

Autocracy, Political Loyalty and the Causes of the Great Leap Famine

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Abstract

We propose a new theoretical interpretation of the political dynamics of the Great Leap Forward, which produced the worst famine on record. Our screening model yields simple testable hypotheses linking the ties of provincial party leaders to Mao with political promotions and radical behavior. Our theoretical model and empirical findings contribute to the literature on factional politics and the ruling tactics of autocratic regimes. Our empirical findings provide a robust explanation for variations across provinces in terms of mortality and various indicators of radicalism during the Great Famine, cast doubt on explanations based on the "tournament hypothesis", and suggest that asymmetric information played a key role in one of the greatest catastrophes in human history.

1 Introduction

The role played by information in the strategies of rulers and in the ensuing outcomes has become a topic of interest in the literature on political institutions. It has been argued that, besides obvious differences in participation and competition, democracies and autocracies also differs in how much information each type of regime provides to its political actors. For example, compared to leaders in democracies, autocrats often possess highly imperfect information concerning the distribution of power among the political elite, the identity of political opposition and, in particular, the political loyalty of their subordinates. To overcome this informational asymmetry, autocrats develop a number of tactics such as the distribution of patronage benefits, selective political promotion and the bloody internal purge of clients perceived to be disloyal. Such tactics are often not only costly to the autocrat, since he needs to send credible signals to the political elite (for example, through brutal purges), but also costly to the population at large since enormously wasteful policies may be needed so as to uncover information essential to the political survival of the leader (Shih 2010).

Even though an autocratic leader may have relatively little information concerning the political loyalty of his subordinates, an incumbent autocrat is not completely blind, since there is always greater affinity between the leader and certain members of the "selectorate" (Enelow and Hinich 1984, Hinich and Munger 1994, Hardin 1997, Bueno de Mesquita, Smith, Siverson, and Morrow 2003). The existence of such affinities means that there are bonds between leaders and followers that both can use to anticipate each other's future behavior.

In this paper, we propose a theoretical model of political screening to illustrate the mechanism through which an autocrat plays factional politics. The model shows that the manner in which factional politics play out can help the autocrat to elicit information concerning the loyalty of subordinates by having them pursue economically wasteful (and eventually socially disastrous) policies. We offer a simple explanation linking elite ties, promotions, and regional policy choices in autocratic regimes. Our screening model predicts that: (i) individuals with network ties to the top autocrat will engage in more radical behavior than individuals without such ties, irrespective of whether asymmetric information concerning individual loyalty is present; (ii) individuals with network ties will have a higher likelihood of receiving a special promotion in the presence of asymmetric information than individuals without such ties, whereas the converse will obtain in the absence of asymmetric information.

This research also highlights the inadequacy of the increasingly popular "tournament hypothesis" in explaining economic and social outcomes in autocracies such as China. We argue that the tournament hypothesis provides an oversimplified representation of auto-

cratic politics because it ignores pre-existing heterogeneity in terms of network ties among regional political leaders. Moreover, we argue that accounting for such ties is essential if one is to understand both the allocation of private goods (such as political promotions) and economic/social outcomes.

While power politics are alive and well in any political system, personal connections and relational ties are of particular import in autocracies in terms of recruiting followers and building a power base. This reflects the deep underlying anxiety of those in power concerning the strength of their control and leads them to perennially need to rally loyal supporters. Our research falls squarely within a large literature on autocratic rule, where the supreme leader is compelled to trade off competence for loyalty (Egorov and Sonin 2011) and is constantly concerned about his very survival (Bueno de Mesquita, Smith, Siverson, and Morrow 2003, Acemoglu, Robinson, and Woren 2012). In this perspective, the arguments advanced in this paper are rather *passé*: factionalism and power struggles have been a central theme in the study of many societies (be they democratic or authoritarian), such as Italy (Zuckerman 1975, Bettcher 2005), Japan (Cox, Rosenbluth, and Thies 2000, Ishikawa and Hirose 1989), Mexico (Camp 2003), or the city of Chicago (Guterbock 1980).

We apply our theory to explain the sharp variance in famine severity across Chinese provinces during the country's Great Leap Famine period. For social scientists, differences in famine severity across Chinese provinces has been of special interest. Because some provinces (Anhui, Henan, and Sichuan) suffered massive losses in human life while others (Jiangxi, Shanxi, Liaoning) were left relatively unscathed, two obvious questions arise: (i) under the same, highly centralized, political regime, how could different provinces fare so differently and (ii) what were the key forms taken by political radicalism that led to the observed social outcomes in terms of mortality or fertility (Yang 1996, Kung and Lin 2003, Kung and Chen 2011, Meng, Qian, and Yared 2015). Answers to these and others questions promise to shed important insights into the nature of the Chinese economic and political system and how this system interacted with elite-mass relations to produce one of history's worst catastrophes.

The reasons behind provincial variation in political radicalism remain contested. While our model purposefully eschews yardstick competition mechanisms, it generates testable hypotheses that allow us to better understand the political causes of China's Great Famine, and especially its highly heterogeneous regional outcomes. Rather than relying merely on the lack of general information about grain production and demand in autocracies due to the lack of a free press (Sen 1981) or the lack of flexibility of government grain procurement policy in a planned system (Meng, Qian, and Yared 2015), our study emphasizes the role of faction politics in shaping major economic and social outcomes in autocracies. In particular,

our research helps to explain why in the GLF period less than half of China's provinces accounted for about 90 percent of total famine-related fatalities. Compared to existing economic research that helps more to explain the Great Leap Forward rather than the Great Leap Famine, we believe that our theory, coupled with empirical evidence, helps to explain why some provincial leaders behaved more radically than others during the GLF and how such behavioral differences resulted in significant variations in the incidence of famine across the country, thereby accounting for a large proportion of deaths.

The remainder of the paper is organized as follows. In section 2, we critically review the existing literature on the Great Famine. In section 3, we briefly describe the historical setting within which the GLF occurred, highlighting the crucial political changes right before and during the GLF. Section 4 proposes a theoretical model of faction politics in autocracies. We model the GLF as a political screening mechanism, which yields testable hypotheses linking factional ties to radicalism and special political promotions, respectively. In section 5 we detail the construction of our measures of radicalism, special promotions and network ties to Mao, and also discuss other important covariates that are likely to affect the patterns of radicalism and promotions. Section 6 sets out our econometric specifications and reports our empirical results. Section 7 concludes.

2 Political incentives, elite networks, and policy choice in explaining GLF elite behavior

In the annals of human history, the Great Leap Famine (1959-61) is estimated to have claimed the lives of at least 17 million people and perhaps as many as 45 million. Recent historical work has reinforced the emphasis on the responsibility of Mao and the central Party leadership in launching policies that precipitated the famine (Teiwes and Sun 1999, Yang 2008, Dikotter 2010). This dovetails with the earlier emphasis on Mao's commitment to collectivization and thus the role of ideology (Dernberger 1972, Schurmann 1968). More recently, Li and Yang (2005) saw the famine as the result of a systematic failure in the Chinese central planning system. Meng, Qian, and Yared (2015) find that, in spite of grain output shortfalls, China as a whole did produce more grain than was needed to avoid severe famine mortality in 1959. In reality those provinces that suffered the highest mortality in 1960 actually had higher historic per-capita grain production. Meng et al speculate that this was due to inflexibilities in the central planners' grain procurement system.

Wide divergence in radicalism and also in famine severity among the provinces points to the limitations of explanations focusing on the role of Mao's ideological commitment

or simply laying the blame on Mao and alternatively the Center (Yang 1996, Kung and Chen 2011). The causal mechanism behind the variations needs to be sought elsewhere.

Recent social science research has increasingly stressed how political elites in non-democratic states, including China, face political and career incentives and are expected to respond to them (Shirk 1993, Landry 2008). Scholars have debated on whether Chinese officials in the post-Mao era have promoted GDP growth in order to gain promotion (Bo 2002, Li and Zhou 2005, Chen, Li, and Zhou 2005). Kung and Chen (2011) applied this career incentives logic to variations in provincial radicalism during the GLF. They hypothesize that provincial leaders who had reached the highest level of their career ladders and thus faced weaker prospects for further promotion in the Communist Party hierarchy were likely to be less radical than those who had more room to rise. However, Yang, Xu, and Tao (2014) found that the pattern of promotions during the GLF period was not consistent with Kung and Chen's basic assumptions and their empirical results led them to conclude that Kung and Chen's key findings could not be sustained.

Research in Chinese politics has also given much attention to patron-client relationships (Nathan 1973, Dittmer 1995, Huang 2000, Shih 2008, Shih 2010, Shih, Adolph, and Liu 2012). Network ties with a senior leader may affect not only local officials' promotion prospects but also their policy choices. In other words, a sound understanding of promotions and policy choices of Chinese provincial officials requires attention to both career incentives and patron-client relationships. Members of the elite are not atomistic individuals solely concerned with cost-benefit analysis and merit-based performance, but are embedded in networks of relationships that often go back decades. According to this latter view, factionalism has been a constant in CCP politics (MacFarquhar and Schoenhals 2006).

In this study, we develop a theoretical model for understanding factional politics in autocracies that allows us to consider the objectives of and the incentives facing both patron and clients within a unified framework and with both complete and asymmetric information. We then test the implications of this model against the variations in provincial radicalism and famine severity in the GLF. Our model centers on the role of the top autocrat's network of political supporters in what Goldstein (1991) termed a system of "bandwagon politics" and explains the dynamics of political radicalism during the GLF as a game of political loyalty Mao employs in the presence of information asymmetry. We argue that, in the presence of information asymmetry, network-based links and historical ties offered opportunities for ex-ante screening, thus generating informational rents: local officials with strong network ties to the incumbent leader were thus at a distinct advantage. Motivated by showing loyalty to the incumbent leader and by the higher likelihood of promotion, local officials with network ties to Mao would then tend to behave more radically, with fatal consequences for the provinces

they governed during the GLF.

3 The historical context

3.1 Mao's leadership of the CCP

Before we present our theoretical model, we outline and review the basic historical contours of Mao's leadership in and of the CCP.

In decades of political and armed struggles, Mao had demonstrated a remarkable capacity to build a disciplined organization by rewarding loyal and trusted followers and periodically purging dissenters. Commenting on Mao's style in the Jiangxi Soviet, He Ducai said:

Mao Zedong trusted too much those who were submissive to him but couldn't treat fairly those who had different opinions, ... Someone as bad as Li Shaojiu, because he knew how to obey [Mao], won [Mao's] trust and was given heavy responsibilities and great power. And then [Li Shaojiu was] not held accountable even when he didn't perform well (Huang Kecheng, 1994: 100-101; see also Wang Ming 2004: 216).

Shortly after he had spoken, He Ducai was purged during Mao's brutal campaign to root out the "Anti-Bolshevik League" in 1930-1931 for siding with General Zhu De instead of Mao. This "Anti-Bolshevik League" campaign took the lives of several thousands of people who had joined the Communists even while the CCP itself was under attack from government troops.

During the Long March, Mao regained his power and gradually built up his influence in the Communist movement. Mao's commanding position in the Communist Party was solidified during the Yan'an Rectification Movement (1942-45), a mass campaign to remold thought as well as to purge undesirable elements, including dissenting intellectuals such as Wang Shiwei. Most members of the Politburo, especially CCP leaders who preceded Mao (Wang Ming, Bo Gu and Zhou Enlai) had to conduct many rounds of self-criticism and learned to always sing Mao's praise (Wang later went to Moscow, never to return).

