The Promotion Club

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Abstract

How can principals incentivize agents' efforts while maintaining personnel flexibility? We show that creating a "promotion club" solves a large part of the problem: the principal selects, from *n* agents, *m* top-performing agents into a club, and then promotes one from within this club based on the principal's idiosyncratic preferences ("mindset"). Intuitively, $m=1$ indicates a tournament, and $m=n$, cronyism. A proper ($m>1$) promotion club outperforms tournament in efforts when there are many homogenous agents, and when intra-crony competitions are strong. We use promotion data of officials in hierarchical governments at different levels to validate the model and test its predictions.

Key words: Promotion, Club, Tournament, Loyalty, Discretion

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1. INTRODUCTION

Tournament is one of the most popular high-powered incentive schemes used in real-world practices, across different organizations (Lazear and Rosen 1981; Bull, Schotter, and Weigelt 1987; Main, O'Reilly, and Wade 1993; Maskin, Qian, and Xu 2000; Li and Zhou 2005; Xu 2011; Boudreau, Lakhani, and Menietti 2016; Ekinci, Kauhanen, and Waldman 2018; Khan, Khwaja, and Olken 2019). It is particularly useful in governments and other non-for-profit organizations, where wage incentives are often too weak to incentivize efforts: salaries in these organizations are usually fixed, or at least resistant to change. Instead, the prestige and benefits associated with a promotion drives agents to work hard (Wang and Zheng 2018). However, the tournament approach has a significant drawback: since the principal commits to promoting the best-performing agent, she may not be able to select her preferred employee as a future crony. When loyalty concerns are significant, the principal should be cautious about committing to such promotion scheme. This echoes the classical competence–loyalty tradeoff (e.g. Egorov and Sonin 2011; Shih, Adolph, and Liu 2012; Zakharov 2016; Bai and Zhou 2019), in which the principal seeks competence/effort for development, but loyalty for survival. While there is no tradeoff when a competent subordinate happens to be loyal, an able and ambitious subordinate may pose serious threats to the existing leadership. Thus the principal often has to settle with a mediocre, but loyal, servant. Such compromises are pervasive in both political and corporate contexts.

If there is a loyalty–competence tradeoff, the principal may think twice before adopting a tournament approach, which only delivers efforts at the cost of survival concerns. Yet schemes that aim to recruit cronies or connected agents suffer from a serious incentive problem. For subordinates, the problem centers on why they should exert effort, knowing that the cronies will ultimately be preferred. For the boss, the problem lies in how to incentivize subordinates while being flexible enough to recruit potential cronies. This paper addresses both questions by proposing a simple, tournament-like incentive scheme. It shows, both theoretically and empirically, that the scheme addresses a large part of the effort–discretion tradeoff, and is indeed adopted in real-world practices.

We call our proposed incentive scheme the *Promotion Club*. In this scheme, the principal (she) selects, from n agents (he, them), m top-performing employees into a club, and then promotes one from within this club based entirely on her own idiosyncratic preferences. These preferences, which we refer to as "mindsets," can be any effort-independent features such as

ideology, moral code, race, religion, etc. Closer mindsets breed loyalty more easily, thus are preferred by the principal. Mindsets are modeled as private information before the formation of the club, but are known within the club. Therefore agents *ex ante* have homogeneous mindsets to the principal. The size of the club represents the principal's degree of discretionary power over personnel decisions. Clearly, $m = 1$ corresponds to a standard tournament; while $m = n$ denotes cronyism. Larger clubs benefit the principal since there are more candidates to choose from. Therefore the principal is (weakly) more likely to select a like-minded agent as a future crony. We first show that effort features an inverted-U shape with respect to club size, when the size is not too small. As the club enlarges for a given agent population, the benefit of being included in the club (and being more likely to be promoted) overweighs the cost of effort at first, but such benefit deteriorates as the club size continues to grow and the promotion probability becomes insufficient compensation for the cost of the effort. We show that promotion club strictly outperforms tournament *in efforts* when the pool of agents is large ($n>4$). The result has important implications on incentive contract design, because it suggests that even without personnel considerations, having a promotion club is a good idea to motivate efforts.

