\left(\frac{B^2}{2c} - r_L - L_P\right) - C \leq (1 - d)\left(\frac{B^2}{2c} - r_L - L_P\right)$, i.e., $d \leq \frac{C}{\frac{B^2}{2c} - r_L - L_P}$. The result then follows. □

Proposition 7 exhibits the dilemma of corruption detection. On the one hand, when corruption is already high, the detection intensity chosen by the Center cannot be too large, since this would encourage the provincial official to cover up the corruption, in which case the Center would not be able to detect the true level of corruption and respond to crises. On the other hand, to induce a limited level of corruption by officials, the detection intensity needs to be sufficiently high.