Many senior leaders, including Ke Qingshi and Tao Zhu, were subjected to severe questioning and lengthy struggle sessions for their experience in the "White Areas" (Ke's wife buckled under the pressure and committed suicide). After Mao rescued them, both Ke and Tao became Mao's diehard followers and were entrusted with significant positions after the Communist takeover (Gao Hua 2011: 516). Mao admired Peng Dehuai's ability as a military commander but was unhappy with Peng's "arrogant airs" and personally orchestrated the

attacks on Peng until the latter was browbeaten. Mao then resurrected Peng to lead various military missions in the ensuing Civil and Korean wars (Gao Hua 2011:620-623). By the time the CCP convened its Seventh Party Congress in 1945, Mao was in firm control of the Party and the military and Mao Zedong Thought was enshrined in the party's constitution as its guiding ideology. Most members of the Central Committee were Mao's firm supporters.¹

The era of Mao following the CCP's takeover of power in 1949 was politically one of campaigns and purges (Teiwes 1997).² At the top, Mao had had a collegial relationship with colleagues such as Zhou Enlai, Liu Shaoqi, Chen Yun, and Deng Xiaoping in the early 1950s. Following the rapid progression of what is known as the socialist transformation, however. Mao felt increasingly constrained by his colleagues on economic matters, as well as by the Soviet Union.³ In late 1957, this balance shifted abruptly. Following the USSR's announcement of catching up with the United States, Mao announced in Moscow that China would seek to catch up with Great Britain in 15 years. Amid a contentious relationship with Khrushchev, who had just denounced Stalin (and his forced-draft collectivization), Mao wanted China to achieve a Great Leap Forward through mass mobilization so that China (and he) would gain greater clout within the socialist camp (Shen Zhihua 2013a). Central to the Leap was steel output, which was backed by a heavy industry coalition (Bachman 1991). Rural China would be urged to promote collectivization, which was supposed to yield higher grain output, an important factor in light of the need to boost output for the growing urban population and for exports. Collectivization was also supposed to yield labor efficiency gains so that more labor would be available for nonagricultural activities including iron-smelting.

With hindsight, it is instructive to ponder whether the damage inflicted by the GLF would have been as great as it was had the adjustment policies introduced prior to the Lushan Conference in the summer of 1959 been followed. In the event, Mao took Peng Dehui's letter as a challenge to his authority and brought in Lin Biao and other potential

¹Mao kept his former nemesis Wang Ming (Chen Shaoyu) as a CC member, toying with him, and using him as a symbol of his magnanimity.

²It is instructive just to mention some of the most salient from the perspective of their chilling effects on opinions and policymaking. In 1955, Mao orchestrated an investigation of the writer Hu Feng and his (alleged) anti-revolutionary clique. Out of 12 million cadres and especially intellectuals targeted for screening, 118,000 were branded as antirevolutionary, traitorous, and criminal and essentially sentenced to death (Shen Zhihua 2013b: 7). In 1957, Mao launched the Anti-rightist Campaign (1957), which led to the ruining of more than a half a million careers. The Anti-Rightist Campaign also set the stage for the launch of the Great Leap Forward.

³He spoke out in 1955 against rightist conservatism in economic development, and pushed for more investment and faster growth. But as imbalances multiplied, Premier Zhou Enlai and a coalition of central government officials countered with policies against "rush advance" and scaled back some of the proposed targets. Mao also sought to escalate the targets for China's second five-year plan (1958-1962), but when the Soviet Union failed to meet Mao's extravagant requests for assistance, his ambitious targets had to be scaled back in favor of Zhou's moderation (Shen Zhihua 2013b: 132-139). Mao therefore felt constrained.

supporters to corral Peng and a small number of others. Mao's senior colleagues quickly lined up behind him to attack Peng and others as right opportunists (Li Rui, 1999). In the aftermath of Lushan, the problems in the rural areas were brushed aside. Grain procurement was stepped up, communal dining halls were again vigorously promoted, and exports of grain also continued (Yang 1996, Yang 2008). All of these policies dramatically aggravated the starvation and the worst months of the Famine were in the spring of 1960. The divergence in provincial behavior when the harmful consequences of the GLF were becoming apparent offers a stark revelation of the preferences and calculations of top provincial leaders.

3.2 Promotions to the CCP central committee and organizational control

As noted earlier, Mao was already the dominant force when the Seventh Party Congress convened in 1945 and he held sway over the composition of the membership on the Seventh CC. This dominance continued with the Eighth CC of 1956: 33 of the 97 Eighth CC members were either full or alternate members on the Seventh CC.⁴

Chinese publications have generally emphasized the open and democratic atmosphere surrounding the Eighth Party Congress in September 1956 (See CCP Party Congress History, 2012). In practice, little was left to chance in preparing for the Congress. Mao appointed Chen Yun (Party position: member and Deputy Secretary of the Secretariat as of 1956 and head of the Organization Department 1937-44) and Deng Xiaoping (head of the Organization Department as of 1956), two trusted colleagues at the time, to lead a special committee on organizational and personnel issues, with a specific emphasis on the "elections."⁵ Key meetings of the CCP Secretariat dealing with the list of candidates were generally held at Mao's residence.

Kung and Chen (2011) gave special attention to the promotion incentives facing CC members. In their account, membership on the CC and Politburo in the latter half of the 1950s was predetermined by "revolutionary credentials" dating back to the pre-1949 years. There were thus extremely high entry barriers for non-members to rise to CC membership or, for that matter, for CC members to get into the Politburo. Kung and Chen reasoned that alternate CC members would be more aggressive in pursuing the Great Leap Forward policies than either full CCP-CC members or non-CC members.

Contrary to Kung and Chen, Yang, Xu, and Tao (2014) noted that there were plenty of opportunities for alternate and even non-CC members to get promoted, with some non-

⁴See Table 3 in Yang, Xu, and Tao (2014) for the composition of the Eighth CC.

⁵As of 1956, Chen was member and Deputy Secretary of the Secretariat and Deng was head of the Organization Department.

CC members vaulting into full CC memberships. Fresh faces accounted for 34% of the CC members and 96% of the alternate members inducted at the Eighth CC in 1956.⁶ Altogether 103 previous non-members became new CC full and alternate members in 1956 (and another 25 joined in 1958).

National leaders led by Mao had a variety of reasons for bringing new members into the CC. On the one hand, there were vacancies left open by deaths and purges. On the other, the top leadership may have wished to enlarge the CC by bringing in fresh blood that would help bolster their initiatives. Mao gave special attention to the promotion process. At a preparatory meeting for the Eighth Party Congress, Mao explicitly mentioned that while some provincial first party secretaries would not be able to get into the CC in 1956, they wouldn't have to wait too long. In May 1958, Mao convened a special second plenary session of the Eighth Party Congress and enunciated the "general line" for the Great Leap Forward. During this meeting, a further 25 new CCP-CC alternate members were added, including nine provincial first party secretaries (CCP Party Congress History 2012: 314). Immediately afterward, the Eighth CC convened its fifth plenum. Besides promoting Lin Biao to Vice Chairman, it also promoted three keen Mao supporters to membership on the Politburo: Ke Qingshi (Shanghai Party Secretary), Li Jingquan (Sichuan First Party Secretary), and Tan Zhelin (Vice Premier). All three would count among the most ardent champions of GLF policies.

Whereas Kung and Chen (2011) hypothesized that CCP-CC alternate members were most zealous in promoting radical policies, the Chinese provinces that suffered the most during the famine were actually led by First Party Secretaries who were either CC full members or non-members. Among the top 10 worst-hit provinces in terms of excessive mortality rates (Sichuan, Guizhou, Anhui, Gansu, Qinghai, Hunan, Henan, Guangxi, Shandong, Yunnan), only the four provincial units of Gansu, Hunan, Guangxi and Yunnan were led by CC alternate members.

4 Theoretical model

We now model China's Great Leap Forward as a screening mechanism used by Mao to realize personal ambition in terms of high levels of radicalism, as well as to elicit information concerning the level of loyalty of provincial leaders. We do this by proposing a simple

⁶An overwhelming majority of the surviving alternate members of the Seventh CC were promoted to full CC membership on the Eighth CC in 1956. Meanwhile, many new faces joined the Eighth CC. Of the 97 full CC members of the Eighth CC, 33 were NOT full or alternate members of the Seventh CC of 1945. 70 of the 73 alternate members on the Eighth CC were new inductees, including 13 who were provincial first secretaries or governors.

principal-agent model with type-dependent reservation utility.

4.1 Preliminaries

The utility of Mao is given by the standard formulation:

$$W(r, p) = r - p, \tag{1}$$

where r is the level of radicalism of the provincial leader and p is (the cost of) promotion. Our assumption is that Mao's utility is increasing in radicalism, which was the form of policy that he wished to implement, and that there are costs associated with promoting a party cadre. (which may stem simply from not being able to promote someone else). The utility function of a provincial leader, parameterized by his loyalty θ , is given by:

$$U(r, p, \theta) = p - \frac{r^2}{2\theta}, \tag{2}$$

where we therefore assume that provincial leader's utility is (i) increasing in promotion and decreasing in radical behavior (which may be unsavory to him because of the costs that are associated with it), and that (ii) the marginal cost of furnishing a given level of radical behavior is decreasing in loyalty. This last assumption would appear to be reasonable: engaging in socially costly radical behavior will be less costly for individuals who are more loyal to Mao. Note that the Spence-Mirlees single crossing property is satisfied, since $U_{r\theta} > 0, \forall \theta$. We denote the reservation utility of provincial leaders by $\bar{v}(\theta)$, with $\bar{v}'(\theta) < 0$. In what follows, we make the following assumption:

ASSUMPTION 1 $\bar{v}'(\theta) < -\frac{1}{2}$.

ASSUMPTION 1 is the key to the results that follow: $\bar{v}'(\theta) < 0$ corresponds to the assumption that the outside options of provincial leaders who are particularly loyal to Mao are few (it suffices to think of what would happen to them in the case of a purge or regime change) whereas those of leaders who are not loyal to Mao are relatively high. In the context of an authoritarian regime such as Mao's, this assumption is highly appealing. That the marginal effect of loyalty on reservation utility must be below some threshold level corresponds to assuming that the negative marginal effect be "sufficiently large" in absolute value terms: that is, reservation utility declines "sufficiently fast" in loyalty.⁷ In technical terms, the

⁷Note that the specific value of $-\frac{1}{2}$ in ASSUMPTION 1 stems from the simple quadratic form taken by the cost of radicalism incurred by the provincial leader. To anticipate somewhat: if the cost of furnishing radical behavior is given by $\frac{r^\beta}{\beta\theta}, \beta > 2$, then $\hat{r}(\theta) = \theta^{\frac{1}{\beta-1}}, \hat{p}(\theta, \bar{v}) = \frac{\theta^{\frac{1}{\beta-1}}}{\beta} + \bar{v}(\theta)$ and the condition becomes

specification of an agency model with type-dependent reservation utility corresponds to the class of principal-agent models considered in the countervailing incentives literature (Lewis and Sappington 1989, Maggi and Rodriguez-Clare 1995, Jullien 2000). The level of loyalty $\theta \in [\underline{\theta}, \bar{\theta}]$ of provincial leaders is assumed to be distributed according to the probability density function $f(\theta)$.

The timing of the game is as follows:

- Mao starts a political campaign involving policy choices indexed by their level of radicalism r ;
- Mao offers implicit radicalism-promotion contracts (r, p) to provincial leaders;
- provincial leaders take or leave the contract; if a local leader accepts the offer, he gets a promotion p and follows Mao with a level of effort r in the campaign.

Of course, in an authoritarian regime such as Mao's, the actual option of refusing the contract does not exist (the result would be being purged), and the participation constraint will therefore always be satisfied. The key in what follows in terms of distinguishing between perfect and asymmetric information will be whether or not the participation constraint is binding.