Moreover, for the principal who values both effort and personnel flexibility, the inverted-U shaped effort curve completely mitigates the effort–discretion tradeoff when the curve is upward sloping: increasing the club size both incentivizes effort and provides greater flexibility regarding personnel decisions. Two birds are killed with one stone. However, this also means the principal who values discretion necessarily selects a club size larger than the level that maximizes effort: she only stops expanding the club when the marginal benefit of personnel flexibility equals the marginal cost of effort distortion, and there is no distortion when the effort curve trends upwards. Thus in equilibrium, the promotion club is always (weakly) oversized. In short, the theoretical contribution of the paper is to introduce a novel promotion scheme – with tournament and cronyism as its special cases – and show that such scheme, i.e., the promotion club, solves a large part of the competence-loyalty tradeoff.

We next confirm the existence of promotion clubs and test model predictions using data from promotions of officials in hierarchical governments. Though the model also applies to corporations that exercise top-down personnel control, a centralized bureaucracy with promotions taking place along different tiers of the hierarchy merits detailed data over a long time horizon. Among the hierarchical governments, China features rich variety and depth of promotion data. Using Chinese data of county leader promotions from 2001 to 2016, we first

confirm the existence of the club-based promotion pattern: The empirical analysis suggests that reaching the top five in the performance measure (in other words, joining the club) can significantly increase an individual's promotion likelihood by 4.1%, which accounts for 9.76% of the mean value of promotion likelihood in our sample (=0.420). In addition, increasing the rank of the performance measure from within or outside the club *cannot* significantly influence employees' likelihood of promotion, which reveals the impact of discretionary power. That is, once an official is among the top five performers locally, it does not matter if s/he ranks the first, or third, or fifth, in the promotion race. These findings demonstrate the existence of a club-based promotion pattern in real-life organizations.

After confirming the existence of promotion clubs, we proceed to test its implications. The model predicts that promotion clubs are larger (smaller) at higher (lower) administrative levels. We examine the promotions of county-, prefecture- and province-level party secretaries in order to analyze the change in club size along the hierarchy. We show that promotion clubs consist of seven members at the prefecture level, which is statistically significant, and is indeed greater than the club of five members at the county level. Provincial-level club size is eight, which is marginally significant, that further suggests discretionary power becomes more important higher up the hierarchy. Our empirical evidence echoes the findings of previous studies (See e.g. Opper, Nee, and Brehm 2015; Landry, Lü, and Duan 2018; Lu, Ma, and Zhu 2018; Chen and Kung 2018), and illustrate the potential of promotion club analysis as a comprehensive framework to understand promotions in bureaucratic hierarchies.

Moreover, the model predicts that regions with greater economic importance tend to have smaller clubs, while regions with higher data volatility - which makes it harder to measure performance - tend to have larger clubs. For the former, we find that regions with higher GDP per capita growth indeed have smaller clubs. For the latter, we investigate areas characterized by greater variance in fiscal revenue growth rate or larger data manipulation, which are proxies for data measurability, and find that higher-variance and larger-manipulation areas indeed have larger clubs. The model also predicts that regions have enlarged club sizes during non-economic campaigns, because personnel flexibility is more important when the ruling objective goes beyond economic development. We investigate the periods during which the higher-level governments launch environmental or social stability campaigns, and show that the clubs are indeed larger during these times.

In the baseline model, we assume agents' mindsets constitute private information when the principal determines the club size, which makes the agents *ex ante* homogenous. However,

in the real world, the principal's and the agents' mindsets are often, at least partially, observable. In particular, it is more likely for an agent to be connected to the principal, and then regarded as a preferred choice, if he shares the same hometown, schools, or working experiences with the principal. To analyze the impact of publicly known crony candidates ("cronies" for short hereafter), we extend the model to assume the existence of publicly known cronies, who are lexicographically preferred to regular agents. We show that two equilibria exist in this scenario. When cronies occupy a small share of the agent population, a *shirk* equilibrium exists where the club size is large and agents shirk compared with homogenous agents. The crony agents shirk because they know they are in need. The non-cronies shirk because they are less preferred even if they make it to the club. Consequently, club size is enlarged when survival concerns are significant, in order to ensure sufficient probability of crony inclusion. However, when cronies comprise a large share of the agent population, a *work* equilibrium exists where only the cronies work hard. Surprisingly, we show that such a crony-ful environment may induce greater total effort than in a same-population tournament, due to intra-crony competition. Again, this is driven by the incentive role of club-based promotion patterns. The prediction is also verified using county-level data from China, where we show that as the shares of cronies increase, *more* fiscal revenue is procured. The extended model and evidence serve two purposes: 1. It relaxes the assumption of private mindsets in the baseline model, which generates new insights in a crony-ful environment; 2. It provides empirical support for the incentive role of promotion clubs, which cannot be tested directly in the baseline.