Consider the first-best solution with perfect information, which corresponds to the case in which provincial leader loyalty θ can be observed by Mao. Let total surplus be denoted by:

$$S(r, p, \theta) = W(r, p) + U(r, p, \theta) = r - \frac{r^2}{2\theta}.$$

Then the first-best level of radicalism \hat{r} is given by:

$$\hat{r}(\theta) = \theta. \tag{3}$$

Thus, the first-best level of radicalism furnished by provincial leaders is equal to their loyalty θ . The optimal promotion function $\hat{p}(\theta)$ is then chosen by Mao so that the individual rationality constraint of each provincial leader is just satisfied: $U(\hat{r}(\theta), \hat{p}(\theta), \theta) - \bar{v}(\theta) = 0$. This yields:

$$\hat{p}(\theta, \bar{v}) = \frac{\theta}{2} + \bar{v}(\theta). \tag{4}$$

$$\hat{p}_\theta(\theta, \bar{v}) = \frac{\theta^{\frac{2-\beta}{\beta-1}}}{\beta(\beta-1)} + \bar{v}'(\theta) < 0.$$

4.2 Asymmetric information

Now consider the case in which the provincial leaders' type is unobservable. This is a standard screening contract situation where the solution must involve truth-telling. The problem for Mao is to maximize expected utility:

$$\begin{aligned} & \max_{\{r(\theta), p(\theta)\}} \int_{\underline{\theta}}^{\bar{\theta}} (r - p) f(\theta) d\theta & (5) \\ \text{s.t. } (IC) & : \theta \in \arg \max_{\{\theta'\}} p(\theta') - \frac{r^2(\theta')}{2\theta}, \forall \theta, \\ (PC) & : V(\theta) = p(\theta) - \frac{r^2(\theta)}{2\theta} - \bar{v}(\theta) \geq 0, \forall \theta, \end{aligned}$$

where θ' is the provincial leader's reported level of radicalism, the first constraint is incentive compatibility, the second is participation, and

$$V(\theta) = p(\theta) - \frac{r^2(\theta)}{2\theta} - \bar{v}(\theta) \quad (6)$$

represents the provincial leader's net utility (i.e. utility in excess of reservation utility). By the usual result (see e.g. Laffont (1990), chapter 10), necessary and sufficient conditions to solve this problem are given by:

$$V_{\theta}(\theta) = \frac{[r(\theta)]^2}{2\theta^2} - \bar{v}'(\theta) \quad (\text{local optimality}) \quad (7)$$

$$r(\theta) \text{ nondecreasing} \quad (\text{monotonicity}) \quad (8)$$

Since $V_{\theta}(\theta) > 0$ under ASSUMPTION 1, setting $V(\underline{\theta}) = 0$ satisfies the participation constraint for all types.⁸ Letting $L(\theta) = \frac{1-F(\theta)}{f(\theta)}$ denote the likelihood ratio, where we impose the usual Monotone Likelihood Ratio Property (MLRP) assumption that $L_{\theta}(\theta) < 0$, it is a standard result that the integrand in (5) can be rewritten as:

$$S(r, p, \theta) - U_{\theta}(r, p, \theta) L(\theta) = \frac{r[(2\theta - r)\theta - rL(\theta)]}{2\theta^2}.$$

This yields:

$$r^*(\theta) = \frac{\theta^2}{\theta + L(\theta)} < \theta = \hat{r}(\theta), \quad (9)$$

⁸Note that if $\bar{v}'(\theta) > 0$, and the sign of $V_{\theta}(\theta)$ varies over the interval $[\underline{\theta}, \bar{\theta}]$, this model can yield "bunching" results of the kind considered in Maggi and Rodriguez-Clare (1995).

so there is insufficient radicalism from Mao's perspective with respect to the first-best optimum, and where it is then obvious, given our assumption that $L_\theta(\theta) < 0$, that equilibrium radicalism is increasing in loyalty so that the monotonicity condition (8) is satisfied:

$$r_\theta^*(\theta) = \frac{\theta [\theta + 2L(\theta) - \theta L_\theta(\theta)]}{[\theta + L(\theta)]^2} > 0.$$

At the optimal level of radicalism, local optimality (7) implies that it must be the case that:

$$V_\theta^*(\theta) = \frac{r_\theta^*(\theta)}{2\theta^2} - \bar{v}'(\theta) = \frac{\theta^2}{2[\theta + L(\theta)]^2} - \bar{v}'(\theta).$$

It follows that the optimal promotion function is then given by:

$$\begin{aligned} p^*(\theta) &= \bar{v}(\theta) + \frac{[r_\theta^*(\theta)]^2}{2\theta} + \int_{\underline{\theta}}^{\theta} V_\theta^*(\tau) d\tau \\ &= \bar{v}(\theta) + \frac{\theta^3}{2[\theta + L(\theta)]^2} + \int_{\underline{\theta}}^{\theta} \left(\frac{\tau^2}{2[\tau + L(\tau)]^2} - \bar{v}'(\tau) \right) d\tau. \end{aligned} \tag{10}$$

Equation (10) displays the standard result in which the participation constraint of the lowest loyalty level provincial leader $\underline{\theta}$ is binding (since the second term on the RHS of (10) vanishes), and in which informational rents increase along with θ . We summarize the preceding discussion in the following Proposition (the proof is relegated to the Appendix):

Proposition 1 *Under ASSUMPTION 1, $\hat{p}_\theta(\theta) < 0$. Moreover, $p_\theta^*(\theta) > 0$.*

Proposition 1 gives us a first glimpse of the key feature that will allow one to distinguish between situations of full and situations of asymmetric information: the comparative statics of the optimal promotion function. Later, this will yield a theoretical result concerning the impact of network ties to Mao on promotions that will provide our main test for the presence of asymmetric information during the Great Leap Forward. Optimal radicalism, for its part, is increasing in θ in both cases. In the first-best optimum in which the loyalty of provincial leaders is observable, promotions $\hat{p}(\theta)$ will be a decreasing function of loyalty: this is because, under ASSUMPTION 1, the cost of satisfying the participation constraint of a provincial leader decreases with loyalty. On the one hand, the cost of optimal radicalism incurred by provincial leaders increases with their level of loyalty. On the other hand, their reservation level of utility decreases along with loyalty. ASSUMPTION 1 ensures that the second effect dominates the first. In order to make each provincial leader's participation constraint bind, Mao will thus reduce promotions as loyalty increases. Conversely, under asymmetric information, and in order to elicit truth-telling concerning loyalty, Mao must

furnish informational rents that are increasing in loyalty: this leads to optimal promotions $p^*(\theta)$ that are increasing in a provincial leader's level of loyalty.

4.3 Effects of ties to Mao

4.3.1 Faction membership as a lower bound on loyalty

Assume that there are two groups of provincial leaders, faction group F and non-faction group N , where members of group F belong to Mao's faction and members of group N are outsiders. It is well known that Chinese culture values the idea of showing loyalty (Zhong) to those who bestows kindness (such as for saving one's life, for providing education, and for discovering one's talent)(Qian 1985). One can reasonably assume that those who had previously studied with, worked for, and fought under Mao in the early days of the revolution would be likely to have a strong sense of loyalty to him. We therefore assume that the level of loyalty of faction members is assumed by Mao to be above some minimum threshold $\theta_F \in (\underline{\theta}, \bar{\theta})$. Following the logic of Alt, Bueno de Mesquita, and Rose (2011) and Ashworth (2005), it is highly likely that the top leader selects faction members among people whom he favors along some dimension, with loyalty *per se* being a prime candidate. It may also be the case that members of the leader's faction are individuals who have managed to survive a series of pre-screening games (such as purges), which leads to them being above a certain threshold loyalty level.

Assume that θ is distributed according to the uniform density over the interval $[\mu - \sqrt{3}\sigma, \mu + \sqrt{3}\sigma]$ with $\mu - \sqrt{3}\sigma > 0$. This implies that the mean and variance of θ are given, respectively, by μ and σ^2 . Moreover:

$$f(\theta) = \frac{1}{2\sqrt{3}\sigma}, F(\theta) = \frac{\theta - \mu + \sqrt{3}\sigma}{2\sqrt{3}\sigma}, L(\theta) = -\theta + \mu + \sqrt{3}\sigma. \quad (11)$$

As an illustration of the type-dependent reservation utility that satisfies ASSUMPTION 1, we pose:

$$\bar{v}(\theta) = v - \theta. \quad (12)$$

Define the average levels of radicalism for faction and non-faction members as:

$$\bar{\hat{r}}(\theta_F, F) = \frac{1}{1 - F(\theta_F)} \int_{\theta_F}^{\bar{\theta}} \hat{r}(\theta) f(\theta) d\theta, \bar{\hat{r}}(N) = \int_{\underline{\theta}}^{\bar{\theta}} \hat{r}(\theta) f(\theta) d\theta,$$

for the first-best optimum, and

$$\bar{r}^*(\theta_F, F) = \frac{1}{1 - F(\theta_F)} \int_{\theta_F}^{\bar{\theta}} r^*(\theta) f(\theta) d\theta, \bar{r}^*(N) = \int_{\underline{\theta}}^{\bar{\theta}} r^*(\theta) f(\theta) d\theta,$$

for the case of asymmetric information. We then have the following Proposition (the proof is relegated to the Appendix):

Proposition 2 *For loyalty distributed according to the uniform density and an affine type-dependent reservation utility function that satisfies ASSUMPTION 1, $\bar{r}(\theta_F, F) > \bar{r}(N)$ and $\bar{r}^*(\theta_F, F) > \bar{r}^*(N)$.*

Proposition 2 establishes that the average level of radicalism will always be higher for faction members than for non-members, whether there is asymmetric information or not. If we find that radical behavior, however it is measured, is a negative function of faction membership, this would cast doubt on our theoretical explanation of the mechanism underlying Mao's actions during the Great Leap Forward.

Now consider the average values of optimal promotions for faction members and non-members. Under the first-best optimum, we have:

$$\bar{p}(\theta_F, \bar{v}, F) = \frac{1}{1 - F(\theta_F)} \int_{\theta_F}^{\bar{\theta}} \hat{p}(\theta, \bar{v}) f(\theta) d\theta, \bar{p}(\bar{v}, N) = \int_{\underline{\theta}}^{\bar{\theta}} \hat{p}(\theta, \bar{v}) f(\theta) d\theta$$

while under asymmetric information, we have:

$$\bar{p}^*(\theta_F, \bar{v}, F) = \frac{1}{1 - F(\theta_F)} \int_{\theta_F}^{\bar{\theta}} p^*(\theta, \bar{v}) f(\theta) d\theta, \bar{p}^*(\bar{v}, N) = \int_{\underline{\theta}}^{\bar{\theta}} p^*(\theta, \bar{v}) f(\theta) d\theta.$$

We then have the following Proposition (the proof is relegated to the Appendix):

Proposition 3 *For loyalty distributed according to the uniform density and an affine type-dependent reservation utility function that satisfies ASSUMPTION 1, $\bar{p}(\theta_F, \bar{v}, F) < \bar{p}(\bar{v}, N)$ whereas $\bar{p}^*(\theta_F, \bar{v}, F) > \bar{p}^*(\bar{v}, N)$.*

Proposition 3 is the key result that allows us to test for the presence of adverse selection during the Great Leap Forward. In the absence of adverse selection, one would expect the average level of promotions of faction members to be **lower** than the average level of promotions of non-faction members. In the presence of asymmetric information, on the other hand, one would expect the average level of promotions to be **higher** for faction members. The combination of Propositions 2 and 3 gives us a powerful two-pronged test of

our theoretical construct. If our principal-agent model is a reasonable description of reality and the loyalty of provincial leaders was known to Mao, one would expect to see radical behavior be an increasing and promotions a decreasing function of faction membership, respectively. If asymmetric information concerning loyalty was present, on the other hand, one would expect both radical behavior and promotions to be increasing functions of faction membership.

5 Data

We now test our two Propositions (2 and 3) using empirical evidence from China's GLF. We also examine the mechanisms leading to heterogeneous mortality in detail. Before turning to our empirical results, we first spell out how we constructed empirical measures of (i) radical behavior, (ii) membership in a faction, (iii) promotions and (iv) various covariates which are potential exogenous determinants of radical behavior and promotions in the GLF context.