The paper contributes to three important strands of literature. First, it speaks to the classical competence–loyalty tradeoff (Glazer 2002; Burkart, Panunzi, and Shleifer 2003; Egorov and Sonin 2011; Zakharov 2016), and the abundant empirical evidence that supports the importance of connections in political survival (Cai and Treisman 2006, Opper and Brehm 2007, Reuter and Robertson 2012; Shih, Adolph, and Liu 2012; Xu 2018; Bai and Zhou 2019; Xi 2019; Buckley and Reuter 2019). While many prior studies rightly point out the distortion of this tradeoff, this paper highlights a potential alleviation of it: to design a promotion club. The paper from this literature that is closest to ours is Jia, Kudumatsu, and Seim (2015), which examines Chinese provincial officials and suggests that connections and performance complement each other because recruiting junior top performers fosters loyalty to the senior official. While we agree with Jia, Kudumatsu, and Seim (2015) on the critical importance of recruiting loyal top performers, our focus is on incentives, i.e., how to ensure the top performers are loyal, and how to ensure that loyalists will perform. Our sample is also broader,

investigating political turnovers at the county, prefectural and provincial levels along the bureaucratic hierarchy.

Second, the paper contributes to theoretical and empirical investigations of the use of tournaments in organizations. Led by Lazear and Rosen (1981) and Rosen (1986), this literature acknowledges the theoretical importance of the tournament approach as a high-powered incentive scheme. Following the classical setup in Lazear and Rosen (1981), our model accommodates both working incentives and personnel flexibility, of which tournament is a special case. We show that a club-based promotion pattern may outperform tournament in efforts, while providing higher personnel flexibilities at the same time. Such result is robust if we consider heterogeneous agents, as well.[1] It is also widely argued that political regimes tend to adopt tournaments to incentivize their officials (Li and Zhou 2005; Chen, Li, and Zhou 2005; Xu 2011). Although a significant portion of the empirical evidence collected thus far on this topic has been from China, there is mixed evidence regarding whether tournaments are indeed adopted in practice (e.g. Li and Zhou 2005; Yao and Zhang 2015). Our empirical investigations are designed to reconcile the mixed evidence by arguing that the promotion club pattern exists, which explains why performance can be significant for promotion in some cases (Bo 1996; Maskin, Qian, and Xu 2000; Li and Zhou 2005; Chen, Li, and Zhou 2005) but not in others (Shih, Adolph, and Liu 2012; Yao and Zhang 2015; Wu *et al*. 2014).

Third, the paper echoes the discussion of adopting different incentive schemes in different environments, for instance Maskin, Qian, and Xu (2000) in M-form and U-form organization comparisons; Shleifer (1985) on yardstick competition; Holmstrom and Milgrom (1991) on multi-task projects; and Alesina and Tabellini (2007) on politicians' and bureaucrats' task assignments. While previous studies have mainly focused on the information structure in incentive scheme designs, this paper explores the interplay between working incentives and personnel flexibilities.

The rest of the paper is organized as follows. We introduce a model of the promotion club in Section 2, and study its features in Section 3. We then apply the model to data from hierarchical governments, and test model predictions in Section 4. We further extend the model to allow for heterogeneous agents in Section 5. We conclude in Section 6.

[1] It is true that by following the Lazear and Rosen (1981) setup, we focus on the working incentives in rank-ordered performance. Though there are many other interesting aspects of principal-agent relationships, we do not intend to provide the most comprehensive model. Instead, we restrict our attention to highlight the loyalty-competence tradeoff and how we may use promotion clubs to alleviate it.

2. MODEL

Consider one principal (she), and *n* agents (he, them). The principal selects *m* **top-performing** agents into a club, and then promotes one of them from within the club. Promotion carries a reward W, which can be a monetary reward, social prestige, or office-holding rents.

Agents exert costly effort a_i, at convex cost, $c(a_i)$. Following the classical setup in Lazear and Rosen (1981), performance X_i is a noisy realization of effort, where $X_i = a_i + \epsilon_i$, $\epsilon_i \sim N(0, \sigma^2)$, i.i.d..[2]

The principal has private "mindset", η_0, which is completely unknown to agents. Examples of mindsets include ideology, religious beliefs, cultural traditions, and moral codes. Likewise, agents have private mindsets η_i, which are only revealed to the principal after they are selected to the club. The principal intends to select the *most like-minded* agent from the club for promotion, because it is easier to breed loyalty with similar mindsets. We assume that agents are *ex ante* homogenous – i.e., they do not know if they are preferred when they exert efforts. When they are selected to join the club, they each assume they have an equal probability of being promoted.[3] An example of this assumption is where η_0, η_i follow an improper uniform distribution, and the principal minimizes the squared distance with the agents within the club, $\mathbb{E}(\min_{i \in M}(\eta_0 - \eta_i)^2)$. In reality, it is sometimes possible that mindsets are public, which is accommodated in the extended model in Section 5.

The game proceeds as follows. First, the principal announces and commits to a club size *m*. Next, agents simultaneously exert effort, the top *m*-performing agents get into the club, and the principal selects one of them to be promoted.[4]

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[2] Effort sometimes translates into competence. This is especially consistent with the experience of civil servants: no specific expertise is required. The more you get to know your constituency, the more local information you collect and the better governor you become.

[3] We assume in the model that efforts and mindsets are independent. In reality, they might be correlated based on the context (e.g. a religion-related effort may reveal the mindset of the principal, and induce more efforts from religious agents intrinsically). But there is no systematic correlation between the two, which justifies our assumption.

[4] Alternatively, a club-based promotion scheme can be that the principal selects *m* agents based on signals of mindset similarities, and then conduct a contest within the club. While this practice bears theoretical interests, it hardly applies to the environment we consider here, since the principal cares about the working incentives of the whole population. For example, if the agents are the mayors of *n* cities within a province, it is almost impossible for a provincial leader to first select *m* like-minded candidates, and forgo the performance of other cities. It is, however, a feasible strategy when agents do not have compulsory tasks, which makes the (*n*-*m*) excluded agents dispensable. Such examples are seen in power transitions in imperialism, where several princes are shortlisted for selection before one of them is declared heir to the throne.

For given agent population n, and promotion prize W, the principal's problem is as follows. She values both efforts, X_i, and gains from personnel discretion, $S(m)$, and selects an optimal club size subject to the agents' incentive constraints:

$$\max_m \alpha \mathbb{E}(\sum_{i \in N} X_i) + \beta S(m) - W$$

s.t.

$$a_i^* \in argmax_{a_i} p_i(club) \frac{W}{m} - c(a_i)$$

where $p_i(club) = p_i(i\ beats\ (n - m)\ others\ in\ X_i)$

The gains from personnel discretion increase naturally with club size, because larger clubs offer more candidates to choose from. We assume S is increasing and concave in m, e.g., $S(m) = \mathbb{E}(\min_{i \in M}(\eta - \eta_0)^2)$. We also assume a fixed W to reflect wage rigidity, especially in public offices.

Each agent selects an effort level under given m:

$$\max_{a_i} p_i\,(club) \frac{W}{m} - c(a_i)$$

As the club size grows, the key trade-off facing the agents is between the easier efforts to get into the club and the fact that shirking may achieve the same outcome. In the meantime, the principal considers how to incentivize high levels of total effort, while maintaining sufficient flexibility over personnel decisions, for survival concerns.[5]

3. ANALYSIS

We start from the agent's effort choice under a fixed club size, and then proceed to the principal's choice of such size. When the size of the club increases, each agent's incentives to exert efforts have two counter-balancing forces: On the one hand, it is easier to get into the club, which incentivizes working. We call it the *incentive role* of promotion clubs. On the other hand, once in the club, the agent faces a lower probability of being selected for promotion, which discourages working. We call it the *selection role*. Weighing the two roles, we have the following proposition.

[5] Notice the equal promotion probability when selected to the club is not equivalent to simply have a tournament, which promotes the best performer, because the efforts to outperform all other agents can far exceeds the efforts to rank at, for instance, the first quartile.

PROPOSITION 1. Effort features an inverted-U shape with respect to the size of the club, m, for $n \geq 5$. Effort decreases with size for $n \leq 4$.
PROOF. See Appendix.