5.1 Radicalism

As a millenarian movement, the Great Leap Forward was marked by extreme radical behavior along multiple dimensions. Note that the concepts of radicalism adopted in the GLF literature are highly specific, and do not correspond to any Left/Right cleavage. In a very concrete sense, radicalism during the GLF corresponds to whatever Mao wanted done at a given moment.⁹

Studies of the Great Leap have used a variety of variables as indicators of radicalism, including the rate of use of communal dining halls (Yang 1996, Chang and Wen 1997), the level of agricultural collectivization (Li and Yang 2005, Kung and Chen 2011), the net procurement ratio (Kung and Lin 2003, Kung and Chen 2011), and steel output (Li and Yang 2005). Contrary to previous studies which have focused on radicalism along a single dimension, we argue that the famine was shaped by a plethora (and sequence) of radical policies. Moreover, indicators of various strands of radical behavior are sometimes uncorrelated or even negatively correlated. For example, public dining hall participation rates in 1959 were negatively correlated with the excessive procurement ratio in 1959 and 1960, with correlation coefficients of -0.6 and -0.5 , respectively. Such negative correlations might stem from higher excess procurement reducing the grain available to start the communal dining halls. Thus, focusing on a single indicator may fail to capture the level of radicalism in a

⁹For example, radicalism during the Cultural Revolution would not correspond at all to the measures used in the context of the GLF.

general sense.

5.1.1 Synthetic measures: mortality and fertility

In this paper, we first adopt (excess) mortality rates and fertility rates as our synthetic measures of the outcome of radicalism (Yang 1996, Lin and Yang 2000, Kung and Lin 2003, Meng, Qian, and Yared 2015). *Ceteris paribus*, our results show that a provincial leader having network ties to Mao is strongly (positively) correlated with these two measures of famine severity at the provincial level. We also provide evidence concerning the intermediate pathways leading from factional ties to famine severity by examining the effect of faction ties on various traditional measures of radicalism such as those (communal dining, steel output, excess procurement) mentioned earlier.

As noted by Amarty Sen, famine obtains when food availability cannot satisfy food demand. In this light we divide radical policies into demand- and supply-side components. Demand-side policies include peasants being allocated to highly calorie-intensive activities such as wasteful land reclamation and irrigation projects or steel production in the countryside, as well as communal dining halls (which led to inefficiency of food consumption); while supply-side policies include agricultural collectivization (which reduced production efficiency), as well as forced procurement (which reduced grain available in rural areas). Of course, the diversion of rural labor to non-agricultural uses also has supply-side consequences (apart from its effect of increasing the demand for calories) in that food production is thereby reduced.

Because of China's rigid household registration system, people were forbidden to move from rural to urban areas or across provincial borders during the famine. This makes the (excess) mortality rate a direct measure of famine severity in each province. A recent study claims that the fertility rate might be a better measure of famine severity than mortality on the premise that famine victims might forego fertility before allowing family members to die of starvation (Meng, Qian, and Yared 2015): as such, we also re-estimate all of our mortality specifications using fertility as an alternative dependent variable.

5.1.2 Specific (intermediate) measures

Radical policies with regard to agricultural collectivization (together with labor diversion) led to a sharp decline in grain output beginning in 1959. Since detailed data on the degree of collectivization and on labor diversion are not available, we use the (negative) growth rate of grain output as a proxy for the level of radicalism in terms of agricultural production.

The Great Leap Forward was associated with the rapid expansion of labor intensive

activities, such as water conservancy projects, land reclamation and the construction of rural steel furnaces. Steel output is arguably a good proxy for labor intensive projects, as well as for the excess demand for food because a significant proportion of steel was produced in so-called "backyard furnaces" in rural areas. Moreover, in view of Mao's explicit preoccupation with catching up with Great Britain in terms of steel output (Mao wengao, vol. 7: 278), steel output is a direct indicator of local radicalism.¹⁰

Other initiatives, such as collectivization, the diversion of agricultural labor to water conservancy and industrial construction, communal dining, and increased grain procurement, were also expected to facilitate China's heavy industry-oriented development strategy (Bachman 1991, Lin and Yang 2000). Mao was convinced that larger collective units would help Chinese agricultural productivity. The communal dining system was *prima facie* created to emancipate women from housework. With a surge in agricultural productivity (due in part to a higher female labor input), the state would be able to extract more primary surplus from the peasantry to fund industrialization efforts, somewhat in the Preobrazhensky tradition. Of course, the communal dining system led to enormous inefficiencies (Chang and Wen 1997), while excess procurement in rural areas led to severe negative incentive effects (Yang 1996, Kung and Chen 2011).

5.2 Ties to Mao

Identifying social network ties is challenging because many such relationships are hidden or unknown to the public. Thus, one cannot simply sum up well-known and officially documented ties involving friendship, as doing so can lead to severe biases. The political science literature (Bo 2002, Shih 2004, Shih 2008, Shih, Adolph, and Liu 2012, Oppen and Brehm 2007) has relied on three dimensions of personal ties, which are often employed in the cultivation of patron-client relations, to proxy for network ties. These are common geographical origins, teacher-student relationships, and shared work experiences. While none of these necessarily leads to strong network ties, their existence, taken jointly, provides the basis for repeated interactions that might facilitate the development of strong ties (Granovetter 1973). In the present study, we measure the pre-existing relationship between Mao and provincial leaders (both the provincial First Party Secretary and the provincial governors) by introducing a dichotomous variable indicating whether a provincial leader was born in the same province as Mao (Hunan), attended the education institutions Mao had led or taught at in

¹⁰We use the *growth rate* of grain output since, given the relatively high population growth rate during this period which pre-dates the one-child policy, growth in food production was the key ingredient to feeding a growing population. With respect to steel output, industrial central planning targets such as that for steel tended to be expressed in levels, and catching up with Britain, in Mao's discourse, involved reaching (and surpassing) their *level* of steel output.

earlier years (the *Peasant Movement Institute* of the 1920s; the *Anti-Japanese University* in the 1930s), or worked with Mao as a military officer during the revolutionary period in the *Fourth Red Army (Hongsi Army)* and *First Red Field Army (Hongyifangmian Army)*.

5.3 Promotions

Politicians care about power and status. Within the CCP, the Central Committee, elected (or rubber-stamped) by the National Party Congress, is theoretically the highest organ of power and membership is highly coveted. It can therefore be used as a favor granted by patrons to followers (Rigby 1968, Kung and Chen 2011). As noted earlier, the size of the Central Committee was expanded substantially at the Eighth Party Congress. This was the first national Party Congress following the CCP takeover of national power and the expansion of the Central Committee allowed Mao to reward military and political leaders after many years of war-making. To the victors go the spoils.

We classify the promotions to the Central Committee during the Eight Party Congress into two categories: "normal" and "special" promotions. *Normal promotions* are those that involve moving up one rung in the hierarchy, i.e. from non-member to alternate member, or from alternate member to full member. There were two types of special promotions. The first were those officials who were catapulted from outside the Central Committee to full membership of the CC during the Eighth National Party Congress. The second were the atypical promotions to the Central Committee made in the spring of 1958. Rather than wait until the Ninth Party Congress, Mao convened an exceptional second plenary session of the 8th Party Congress in the spring of 1959, just a few months after the launch of the Great Leap Forward. During this session, an additional slate of alternate members to the Central Committee was put forward and approved a number of provincial leaders (Yang, Xu, and Tao 2014).

In our sample of First Party Secretaries for 1958-1962, 48 percent received special promotions, including 25.6 % who were catapulted from outside the CC to full CC membership in September 1956 and another 22.4% who were inducted into the CC in Spring 1958. Of the remaining 52 percent, 38.4% were given normal promotions and 13.6% remained at the same rank.

5.4 Covariates

Our key covariates include the individual characteristics of provincial leaders, as well as provincial economic characteristics.

5.4.1 Characteristics of provincial leaders

Individual characteristics of provincial leaders include seniority in the party (age and length of tenure in the party), local identity (whether the provincial leader was a native of the province he governed), education level (whether the provincial leader had received a college degree or above), and pre-revolutionary credentials (whether the provincial leader had taken part in the Long March and whether he had engaged in guerilla warfare).

5.4.2 Provincial characteristics

We control for time-varying economic characteristics of each province. A province’s agricultural endowment would likely have a significant effect on policy choices (such as grain procurement) and on the incidence of famine and we therefore include per capita grain output as a covariate. A province rich in agriculture would be more likely to be called upon to step up grain procurement during the Great Leap Forward and especially during the famine. In the absence of interprovincial grain transfers, a province with subsistence agriculture would have little margin for error and would be more susceptible to famine were harmful policies to be adopted.

Yang (1996) suggests that, in order to “leapfrog” their wealthier counterparts, leaders in poorer provinces might be tempted to adopt more radical policies as a signal of their political loyalty. Shih (2008) suggests that leaders in affluent provinces had more subtle and credible means of demonstrating their loyalty. We employ provincial per capita GDP to proxy this possible effect. Because the urban population were guaranteed grain rations and thus relatively protected during the famine years, we follow Lin and Yang (2000) and control for the proportion of the population that is rural in each province.

Table 1 presents the summary statistics, including both the total standard and within-province standard deviations of the main variables.¹¹ We restrict our sample to the five-year period running from 1958 to 1962. 1958 is the starting year of the Great Leap Forward. By 1962, the GLF had largely ended. Beijing, Tianjin and Shanghai are excluded because of their status as centrally administered municipalities. Tibet is excluded due to missing data. Our sample thus includes 25 provinces.

¹¹This is because we account for time-invariant province-specific unobservables in the empirical specifications that follow. As such, our identification strategy is driven but *time-varying* provincial and provincial leader characteristics.

6 Empirical results

In presenting our empirical specifications and findings, we adopt the following narrative structure. We first examine whether the provincial leaders’ personal ties to Mao were systematically related to the patterns of special promotions to the Central Committee, and then analyze whether the network ties of provincial leaders to Mao were associated with patterns of famine severity as well as with various measures of provincial radicalism during the Great Leap Forward. Our underlying theoretical hypotheses, crystallized in Propositions 2 and 3, are that, in the presence of asymmetric information concerning loyalty, network ties to Mao should be associated with (i) higher levels of radicalism and (ii) a higher likelihood of special promotions. In contrast, in the absence of asymmetric information, factional network ties to Mao should be associated with lower levels of special promotions. We begin with our main test for the presence of asymmetric information, based on the relationship between special promotions and network ties to Mao.

6.1 Special promotions

Because our focus in this study is on the patterns of radical behavior in Chinese provinces, we limit our attention to the provincial First Party Secretaries and governors.¹² We estimate a probit specification using a sample of 63 provincial FPSs and governors who served between 1956 and 1962. The specification of our model is given by:

$$y_j = \Phi(Faction_j\alpha + X_j\gamma + \varepsilon_j), \quad (13)$$

where y_j is a dummy variable that equals 1 if individual j obtained a special promotion to the Eighth Central Committee during the first and second plenary sessions of the Eight National Party Congress, $Faction_j$ is our measure of personal network ties to Mao, X_j is a matrix of covariates and ε_j is a disturbance terms that is assumed to satisfy the usual assumptions.

Covariates include the individual’s age and education level; an individual’s seniority, both in terms of their age and their years of CCP membership; finally, we include “prerevolutionary credentials” as proposed by Kung and Chen (2011), including Long March and guerilla warfare experiences.¹³ Results are reported in Table 2.

¹²We also estimated the same equation by restricting attention to the FPS subsample: the results are qualitatively similar.

¹³Kung and Chen (2011) took an individual’s “original rank on the 7th Central Committee” as a covariate in their promotion regression. We have not included this covariate in our sample of 63 provincial leaders because only Wu Lanfu (a member of an ethnic minority from Inner Mongolia who was an alternate member) belonged to the 7th Central Committee, and there is therefore not enough variation to identify anything

Whether or not we include covariates, the coefficients associated with the provincial leaders' ties to Mao are all positive and statistically significant at the usual 5% levels of confidence. On the basis of Proposition 3, this provides compelling evidence in favor of the presence of asymmetric information for the time period covered. The point estimates of the marginal effects indicate that having ties to Mao was associated with a 30% increase in the probability of getting a special promotion. The marginal effect, at the sample mean, of having ties to Mao is above 28% (28%-36% depending on which covariates are included). Amongst the covariates, only educational attainment and years of Party membership have a significant positive influence on the likelihood of obtaining a special promotion. Pre-revolutionary credentials such as Long March and guerilla warfare experience do not appear to be associated with special promotions, once factional ties to Mao are controlled for.

6.2 Famine severity

We now consider the relationship between famine severity and provincial leaders' network ties to Mao. On the basis of Proposition 2, we expect network ties to Mao to be associated with greater famine severity. This corresponds to a reduced form specification in which ties to Mao are expected to increase radicalism, and radicalism in turn is expected to increase famine severity. To test this hypothesis, our empirical specification is given by:

$$Severity_{pt} = Faction_{pt}\alpha + X_{pt}\gamma + \xi_p + \lambda_t + \varepsilon_{pt}, \quad (14)$$

where p indexes provinces, t indexes years, $Severity_{pt}$ is famine severity measured either in terms of the mortality rate or of the fertility rate, ξ_p and λ_t control for time-invariant province-level unobservables and shocks common to all provinces in a given year, respectively, and ε_{pt} is the usual disturbance term. Potential covariates X_{pt} include provincial economic characteristics, as well as the characteristics of the provincial leaders. We consider different sets of covariates sequentially in order to examine several hypotheses that have been proposed in the literature to explain the heterogeneity across provinces in the severity of the Great Famine. Table 3 reports results when famine severity is measured using mortality rates.

All specifications are estimated for 25 provinces over the years 1958-1962, yielding a total of 125 observations. Since we include year and province (fixed) effects in all specifications, identification comes exclusively from within-province variation. While time-varying provincial unobservables correlated with our covariates might bias our results, time invariant province-specific unobservables, and year-specific unobservables are accounted for. All standard errors are clustered at the provincial level, thereby accounting for serial correlation empirically meaningful.

in time-varying provincial unobservables in our inference.

6.2.1 Ties to Mao

In the first column, we eschew covariates and only include the provincial leader’s network ties to Mao. As will become clear, and in consonance with Proposition 2, famine severity is a positive and statistically significant function of the provincial leader having network ties to Mao, with the magnitude of the effect increasing as additional covariates are added. In the second column, we control for food availability in each province. Since urban residents enjoyed government grain rations (Lin and Yang 2000), we control for the proportion of provincial population that is rural. To test the “tournament hypothesis” proposed by Kung and Chen (2011), column 3 adds the provincial leader’s party rank. In column 4 we add provincial GDP per capita. Finally, in column 5, we add the provincial leader’s party tenure and a dummy indicating whether or not he was a native of the province.

All five specifications indicate a strong positive impact of the provincial leader’s ties to Mao on the provincial mortality rate. Even in the absence of covariates, the point estimate suggests that mortality rates in provinces governed by leaders with ties to Mao were almost 6 per thousand higher than in provinces that were not. Given that the average mortality rate during the famine years (1958-1962) was 15 per thousand, the magnitude of the effect is noteworthy, and corresponds to a 40% differential.

The effects of grain availability are consistent with expectations: a 1% increase in grain output per capita yields a 20 per thousand decrease in the mortality rate. Taken together these two coefficients provide us with a useful metric. In comparative terms, a provincial leader having network ties to Mao is equivalent to a fall of $6.83 \div 19.47 = 0.35\%$ in grain output per capita. Given that the sample standard deviation of the latter is equal to 0.25%, this is a very large effect indeed. As covariates are added, the deleterious effect of a provincial leader having network ties to Mao increases: in the fifth column, having ties to Mao is equivalent to a $11 \div 17 = 0.68\%$ fall in grain output per capita. To control for the possibility that some provinces might have already yielded to political radicalism even before the pre-Great Leap (Kung and Chen, 2011), we also extended our sample back to 1957. Results (available upon request) are very similar to those of Table 3 and the magnitude of the effects associated with ties to Mao are further strengthened.

6.2.2 Urbanization and grain self-sufficiency

According to Lin and Yang (2000), provinces with higher urbanization rates should have benefitted from the city-bias associated with the food distribution system and suffered less.

In another words, a higher rural share of the population should be associated with a higher mortality rate (and a lower fertility rate). However, our empirical results (columns 2 to 5 of Table 3) do not indicate a statistically significant impact of the share of the population that was rural on the mortality rate; indeed though statistically indistinguishable from zero, the point estimate is actually *negative*.

This finding can be accounted for as follows. On the one hand, higher urbanization rates, combined with lower urban mortality rates, should lead to a positive effect of the rural population share on provincial mortality. On the other hand, under the assumption of provincial self-sufficiency in grain (which was the norm, except for the three centrally administered municipalities of Beijing, Shanghai and Tianjin, which we exclude from our sample), higher urbanization rates imply a heavier burden of procurement on the provincial rural population and thus lead to higher rural mortality. It is likely that the two effects cancel each other out statistically and thus produce the result reported here. That this second effect is likely to have been of sufficient magnitude to offset the first is borne out by the numbers presented in Table 4. In 1959, for example, the grain transferred across provinces accounts for less than 10% of the total net procurement and roughly 75% of that was transferred to the three centrally administered municipalities, which are excluded from our analysis (and data). In other words, 90% of the grain procured by the central government was consumed in cities within its province of origin. Because the amount of grain redistributed to provinces other than the three centrally administered municipalities was quite limited, most provinces had to be largely self-sufficient in terms of grain consumption. For those provinces with higher urban population shares, more resources had to be collected from the countryside, leading to higher mortality in the countryside.¹⁴

6.2.3 Party rank, other covariates and an alternative measure of famine severity

Contrary to Kung and Chen (2011), our results suggest that the provincial leader's party rank has little statistical power in terms of explaining variations in provincial famine severity. Neither the coefficient associated with being an alternate member, nor that associated with being a full member is statistically significant, and the null of the equality of the two coefficients is never rejected at conventional levels of confidence.

The level of development, as measured by log GDP per capita, has a negative but statistically insignificant effect on mortality, as does the length of tenure of the provincial leader.

To ascertain the robustness of our findings, we presents results in which the fertility rate is used as an alternative measure of famine severity in Table 5. As with mortality, extending

¹⁴We shall re-examine this question analytically in the simple theoretical model of causal pathways presented in section 6.3.2 below.

the sample back to 1957 yields similar results. Network ties with Mao again have a negative and statistically significant effect on famine severity. Fertility rates in provinces governed by provincial leaders with ties to Mao are 10 per thousand lower than in provinces that were not, with the magnitude of the effect in terms of the grain output metric used earlier being very similar.

6.3 Causal mechanisms

6.3.1 The growth rate of grain output, excess procurement, and retained grain in rural areas

Our results so far confirm our hypotheses that provinces governed by leaders with ties to Mao behaved more radically in responding to Mao's call during the Great Leap Forward and as a result suffered more severely from the famine, as predicted by a reduced-form version of Proposition 2. We have also shown that special promotions were more likely, *ceteris paribus*, for individuals with network ties to Mao, a prediction of the asymmetric information portion of Proposition 3. Here, we seek to identify the specific measures of radicalism through which network ties to Mao increased famine severity. This section therefore constitutes a direct test of Proposition 2.

As discussed earlier, the Great Leap Forward was marked by extreme radical policies along multiple dimensions. The empirical counterparts to the single $\widehat{r}(\theta_F, F)$ or $\overline{r}^*(\theta_F, F)$ of our theoretical results are therefore multitudinous. While studies of the Great Leap Forward have used a variety of indicators of radicalism, including the rate of communal dining halls (Yang 1996, Chang and Wen 1997), the level of agricultural collectivization (Li and Yang 2005, Kung and Chen 2011), grain output (Li and Yang 2005, Kung and Chen 2011) and the net procurement ratio (Kung and Lin 2003, Kung and Chen 2011), a comprehensive conceptual framework that captures the multiplicity of policies and their interactions is needed to better understand the logic that led from the Great Leap Forward to the Great Leap Famine.

Rapid collectivization leading to the formation of the people's communes greatly reduced work incentives in agriculture while simultaneously much labor was diverted to water conservancy projects and iron/steel smelting. These policy measures contributed to grain output declines and the onset of an agricultural crisis (as well as exhaustion-related health declines). Meanwhile, for peasants forced to work hard on large irrigation and land reclamation projects and the construction and operation of "backyard iron furnaces", calorie intake requirements increased. The heavy promotion of communal dining halls in the people's communes resulted in both overconsumption and wastage of food.

Even though local authorities had set excessive grain procurement quotas during the GLF, realized net grain procurement had to be adjusted, albeit inadequately, as conditions worsened. The adjustments in realized net grain procurement could be achieved through a combination of reduced procurement obligations and increased grain resale to the countryside. Below, we combine these elements in a simple two-sector model that will allow us to interpret our empirical findings in a structured manner.

In Table 6, we examine the impact of ties to Mao on the growth rate of provincial grain output, the excess procurement ratio and retained grain per capita in rural areas. Controlling for the effects of weather (using the share of disaster-affected land area), provinces whose leaders had network ties to Mao suffered significant declines of grain output, as shown in column 1 and 2.¹⁵ Concomitantly, we find **no impact** of ties to Mao on retained grain per capita in rural areas (column 5 and 6). It would appear that those provinces that had suffered the greatest declines in agricultural output during the famine adjusted their procurement practices to compensate for the crisis. That this may indeed have been the case is suggested by the results reported in columns 3 and 4: the excess procurement ratio actually declined in provinces whose leaders had ties to Mao, although this effect is estimated quite imprecisely.

If provinces whose leaders had ties to Mao did not significantly lower the level of retained grain per capita (whether this lack of effect transpired through a reduction in excess procurement ratios or some other mechanism such as increased grain resale to the countryside is not a crucial element of the story), why did these provinces suffer higher mortality and lower fertility? The remaining piece of the puzzle revolves around policies such as forced participation in communal dining halls, the building of large irrigation and land reclamation projects, and the operation of "backyard iron furnaces": all of these practices either significantly increased the demand for calories (the wasteful use of rural labor in high calorie consumption activities), or drastically increased the inefficiency of the process through which retained grain was turned into calories actually available to the population (the communal dining halls). Since no data exist concerning labor diversion to water conservancy projects and backyard iron furnaces, we must base our test of this hypothesis using the communal dining hall participation rate (Chang and Wen 1997) and steel output as key dependent variables. As Table 7 shows, a province being governed by a leader with ties to Mao is associated with an increase of 23% in the communal dining hall participation rate, and an increase in steel output of between 125 and 165%, depending upon the covariates which are included in the specification. Taking these two variables as our preferred proxies for radical behavior,

¹⁵The growth rate of grain output is defined as the growth rate of provincial grain output with respect to the previous year.

Table 7 provides compelling evidence in favor of the hypothesis set forth in Proposition 2.¹⁶

All of these findings can be tied together in a very simple model that highlights the mechanisms at work in producing the Great Leap Famine.

6.3.2 A simple model of the Great Leap Famine

Consider a very simple two-sector model of calorie production and consumption. Let the total rural labor force N^A , be equal to the rural labor force engaged in the production of calories L^A and the rural labor force R used for radical activities that do not produce food, such as useless land reclamation and irrigation projects, or the establishment of rural blast furnaces:

$$N^A = L^A + R.$$

The results of Table 7 on steel output imply that a substantial portion of the rural work force must have been diverted to such activities, so we pose $R'(F) > 0$, where F represents faction ties to Mao. The urban population will be denoted by N^U . Assuming no interprovincial movement of food, or of labor, the total food supply produced within the province will be determined by the following production technology:

$$Q(N^A - R(F)),$$

where $Q(\cdot)$ is an increasing and concave production technology (land is assumed to be fixed). The amount of food theoretically available to the rural population is given by:

$$(1 - \pi(F))Q(N^A - R(F)),$$

where $\pi(F)$ corresponds to the procurement ratio: $(1 - \pi(F))Q(N^A - R(F))$ therefore corresponds to retained grain in rural areas. Our finding in Table 6 that the total amount of retained grain in rural areas did *not* vary significantly as a function of network ties to Mao corresponds to imposing the condition that:

$$\frac{d}{dF}(1 - \pi(F))Q(N^A - R(F)) = -\pi'(F)Q(N^A - R(F)) - (1 - \pi(F))R'(F)Q'(N^A - R(F)) = 0. \quad (15)$$

In urban areas, the amount of food available in theory is equal to:

$$\pi(F)Q(N^A - R(F)).$$

¹⁶Note that data on the communal dining hall participation rate are available only for a single year.