Proposition 1 states that, when the agent population is large, the promotion club outperforms tournament in terms of generating working incentives. As the size of promotion club grows, the incentive role dominates because a positive promotion probability is worth the efforts. As the size becomes larger and larger, the selection role dominates, and agents are reluctant to work harder for small promotion probabilities. However, for small agent population (when $n \leq 4$,), the selection role always dominates, thus tournament is optimal. Proposition 1 is important, because it shows that club-based promotion can be a good idea even if maximizing efforts is the principal's only objective. More importantly, denoting the effort-maximizing size as m_{club}, Proposition 1 suggests that before the club expands to m_{club}, the principal can effectively incentivize efforts and increase personnel discretion at the same time. Consequently, there is no loyalty-competence tradeoff when the club size grows from tournament ($m = 1$), to the effort-maximizing club size, m_{club}. And the principal can kill two birds with one stone.

However, the principal does not stop at m_{club}. Under a given W, she solves the following problem:

$$\max_m \alpha[\sum\nolimits_{i \in N} X_i(a^*)] + \beta S(m)$$
$$\Rightarrow \max_m \alpha n a^*(m) + \beta S(m)$$

Intuitively, equilibrium is reached when the marginal benefit of personnel flexibility equals the marginal cost of incentive distortion. Thus we have the following proposition:

PROPOSITION 2. In equilibrium, $m^* \geq m_{club}$, which leads to (weakly) sub-optimal efforts.
PROOF. See Appendix.

Proposition 2 shows that although the promotion club scheme alleviates the effort–discretion tradeoff, it does not mitigate the problem, in terms of working efficiency. The principal always tends to oversize the club, which results in effort distortion. Combining the two propositions, we describe both the benefits and costs in adopting a promotion club: it may

generate high incentives to work and high degrees of personnel flexibilities at the same time, but may suffer from effort distortion by an oversized club.

Having analyzed the merits of promotion clubs, the next question is whether real-life organizations practice promotion in a club-based manner. Consider a hierarchical government with centralized personnel control, that is, local officials (subordinates) are appointed and promoted by superior officers. Furthermore, local officials exert efforts to develop the local economy, while the superior officials care both about economic performances, and whether the subordinates are loyal, i.e., share similar mindsets, because future political survival is at stake. In this context, Proposition 2 also helps to establish useful comparative statics for empirical investigations. We summarize the comparative statics with testable predictions as follows.

First, as α increases, or β decreases, the club size m decreases. α measures the importance of local economic performance to the principal, while β denotes the importance of survival concerns. In reality, principals at higher administrative levels of a hierarchical organization usually have stronger survival concerns, this result leads to two predictions about bureaucratic promotions in hierarchical governments:

PREDICTION 1. Clubs are smaller in regions that are economically more important.

PREDICTION 2. Clubs are smaller at the county level than at the prefecture level, which is smaller than that at provincial level.

Second, as σ increases, a^* decreases, and thus m increases. σ proxies for the measurability of tasks. When the task is straightforward to measure, e.g. GDP growth or fiscal revenue growth, the promotion scheme is more meritocratic. Otherwise it is more idiosyncratic. Based on this analysis, we predict that clubs will be larger in areas where output is harder to measure. This echoes the rationale of efficiency distortion in a multi-task model (Holmstrom and Milgrom 1991). In the meantime, when principals launch (non-economic) campaign movements such as environmental protection, poverty eradication, anti-corruption, etc., it is usually a strong signal of a shift in governance focus. Consequently, evaluations based on economic performance rankings should be granted greater flexibility to accommodate non-economic needs, thus a larger club size (based on economic performance rankings) *during* the campaigns.

PREDICTION 3. Clubs are smaller in areas where output is easier to measure.

PREDICTION 4. Clubs are larger during non-economic campaigns.

Similar intuitions apply to corporate environments, where managers in each levels care both about the performances of their teams, as well as the survival in corporate fights. We focus on hierarchical governments because they usually merits better data for empirical investigations. In the next section, we examine one of such hierarchical governments, China. Since promotion clubs are novel theoretical organizational designs, we first confirm its existence in real life, using promotion data from Chinese officials, and then proceed to test the above predictions of the model.