The impact of network ties to Mao is therefore a reduction in theoretical food supply in urban areas of:

$$\begin{aligned}\frac{d}{dF}\pi(F)Q(N^A - R(F)) &= \pi'(F)Q(N^A - R(F)) - \pi(F)R'(F)Q'(N^A - R(F)) \\ &= -R'(F)Q'(N^A - R(F)),\end{aligned}$$

where the second equality stems from imposing condition (15). Note that the result here stems, for analytical convenience, from a reduction in excess procurement, though it is highly likely (given our empirical results in which there is a reduction in excess procurement, but which is not statistically significant) that other mechanisms produced the same result.

Theoretically available food supply is converted into actual dietary energy supply S^A and S^U through a simple production technology which depends upon the inefficiency $c(F)$ of the food distribution system:

$$\begin{aligned}S^A &= (1 - c(F))(1 - \pi(F))Q(N^A - R(F)), \\ S^U &= (1 - c(F))\pi(F)Q(N^A - R(F)),\end{aligned}$$

where $c(F)$ will represent the communal dining rate. Since we have found in Table 7 that the communal dining rate is a statistically significant and increasing function of network ties to Mao, it follows that $c'(F) > 0$. The consequence is that an increase in radicalism caused by network ties to Mao will be associated with changes in dietary energy supply of:

$$\begin{aligned}\frac{dS^A}{dF} &= -c'(F)(1 - \pi(F))R'(F)Q(N^A - R(F)), \\ \frac{dS^U}{dF} &= -c'(F)\pi(F)Q(N^A - R(F)) - (1 - c(F))R'(F)Q'(N^A - R(F)),\end{aligned}$$

in rural and urban areas, respectively. Dietary energy supply is thus reduced in both rural and urban areas by the increase in the communal dining rate, with a potential second effect in urban areas stemming from a decline in excess procurement.

On the demand side, the demand for calories in rural areas is assumed to be equal to the demand for calories from agricultural labor $(N^A - R(F))\underline{e}$ plus the demand for calories from peasants engaged in high calorie intensity (wasteful) radical activities $R(F)\bar{e}$, where $\bar{e} > \underline{e}$:

$$D^A = (N^A - R(F))\underline{e} + R(F)\bar{e} = N^A\underline{e} + R(F)(\bar{e} - \underline{e}),$$

whereas the demand for calories in urban areas is given by:

$$D^U = N^U \underline{e},$$

where for simplicity we assume that the base demand for calories \underline{e} is the same in rural and urban areas.

Mortality in both rural (M^A) and urban (M^U) areas is assumed to be an increasing function $\mu(\cdot)$ of the difference between food demand and food supply (there may of course be a minimum threshold level of the *excess* demand for calories below which $\mu'(\cdot) = 0$, which we shall assume has been crossed). This yields:

$$\begin{aligned} M^A &= \mu(D^A - S^A) = \mu(N^A \underline{e} + R(F)(\bar{e} - \underline{e}) - (1 - c(F))(1 - \pi(F))Q(N^A - R(F))), \\ M^U &= \mu(D^U - S^U) = \mu(N^U \underline{e} - (1 - c(F))\pi(F)Q(N^A - R(F))), \end{aligned}$$

with total provincial mortality being given by:

$$M = M^A + M^U.$$

It follows that the increase in total provincial mortality due to network ties to Mao, which we know from the results presented in Table 3 to be positive and statistically significant, can be decomposed into three parts as:

$$\begin{aligned} \frac{dM}{dF} &= \mu'(D^A - S^A) R'(F) (\bar{e} - \underline{e}) \\ &\quad + [\mu'(D^A - S^A) (1 - \pi(F)) + \mu'(D^U - S^U) \pi(F)] c'(F) Q(N^A - R(F)) \\ &\quad + \mu'(D^U - S^U) (1 - c(F)) R'(F) Q'(N^A - R(F)), \end{aligned}$$

all of which have clear empirical counterparts in our results:

- $\mu'(D^A - S^A) R'(F) (\bar{e} - \underline{e})$ stems from the increase in the demand for calories for peasants who have been diverted to high calorie requirement wasteful projects proxied by the increase in steel output, as documented in Table 7;
- $[\mu'(D^A - S^A) (1 - \pi(F)) + \mu'(D^U - S^U) \pi(F)] c'(F) Q(N^A - R(F))$ stems from the increase in the provincial communal dining rate, as also documented in Table 7;
- $\mu'(D^U - S^U) (1 - c(F)) R'(F) Q'(N^A - R(F))$ stems from the reduction in urban food supply, caused by the fall in the excess procurement ratio, as documented in Table 6 (if we take this effect to be statistically insignificant, the first two effects remain).

Note that if we write the rural population as $N^A = \rho N$ and the urban population as $N^U = (1 - \rho) N$, where $N = N^A + N^U$, and ρ is therefore the rural population share:

$$M = \mu(\rho N \underline{e} + R(F)(\bar{e} - \underline{e}) - (1 - c(F))(1 - \pi(F))Q(\rho N - R(F))) \\ + \mu((1 - \rho) N \underline{e} - (1 - c(F))\pi(F)Q(\rho N - R(F))).$$

It follows that the impact of an increase in the rural population share will be given by:

$$\frac{dM}{d\rho} = \left\{ \begin{array}{l} [\mu'(D^A - S^A) - \mu'(D^U - S^U)] [\underline{e} + \pi(1 - c)Q'(\rho N - R)] \\ -(\mu'(D^A - S^A)(1 - c)Q'(\rho N - R)) \end{array} \right\} N,$$

whose sign will be ambiguous when the marginal impact on mortality of the excess demand for calories is larger in rural than in urban areas (in which case the first term is positive and the second term is negative). Thus, there is no *a priori* reason to expect, as in Lin and Yang (2000), that provinces with higher rural population shares will have higher mortality rates. Indeed, our negative (though statistically insignificant) effect of the rural population share on mortality is compatible with (i) either the marginal effect of the excess demand for food being greater in rural than in urban areas, with the second (negative) effect outweighing the first, or (ii) with the first effect being negative as well.

6.4 Other covariates and summary

It is worth noting that the provincial leader's tenure in the CCP is associated with a significantly lower communal dining rate and steel output, thus providing a plausible explanation for the mitigating effect of party tenure on mortality reported earlier in Table 3 (although that effect was found to be statistically insignificant at usual level of confidence). We also find that provinces governed by leaders who were native sons tended to behave significantly less radically in terms of steel output but not in terms of communal dining, where the effect is statistically indistinguishable from zero. In view of the enormous economic and human costs of the Great Leap Forward, this finding implies that native sons were somewhat less willing to impose costs on their hometown provinces than were non-natives, though this did not translate into lower mortality rates in such provinces. This finding is consistent with Persson and Zhuravskaya (2012), who suggest that the embeddedness of local leaders would moderate their zeal in promoting the implementation of (radical) national policies.

Overall, three empirical findings stand out. First, special promotion patterns during the GLF are consistent with the screening mechanism hypothesis, and reject the full information hypothesis, since the likelihood of a provincial leader receiving a special promotion is an

increasing function of his having network ties to Mao. Second, provinces in which leaders had network ties to Mao displayed significantly higher mortality rates and significantly lower fertility rates, while the rank of the party leaders –the key explanatory variable in the tournament hypothesis literature– has no explanatory power whatsoever. Third, the impact of network ties to Mao on the radical behavior that led to the famine flows through demand-side effects that increased the demand for calories, such as the coercion of rural labor into high energy requirement non-food activities such as steel production, as well as supply-side effects such as the allocation of labor away from grain production (which fell drastically) or especially the dragooning of the population into the waste-prone communal dining halls. One interesting "humane" response of provincial leaders with factional ties to Mao stands out: while grain output growth was significantly reduced in provinces whose leaders had network ties to Mao, this effect was largely offset (by some mechanism yet to be statistically identified), leading to no effect of network ties to Mao on retained grain per capita in rural areas.

7 Conclusion

More than half a century after the Great Leap Forward ended, much about it remains a mystery, a mystery with consequences of catastrophic proportions. How could it be that a relatively limited number of utterances by Mao led China onto a path that yielded such tragic outcomes?

While it is surely an overstatement to reduce one of the greatest tragedies in human history to a monumental screening mechanism constructed by the Great Helmsman to elicit information concerning the loyalty of his minions, we have presented empirical evidence that suggests that such an explanation represents a significant part of the story. In an authoritarian regime such as China's, promotion patterns and radicalism were firmly embedded within a dense political network of patron-client relationships, which we have attempted to proxy through a measure of the network ties of provincial leaders to Mao based on their biographies.

It is striking that special promotion patterns, two measures of famine severity, and several measures of radical behavior are all strongly associated with the ties of provincial leaders to Mao, and that competing explanations, such as the relative rank of provincial leaders, have little explanatory power once such ties are taken into account. Provincial leaders with network ties to Mao behaved significantly more radically along several dimensions, displayed a significantly higher likelihood of vaulting into the Eighth Central Committee in 1956 and 1958, and led provinces where famine severity was significantly higher. When Mao promoted

his messianic vision during the Great Leap Forward, provincial leaders with network ties to him received special promotions and were thus further in Mao's debt. As Mao put forth his messianic vision, these provincial leaders became Mao's most enthusiastic supporters and promoters of that vision. Tragically their feverish embrace of radicalism resulted in many more deaths in the provinces they led.

Our evidence thus leads us to place more weight on Mao's machinations in launching and sustaining the Great Leap Forward and thus the role of Mao and his provincial agents in causing the most deadly famine in history. Our theoretical model and empirical findings not only offer a new perspective through which to understand the causes of the Great Leap Forward, they also shed light on the impact of political networks on hierarchical structures, political behavior and socio-economic outcomes in authoritarian regimes and may be used to elucidate the myriad development "fevers" that have swept across China in the post-Mao era.

The popular tournament hypothesis concerning China's developmental state and growth in the reform era assumes that political promotion is largely merit- or performance-based. Basing themselves on this meritocratic assumption, scholars have explored how tournaments and promotions have affected government budgetary spending (Guo 2009), educational expenditures (Lu and Liu 2014), and even Great Leap Forward radicalism (Kung and Chen 2011). Our findings should at least encourage researchers to consider these important economic and public policy topics within a broader political context, thereby bringing politics explicitly back into the analysis. The tournament hypothesis fundamentally and unrealistically de-politicizes the phenomena under consideration, and reduces everything to a question of bureaucratic management. However, politics, be it democratic or autocratic, cannot be swept under the rug. The fight for survival is real. In order to secure power, leaders recruit people they can trust and rely on members of their networks to do their bidding. This opens up additional exciting research topics. Instead of asking how local officials compete with each other in promoting radical policies that may increase growth and/or ruin society, it may be more fruitful intellectually to ask why some officials promote growth while others hinder it, why some time periods are more conducive to growth than others, and what power structures are associated with the establishment of pro-growth policies.

References

- ACEMOGLU, D., J. A. ROBINSON, AND D. WOREN (2012): *Why Nations Fail: The Origins of Power, Prosperity and Poverty*. New York: Crown Business.
- ALT, J. E., B. BUENO DE MESQUITA, AND R. ROSE (2011): "Disentangling Accountability

- and Competence in Elections: Evidence from US Term Limits,” *The Journal of Politics*, 73(1), 171–186.
- ASHWORTH, S. (2005): “Reputational Dynamics and Political Careers,” *Journal of Law, Economics and Organization*, 21(2), 441–466.
- BACHMAN, D. (1991): *Bureaucracy, Economy, and Leadership: The Institutional Origins of the Great Leap Forward*. Cambridge University Press, New York.
- BETTCHEK, K. E. (2005): “Factions of Interest in Japan and Italy: The Organizational and Motivational Dimensions of Factionalism.,” *Party Politics*, 11(3), 339–358.
- BO, Z. (2002): *Chinese Provincial Leaders: Economic Performance and Political Mobility Since 1949*. M.E. Sharpe, Armonk, NY.
- BUENO DE MESQUITA, B., A. SMITH, R. SIVERSON, AND J. MORROW (2003): *The Logic of Political Survival*. MIT Press, Cambridge.
- CAMP, R. A. (2003): “Informal and Formal Networking Among Elite Mexican Capitalists and Politicians.,” *Comparative Sociology*, 2(1), 135–154.
- CHANG, H., AND G. WEN (1997): “Communal Dining and the Chinese Famine of 1958–1961,” *Economic Development and Cultural Change*, 46(1), 1–34.
- CHEN, Y., H. LI, AND L. ZHOU (2005): “Relative Performance Evaluation and the Turnover of Provincial Leaders in China,” *Economics Letters*, 88(3), 421–425.
- COX, G. W., F. M. ROSENBLUTH, AND M. F. THIES (2000): “Electoral Rules, Career Ambitions, and Party Structure: Comparing Factions in Japan’s Upper and Lower Houses.,” *American Journal of Political Science*, pp. 115–122.
- DERNBERGER, R. F. (1972): “Radical Ideology and Economic Development in China: The Cultural Revolution and Its Impact on the Economy,” *Asian Survey*, 12(12), 1048–65.
- DIKOTTER, F. (2010): *Mao’s Great Famine: The History of China’s Most Devastating Catastrophe, 1958–62*. Bloomsbury, London.
- DITTMER, L. (1995): “Chinese Informal Politics.,” *The China Journal*, 34, 1–34.
- EGOROV, G., AND K. SONIN (2011): “Dictators And Their Viziers: Endogenizing The Loyalty-Competence Trade-Off.,” *Journal of the European Economic Association*, 9(5), 903–930.
- ENELOW, J. M., AND M. J. HINICH (1984): *The Spatial Theory of Voting: An Introduction*. CUP Archive.
- GOLDSTEIN, A. (1991): *From Bandwagon to Balance-of-Power Politics: Structural Constraints and Politics in China, 1949–1978*. Stanford University Press, Stanford.

- GRANOVETTER, M. S. (1973): "The Strength of Weak Ties," *American Journal of Sociology*, 78(6), 1360–1380.
- GUO, G. (2009): "China's Local Political Budget Cycles.," *American Journal of Political Science*, 53(3), 621–632.
- GUTERBOCK, T. M. (1980): *Machine Politics in Transition: Party and Community in Chicago*. University of Chicago Press.
- HARDIN, R. (1997): *One for All: The Logic of Group Conflict*. Princeton University Press.
- HINICH, M., AND M. MUNGER (1994): *Ideology and the Theory of Public Choice*. University of Michigan Press, Ann Arbor.
- HUANG, J. (2000): *Factionalism in Chinese Communist Politics*. Cambridge University Press, New York.
- ISHIKAWA, M., AND M. HIROSE (1989): *The LDP: The Structure of the Long Political Rule*. Iwanami, Tokyo.
- JULLIEN, B. (2000): "Participation Constraints in Adverse Selection Models," *Journal of Economic Theory*, 93(1), 1–47.
- KUNG, J., AND S. CHEN (2011): "The Tragedy of the Nomenklatura: Career Incentives and Political Radicalism During China's Great Leap Famine," *American Political Science Review*, 105(1), 27–45.
- KUNG, J., AND Y. LIN (2003): "The Causes of China's Great Leap Famine, 1959-1961," *Economic Development and Cultural Change*, 52(1), 51–73.
- LAFFONT, J.-J. (1990): *The Economics of Uncertainty and Information*. MIT Press, Cambridge, MA.
- LANDRY, P. (2008): *Decentralized Authoritarianism in China: The Communist Party's Control of Local Elites in the Post-Mao Era*. Cambridge University Press, Cambridge.
- LEWIS, T., AND D. SAPPINGTON (1989): "Countervailing Incentives in Agency Problems," *Journal of Economic Theory*, 49(2), 294–313.
- LI, H., AND L. ZHOU (2005): "Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China," *Journal of Public Economics*, 89(9), 1743–62.
- LI, W., AND T. YANG (2005): "The Great Leap Forward: Anatomy of a Central Planning Disaster," *Journal of Political Economy*, 113(4), 840–877.
- LIN, Y., AND T. YANG (2000): "Food Availability, Entitlements and the Chinese Famine of 1959-61," *The Economic Journal*, 110(460), 136–158.
- LU, X., AND M. LIU (2014): "The Sources of De Facto Power and Education Provision: Understanding Local Government Incentive in China," Working paper.

- MACFARQUHAR, R., AND M. SCHOENHALS (2006): *Mao's Last Revolution*. Belknap Press of Harvard UP, Cambridge.
- MAGGI, G., AND A. RODRIGUEZ-CLARE (1995): "On Countervailing Incentives," *Journal of Economic Theory*, 66(1), 238–263.
- MENG, X., N. QIAN, AND P. YARED (2015): "The Institutional Causes of Famine in China, 1959-61," *Review of Economic Studies*, forthcoming.
- NATHAN, A. (1973): "A Factionalism Model for CCP Politics," *The China Quarterly*, 34, 33–66.
- OPPER, S., AND S. BREHM (2007): "Net Works versus Performance: Political Leadership Promotion in China," *Working paper, Lund University*.
- PERSSON, P., AND E. ZHURAVSKAYA (2012): "Elite Influence as a Substitute for Local Democracy: Evidence from Backgrounds of Chinese Provincial Leaders," *Working paper*.
- QIAN, M. (1985): *Zhonghuawenhuashierjiang*. Taipei, Lianjing.
- RIGBY, T. H. (1968): *Communist Party Membership in the USSR, 1917-1967*. Princeton University Press, Princeton, NJ.
- SCHURMANN, F. (1968): *Ideology and Organization in Communist China*. University of California Press, Berkeley.
- SEN, A. (1981): "Ingredients of Famine Analysis: Availability and Entitlements.," *The Quarterly Journal of Economics*, pp. 433–464.
- SHIH, V. (2004): "Factions Matter: Personal Networks and the Distribution of Bank Loans in China," *Journal of Contemporary China*, 13(38), 3–19.
- (2008): "Nauseating' Displays of Loyalty: Monitoring the Factional Bargain Through Ideological Campaigns in China," *Journal of Politics*, 70(4), 1177–1192.
- (2010): "The Autocratic Difference: Information Paucity," *Mimeo*.
- SHIH, V., C. ADOLPH, AND M. LIU (2012): "Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China," *American Political Science Review*, 106(1), 166–187.
- SHIRK, S. (1993): *The Political Logic of Economic Form*. University of California Press, Berkeley.
- TEIWES, F. (1997): *Politics and Purges in China: Rectification and the Decline of Party Norms, 1950-1965*. Sharpe, Armonk, second edn.
- TEIWES, F., AND W. SUN (1999): *China's Road to Disaster: Mao, Central Politicians, and Provincial Leaders in the Unfolding of the Great Leap Forward, 1955-1959*. M.E. Sharpe, Armonk, N.Y.

- YANG, D. (1996): *Calamity and Reform in China: State, Rural Society and Institutional Change Since the Great Leap Famine*. Stanford University Press, Palo Alto.
- YANG, D., H. XU, AND R. TAO (2014): “A Tragedy of the Nomenklatura? Careers Incentives, Political Loyalty, and Political Radicalism During China’s Great Leap Forward,” *Journal of Contemporary China*, 23(89), 864–883.
- YANG, J. (2008): *Mubei: Zhongguo Liushi Niandai Da Jihuang Jishi (Tombstone: A Chronicle of the Great Famine in China in the 1960s)*. Tiandi tushu, Hong Kong.
- ZUCKERMAN, A. (1975): “Political Cleavage: A Conceptual and Theoretical Analysis,” *British Journal of Political Science*, 5(2), 231–248.

A Data sources

Data on mortality and fertility rates are drawn from *A Compilation of Historical Statistical Data of Provinces, Autonomous Regions, and Municipalities, 1949-1989 (Quanguo Gesheng Zizhiqu Zhixiashi Lishi Tongji Ziliao Huibian, 1949-1989)*, compiled by the State Statistical Bureau in 1990 (See Lin and Yang 2000). Data on grain output, procurement and agricultural resale are obtained from *Economic Data of Agriculture, 1949-1983 (Nongye Jingji Ziliao, 1949-1983)*, compiled by the Planning Office of the Ministry of Agriculture, Livestock, and Fisheries in 1983 (see Lin and Yang, 2000; Kung and Chen 2011). Provincial leaders’ individual characteristics including historical ties, promotion type, party rank, age, years of party standing, local identity, education level and pre-revolutionary credentials are coded from *A Compendium of Central Committee Members of Various Plenums, 1921-2003 (Zhongguo gongchandang lijie zhongyang weiyuan dacidian), Materials on the Organizational History of China’s Central Communist Party (Zhonggong zhongyang zuzhishi ziliao)* and *Biographies of People in the Red First Front Army (Zhongguo gongnong hongjun diyi fangmianjun renwuzhi)*. Data on climate are obtained from *Report of the Damage Caused by Disaster in China, 1949-1995 (Zhongguo zaiqing baogao, 1949-1995)*, compiled by State Statistical Bureau and Ministry of Civil Affairs in 1996. Data on the communal dining rate are drawn from Yang (1996). Finally, data on other provincial characteristics including steel output, GDP per capita, and rural and urban populations are obtained from *Comprehensive Statistical Data and Materials on 50 Years of New China, 1949–1998 (Xinzhongguo wushinian tongji ziliao huibian)*, compiled by the State Statistical Bureau in 1999 (See Meng et al. 2015).

B Proof of Proposition 1

Notice that $\widehat{p}_\theta(\theta, \bar{v}) = \frac{1}{2} + \bar{v}'(\theta)$. Under ASSUMPTION 1, $\widehat{p}_\theta(\theta, \bar{v}) < 0$. The second part of the Proposition does not depend upon ASSUMPTION 1. By Leibnitz’s Rule, differentiation of (10) yields $p_\theta^*(\theta) = \frac{\theta^2[\theta+2L(\theta)-\theta L_\theta(\theta)]}{2[\theta+L(\theta)]^3} > 0$, where the inequality follows directly from MLRP. ■

C Proof of Proposition 2

For the uniform density and the affine type-dependent reservation utility function given by equation (12), and recalling the expressions derived in equations (3), (4), (9) and (10), the optimal levels of radicalism and promotions are given by:

$$\begin{aligned}\widehat{r}(\theta) &= \theta, r^*(\theta) = \frac{\theta^2}{\mu + \sqrt{3}\sigma}, \\ \widehat{p}(\theta, \bar{v}) &= v - \frac{\theta}{2}, p^*(\theta, \bar{v}) = v + \frac{4\theta^3 - 7\mu^3 - 3\sqrt{3}\mu^2\sigma + 9\mu\sigma^2 + 21\sqrt{3}\sigma^3}{6(\mu + \sqrt{3}\sigma)^2}.\end{aligned}$$

In the first-best optimum, the mean level of radicalism for faction members is given by $\bar{\widehat{r}}(\theta^F, F) = \frac{1}{1-F(\theta^F)} \int_{\theta_F}^{\bar{\theta}} \widehat{r}(\theta) f(\theta) d\theta = \frac{1}{2} [\theta_F + \mu + \sqrt{3}\sigma]$, whereas for non-faction members it is given by $\bar{\widehat{r}}(N) = \int_{\underline{\theta}}^{\bar{\theta}} \widehat{r}(\theta) f(\theta) d\theta = \mu$. It follows that:

$$\bar{\widehat{r}}(\theta_F, F) - \bar{\widehat{r}}(N) = \frac{1}{2} \left[\theta_F - (\mu - \sqrt{3}\sigma) \right] > 0,$$

since $\theta_F \in (\underline{\theta}, \bar{\theta}) = (\mu - \sqrt{3}\sigma, \mu + \sqrt{3}\sigma)$. In the case of asymmetric information, the corresponding expressions are given by $\bar{r}^*(\theta^F, F) = \frac{1}{1-F(\theta^F)} \int_{\theta_F}^{\bar{\theta}} r^*(\theta) f(\theta) d\theta = \frac{1}{3} \left(\theta_F + \mu + \sqrt{3}\sigma + \frac{\theta_F^2}{\mu + \sqrt{3}\sigma} \right)$, and $\bar{r}^*(N) = \int_{\underline{\theta}}^{\bar{\theta}} r^*(\theta) f(\theta) d\theta = \frac{\mu^2 + \sigma^2}{\mu + \sqrt{3}\sigma}$. It follows that:

$$\bar{r}^*(\theta^F, F) - \bar{r}^*(N) = \frac{(\theta_F + 2\mu) [\theta_F - (\mu - \sqrt{3}\sigma)]}{3(\mu + \sqrt{3}\sigma)} > 0. \blacksquare$$