4. EVIDENCE AND FEATURES OF PROMOTION CLUBS

In this session, we first introduce the institutional background of China, and why it is a good case in point. Next, we confirm the existence of promotion clubs in China, investigate its features, and test the predictions from Section 3.

4.1. *Background*

Personnel control in China has always been top down and highly centralized (Xu 2011). The central government appoints provincial leaders, who then appoint municipal leaders, who in turn appoint county-level leaders. In the reform era (post-1978), systematic evaluations gradually became institutionalized. In 1979, it was proposed that employee evaluations (thus promotions and demotions) should be based on four indicators: 1. Virtue: moral standards and political stances; 2. Competence: education level and management capabilities; 3. Diligence: whether the officials work tirelessly to serve the people; and 4. Performance (see, *On the evaluation of cadres*, by the Publicity Department of the CPC Central Committee). Apparently, (economic) performance was easily measurable and thus became the most important criterion of cadre selection.[6] Since then, follow-up policies and documents have specified the need to

[6] For instance, in the development index in Jiangsu province, economic development accounts for 40%, living standards for 30%, social development for 20%, and environmental protection for 10% (The First Bureau of Organization Department, 2006, pp.176-184).

select cadres according to their region's economic performance. Not surprisingly, this mechanism greatly incentivizes economic development efforts.

This evaluation system was designed to accommodate the need for a loyal and obedient subordinate, a feature that is sometimes equally (if not more) important for superior officials.[7] Of the four criteria described above, virtue and diligence are highly unobservable and depend heavily on superiors' idiosyncratic preferences. Nor are there explicit rules of implementation regarding these two criteria. We believe such flexible and objective measures facilitate the principals to appoint loyalists to desirable posts. The combination of these two measurement categories constitutes an institutional foundation to help superior officers balance subordinates' efforts and personnel discretions. In particular, this institutional design provides a good environment to test whether a club-based promotion pattern is adopted.

Understanding this balance further helps us to interpret the mixed empirical evidence on whether efforts, or performance-based tournaments, increase promotion probabilities. To reiterate, the superior officer strives to balance economic development and personnel discretion, and selects a more meritocratic, tournament-like scheme when the importance of economic development outweighs personnel discretion. However, when political survival concerns dominate, the selection process is biased towards personal discretion. The intuition reconciles the findings in the literature concerning the evidence found at different levels of the political hierarchy. At the county or municipal level, where economic development is believed to be the main driving force behind promotion decisions, there is considerable empirical evidence that enhanced economic performance leads to better promotion opportunities (Chen and Kung 2016; Landry, Lü, and Duan 2018). At the provincial or higher levels, where political struggles are more severe, we expect to see mixed evidence, to echo previous findings in the literature (e.g. Li and Zhou 2005 vs. Shih, Adolph, and Liu 2012). In particular, if one considers the differences between governors/mayors and corresponding party secretaries, our theory predicts that economic performance is more likely to be a positive signal for the former, but not the latter. This is consistent with the empirical findings of Choi (2012) at the provincial level, and Yao and Zhang (2015) at the prefectural level.

[7] A 1994 Central Committee report states that "the understanding of politics for high-level cadres, especially those above provincial level offices, matters for the fate of the Party and the nation." However, for grass-roots officials, the evaluation focuses more on "the achievements to develop the local economy, society and party organizations" (General Office of the CPC Central Committee, 2009).

To summarize, meritocratic political selection (measured by the size of the club) is determined by the weights assigned to economic development versus personnel discretion. In regions where economic development is more important, or at lower administrative levels, the superior officer tends to adopt a more meritocratic system, which leads to smaller clubs. Conversely, if political survival concerns are dominant in the region, or at higher administrative levels, the officer requires greater flexibility over personnel control to recruit loyal cronies, which leads to larger clubs.

4.2. *Data and Variables*

China's institutional background makes it a good candidate for our empirical investigation. Specifically, we mainly focus on the political selection of county-level party secretaries, in which local economic performance plays a significant role. The empirical application is based on a dataset of 9,451 county-level party secretaries from 2,965 counties from 2001 to 2016.[8]

A core element of mapping the theory to China's county-level data is to define promotion. We employ the *de facto* power change induced by political turnover to define promotion, which is consistent with the mainstream approach in the literature (Li and Zhou 2005; Chen, Li, and Zhou 2005; Jia, Kudumatsu, and Seim 2015; Yao and Zhang 2015). That is, we define promotions as changes to powerful and more influential positions at higher levels in the bureaucratic hierarchy.[9] For instance, a county secretary is regarded as promoted if he receives a position at the provincial level or becomes a core member at the prefectural level. The latter includes deputy secretary, mayor, deputy mayor, standing committee member, secretary-general, as well as director of the Peoples' Congress or chairman of the People's Political Consultative Conference.[10] Using this definition, around 39% of party secretaries were promoted in our sample.[11] We briefly summarize the political turnover and promotion of party secretaries in our sample in Figure 1.