D Proof of Proposition 3

In the first-best optimum, the mean level of promotions for faction members is given by $\bar{\widehat{p}}(\theta_F, \bar{v}, F) = \frac{1}{1-F(\theta^F)} \int_{\theta_F}^{\bar{\theta}} \widehat{p}(\theta, \bar{v}) f(\theta) d\theta = \frac{1}{4} (4v - \theta_F - \mu - \sqrt{3}\sigma)$, whereas for non-faction members it is given by $\bar{\widehat{p}}(\bar{v}, N) = \int_{\underline{\theta}}^{\bar{\theta}} \widehat{p}(\theta, \bar{v}) f(\theta) d\theta = v - \frac{\mu}{2}$. It follows that:

$$\bar{\widehat{p}}(\theta_F, \bar{v}, F) - \bar{\widehat{p}}(\bar{v}, N) = \frac{1}{4} (\mu - \sqrt{3}\sigma - \theta_F) < 0.$$

In the case of asymmetric information, the corresponding expressions are given by:

$$\begin{aligned}\bar{p}^*(\theta_F, \bar{v}, F) &= \frac{1}{1-F(\theta_F)} \int_{\theta_F}^{\bar{\theta}} p^*(\theta, \bar{v}) f(\theta) d\theta \\ &= \frac{1}{6} \left(6v + \theta_F - 6\mu + 12\sqrt{3}\sigma + \frac{\theta_F^2 - 36\sigma^2}{\mu + \sqrt{3}\sigma} + \frac{\theta_F^3 + 24\sqrt{3}\sigma^3}{(\mu + \sqrt{3}\sigma)^2} \right)\end{aligned}$$

and

$$\bar{p}^*(\bar{v}, N) = \int_{\underline{\theta}}^{\bar{\theta}} p^*(\theta, \bar{v}) f(\theta) d\theta = v - \frac{\mu^2 - 7\sigma^2}{2(\mu + \sqrt{3}\sigma)}.$$

It follows that:

$$\bar{p}^*(\theta_F, \bar{v}, F) - \bar{p}^*(\bar{v}, N) = \frac{[\theta_F - (\mu - \sqrt{3}\sigma)] [\theta_F^2 + 2\theta_F\mu + 3(\mu^2 + \sigma^2)]}{6(\mu + \sqrt{3}\sigma)^2} > 0. \blacksquare$$

Table 1: Descriptive statistics.

Variables	Variable definition	Mean	Standard deviation	
			Total	within-Province
Log steel output		1.407	2.565	0.818
Mortality rate (per thousand)		14.975	9.570	6.078
Fertility rate (per thousand)		26.789	8.450	3.978
FPS's network ties	= 1 if a province's First Party Secretary had personal ties with Mao, = 0 otherwise	0.384	0.488	0.179
Governor's network ties	= 1 if a province's governor had personal ties with Mao, = 0 otherwise	0.272	0.447	0.179
Provincial leader's ties	= 1 if provincial leader had personal ties with Mao, = 0 otherwise	0.584	0.495	0.219
Provincial leader's promotion pattern	= 1 if a provincial leader got a special promotion, = 0 otherwise	0.480	0.502	0.208
Provincial leader's age	Age of provincial leader in a given year	50.704	4.670	1.349
Provincial leader's education	=1 if college or above	0.222	0.419	
Provincial leader's party standing	Number of years a provincial leader has been a member of the Communist Party	30.544	3.853	1.729
Local identity	= 1 if provincial leader was native, = 0 otherwise	0.312	0.465	0.126
Log grain output per capita		5.498	0.252	0.083
Growth rate of grain output (%)	Growth rate of grain output over normal years	-11.962	17.197	6.531
Excess procurement ratio (%)	Excess procurement ratio over normal years	3.267	6.381	3.598
Retained grain per capita	Retained grain per capita in rural areas	2.547	0.653	0.248
Rural population (%)	Ratio of rural population to total	79.759	9.643	1.870
Level of development	Log GDP per capita	5.207	0.387	0.088

Table 2: Ties to Mao and special promotions.

Dependent variable: = 1 if a provincial leader got a special promotion = 0 otherwise					
Covariates					
Provincial leader's personal ties with Mao	0.314 (0.128)	0.355 (0.131)	0.284 (0.143)	0.334 (0.153)	0.279 (0.161)
Education level		0.258 (0.157)	0.338 (0.169)	0.261 (0.170)	0.337 (0.181)
Age			-0.015 (0.013)		-0.014 (0.013)
Years of party membership			0.023 (0.013)		0.023 (0.013)
Long March experience				0.046 (0.182)	-0.016 (0.162)
Guerilla warfare experience				0.079 (0.133)	0.034 (0.126)
Intercept	-0.893 (0.223)	-1.124 (0.269)	-0.832 (1.687)	-1.256 (0.389)	-0.922 (1.860)
Pseudo- R^2	0.084	0.125	0.168	0.131	0.169
Observations	63	63	63	63	63

Note: We report marginal effects at the sample mean. Huber-White robust standard errors in parentheses.

Table 3: Ties to Mao and provincial famine severity I.

		Dependent variable: mortality rate				
Covariates						
Provincial leader's network ties with Mao	5.847 (3.222)	6.836 (3.823)	9.223 (3.560)	10.57 (2.761)	11.86 (2.983)	
Log grain output per capita, $t - 1$		-19.47 (8.677)	-20.56 (8.724)	-20.68 (9.059)	-17.38 (13.21)	
Rural population (%)		-0.110 (0.235)	-0.171 (0.238)	-0.113 (0.228)	-0.172 (0.231)	
Provincial leader's party rank was:						
Alternate member (<i>AM</i>)			1.566 (1.541)	6.829 (5.066)	5.418 (6.230)	
Full member (<i>FM</i>)			-2.684 (4.426)	2.664 (5.778)	-0.273 (8.107)	
Provincial leader's length of tenure in the party				-0.507 (0.461)	-0.559 (0.520)	
Provincial leader's was a native of the province				1.331 (3.303)	1.913 (3.543)	
Log GDP per capita					-8.868 (14.67)	
Intercept	11.05 (1.645)	138.4 (56.17)	148.3 (57.60)	154.6 (60.91)	190.8 (60.05)	
$H_0 : AM = FM : p$ -value			0.331	0.217	0.181	
R^2	0.431	0.478	0.484	0.490	0.496	
Provinces	25	25	25	25	25	
Observations	125	125	125	125	125	

Note: Standard errors in parentheses are clustered at the provincial level. Province and year effects included in all specifications.

Table 4: National procurement and inter-provincial distribution.

Year	Procurement level	Exports		Imports		Municipal Imports	
		level	%	level	%	level	%
1954	631.7	160.5	25.4	106.1	16.8	53.9	50.9
1955	723.5	166.0	23.0	102.0	14.1	48.6	47.7
1956	574.0	154.8	27.0	87.5	15.3	43.3	49.5
1957	677.4	156.6	23.1	103.5	15.3	51.4	49.6
1958	834.5	169.8	20.3	85.7	10.3	54.4	63.5
1959	951.3	204.6	21.5	86.7	9.1	65.2	75.3
1960	617.9	140.9	22.8	107.0	17.3	68.6	64.1
1961	516.1	43.1	8.4	124.9	24.2	64.6	51.7
1962	514.4	41.5	8.1	108.2	21.0	61.7	57.1
1963	578.4	72.9	12.6	132.5	22.9	59.9	45.2
1964	636.9	104.9	16.5	129.1	20.3	60.7	47.0
1965	671.9	94.6	14.1	131.2	19.5	60.3	45.9
1966	764.8	102.6	13.4	98.3	12.9	60.6	61.6

Source: Materials on the Agricultural Economy, 1949-1983.

Table 5: Ties to Mao and provincial famine severity II.

Dependent variable: fertility rate					
Covariates					
Provincial leader's network ties with Mao	-8.321 (3.336)	-9.330 (2.930)	-9.986 (4.406)	-10.75 (4.585)	-11.60 (4.499)
Log grain output per capita, $t - 1$		19.99 (2.817)	20.44 (3.112)	19.98 (3.189)	17.82 (3.495)
Rural population (%)		0.071 (0.183)	0.092 (0.186)	0.059 (0.185)	0.098 (0.199)
Provincial leader's party rank was:					
Alternate member (AM)			-2.232 (0.727)	-3.864 (2.862)	-2.939 (3.249)
Full member (FM)			-1.190 (4.160)	-3.551 (5.520)	-1.624 (6.193)
Provincial leader's length of tenure in the party				0.149 (0.257)	0.183 (0.254)
Provincial leader was a native of the province				2.118 (2.075)	1.736 (2.142)
Log GDP per capita					5.819 (4.348)
Intercept	21.54 (1.408)	-90.78 (23.24)	-92.99 (25.46)	-91.15 (25.64)	-114.9 (34.50)
$H_0 : AM = FM : p$ -value			0.803	0.937	0.753
R^2	0.784	0.834	0.835	0.837	0.840
Provinces	25	25	25	25	25
Observations	125	125	125	125	125

Note: Standard errors in parentheses are clustered at the provincial level. Province and year effects included in all specifications.

Table 6: Network ties and the growth rate of grain output, the excess procurement ratio and retained grain in rural areas.

	Dependent variable					
	Growth rate of grain output		Excess procurement ratio		Retained grain per capita in rural areas	
Covariates						
Provincial leader's network ties with Mao	-0.088 (0.035)	-0.069 (0.027)	-1.962 (2.995)	-0.966 (2.756)	0.011 (0.048)	0.025 (0.054)
Share of damaged area		-0.168 (0.097)		-7.609 (2.929)		-0.248 (0.257)
Intercept	0.001 (0.014)	0.161 (0.036)	1.421 (1.220)	5.966 (1.445)	2.300 (0.040)	3.099 (0.085)
R^2	0.534	0.562	0.547	0.580	0.558	0.554
Provinces	25	25	25	25	25	25
Observations	125	119	125	119	125	119

Note: Standard errors in parentheses are clustered at the provincial level. Province and year effects included in all specifications.

Table 7: Communal dining rate, steel output and network ties.

Covariates	Dependent variable				
	Communal dining rate	Steel output			
Provincial leader's network ties with Mao	23.360 (10.30)	1.655 (0.460)	1.548 (0.523)	1.272 (0.477)	1.248 (0.517)
Provincial leader's length of tenure in the party	-2.837 (1.425)	-0.092 (0.033)	-0.073 (0.039)	-0.078 (0.034)	-0.081 (0.034)
Provincial leader was a native of the province	9.964 (9.787)	-1.874 (0.522)	-1.867 (0.644)	-1.509 (0.493)	-1.490 (0.486)
Rural population (%)			-0.073 (0.066)	-0.022 (0.058)	-0.022 (0.058)
Log GDP per capita, $t - 1$			0.491 (1.147)	0.242 (1.248)	0.316 (1.324)
Log steel output, $t - 1$				0.052 (0.170)	0.068 (0.169)
Net procurement ratio					-0.022 (0.024)
Intercept	135.4 (41.54)	3.612 (1.088)	7.769 (7.826)	4.180 (6.772)	4.186 (7.028)
R^2	0.263	0.512	0.530	0.553	0.557
Provinces	25	25	25	25	25
Observations	25	122	122	122	122

Note: Standard errors in parentheses are clustered at the provincial level in columns 2 to 5. Huber-White robust standard errors in column 1. Province and year effects included in columns 2 to 5.