[8] Our dataset covers China's county-level administration divisions including counties, districts, county-level cities, autonomous counties, banners and autonomous banners. For convenience, we refer to all of them as "counties."
[9] By tracking the power changes of the positions, we avoid calling the cases of higher ranks but lower influence in the hierarchy as promotions.
[10] More detailed definitions of promotion are presented in Table A3. We use the *de jure* definition of promotion provided in the *Civil Servant Law of the People's Republic of China* for our robustness checks; the results are reported in Figure A5.
[11] This percentage coincides with those at the prefectural and provincial levels: 26% for provincial leaders in Jia, Kudumatsu, and Seim (2015) and 39% for prefectural leaders in Yao and Zhang (2015). In addition, we summarize other secretaries' personal characteristics in Figure A2, which are regarded as important factors affecting officials' political turnover.

Figure 1 Here

Another core element is the measurement of the club. In this paper we argue that economic performance serves as the basis of club formation, and that local officials are required to achieve sufficient economic performance in order to enter it. Since relative performance measures may mitigate the moral hazard problem (Lazear and Rosen 1981; Gibbons and Murphy 1990; Kumbhakar and Hjalmarsson 1998; Jenter and Kanaan 2015), we further argue that club size corresponds to the performance ranks among competitors. We measure performance rank by referring to the rank of growth rate of fiscal revenue for a county, within a prefecture, which has been proven a crucial indicator in China's political selection system (Ong 2012; Chen and Kung 2016; Landry, Lü, and Duan 2018).[12] We calculate fiscal revenue growth as the moving average since the first year the secretary took office in order to capture the tenure-based cadre evaluation in China.

What remains opaque is which rank matters for entering the club, or in other words, how large the clubs are. Our first empirical exercise in the next section explores this question. Before proceeding to the empirical analysis, we introduce some control variables, including party secretaries' personal characteristics such as age, education year, as well as tenure year, and counties' socioeconomic characteristics such as population density, relative economic size (measured as the county's revenue as a share of the prefecture's revenue), as well as economic structures (measured by the ratio of agriculture output to GDP and the ratio of manufactural output to GDP). The summary statistics of these variables are presented in Table 1.

Table 1 Here

4.3. *Econometric Specification and Empirical Results*

[12] One concern arising from measuring performance with growth is that it may favor the initially under-developed areas, as they tend to enjoy relatively higher growth rate in subsequent periods. However, this concern would not threaten the validity of our analysis: First, data reveals that such pattern is quite weak in the sample period in China, as illustrated in the left part of Figure A1. Second, we compare and rank growth measure between counties within the same prefecture, and the right part of Figure A1 tells that within-prefecture convergence does not completely dominate all areas. In particular, if we focus on the subsample where within-prefecture correlation between initial revenue level and subsequent revenue growth is relatively weak (between -0.2 and 0.2), our results remain robust (Figure A6).

Following Jia, Kudumatsu, and Seim (2015), we use a linear probability model to examine the relationship between club size and promotion. The econometric specification is as follows:

$$P_{ct} = \alpha + \beta \sum_{i=1}^{10} R_i + \gamma X'_{ct} + \rho Z'_{ct} + \delta_c + \eta_t + \xi_{pt} + \varepsilon_{ct} \qquad (1)$$

where c and t indicate county and year, respectively, and p indicates the prefecture the county is governed by. The dependent variable P_{ct} is a dummy variable that equals 1 if the county's party secretary was promoted at the end of his tenure, and 0 otherwise. The main independent variables are a series of R_i's, where R_i equals 1 if the moving average fiscal revenue growth of county c in year t is located in the top i-th rank within the prefecture, and 0 otherwise. We interpret the positive significance of the coefficient of R_i as an indicator of the existence of a promotion club and i as the club size.

In addition, X'_{ct} represents personal characteristics and Z'_{ct} represents socioeconomic characteristics, detailed in Section 4.2. We also control for county fixed effects δ_c, capturing all time-invariant county-level factors, and year fixed effects η_t, capturing the economic shocks affecting all counties in a given year. We also consider prefecture-level time-invariant factors and allow their effects to evolve by year, which is captured by ξ_{pt}. The standard errors are clustered at the prefectural level to address the heteroskedasticity and serial correlation of the error term within each prefecture.

4.3.1. *Existence of Promotion Clubs*

We first confirm the existence of club-based promotions. The baseline result is reported in Figure 2, where the green dots indicate coefficients and the blue dashed lines represent 95% confidence intervals. [13] We find positive and significant results for i = 5, which not only empirically justifies the existence of a promotion club, but also reveals that the club has five members. In terms of magnitude, the coefficient of R_5 = 0.041 (standard error = 0.017).[14] This means that joining the club significantly increases an individual's promotion likelihood by 4.1%, which accounts for 9.76% of the mean value of promotion likelihood in our sample (=0.420).[15] In other words, with a strong promotion incentive, China's county-level party

[13] The baseline result, along with the results from Figures 4 and 5, are also reported in Table A5.
[14] The corresponding p value is 0.019, and the adjusted p value through multiple-test procedure is 0.084.
[15] The standard error in Figure 2 is increasing as the rank increases, which rises the concern that a smaller club size at county level may be the consequence of such trend. However, we do not think it would affect the

secretaries compete to pursue high fiscal revenue growth (top five within the prefecture) in order to join the promotion club. However, within the club, increasing the rank of fiscal revenue growth cannot significantly influence one's likelihood of promotion, which paves the way for discretionary power in political selection.[16]

Figure 2 Here

We conducted four more exercises to justify the robustness of our baseline finding. First, as Proposition 1 indicates, the promotion club is an efficient mechanism especially when agent population size is large enough (> 4). We focus on the subsample in which at least five counties are governed by the same prefecture, which covers around 94.06% in terms of observation or 93.70% in terms of county number, and report the results in Figure A3. We find similar patterns that the top five performers are selected to join the promotion club.

Second, many officials' personal information is missing in our sample. We argue this would not threaten the validity of our results.[17] Specifically, we calculate the number of counties within each prefecture as if there are no missing values as well as the counterpart in our sample where missing values exist. We use the ratio of these two numbers as an indicator and employ the subsample with a relatively mild missing extent (ratio < 0.5) to repeat the baseline exercise. The results, reported in Figure A3, reinforce our finding that joining the top five can significantly increase one's promotion likelihood.

identification of club sizes. The variance of $\widehat{\beta_j}$ is calculated as $\sigma^2/(SST_j \times (1 - R_j^2))$, where σ is the standard error of residuals, SST_j is the sample variance of R_j, and R_j^2 is the R-squared from regressing R_j on all other independent variables. Here we have clear expectation about the evolution of SST_j along j (but not for R_j): as our independent variables are dummies and the fraction of value 1 increases with j, their variances would first increase until the mean reaches around 0.25 and then decrease. Thus under the case where there is no apparent systematic pattern for R_j, we can naturally expect $\mathrm{var}(\widehat{\beta_j})$ would temporarily decrease and then increases with j.

[16] The practice of political selection in China provides some hints on the existence of promotion club identified by our empirical analysis. For example, according to the political selection procedure in Table A1 which is summarized from "Regulation on the Selection and Appointment of the Party and Government Leaders"(2014), the third and core step is to recommend or nominate some candidates (mainly according to their performance) for further investigation, and the number of candidate to be investigated should be more that those who are finally promoted. It shares almost the same spirit with our prototype of promotion club.

[17] Around 46% of observations in our sample suffer from such a problem that at least one of official-related variables (including P_{ct} and X_{ct}) is missed. However, only 15% of observations are dropped due to missing economic variables. The disparity between these two missing ratios allow us to test whether the missing values are randomly distributed, or in other words, whether the missing values are clustered at a given rank: among the sample with no economic information missing, we generate an variable indicating whether there is missing in personal information for each observation, and then regress it on performance ranks. We find no significant correlations in Table A6, which suggests that the missing values are not clustered.

The third concern arises from favoritism: what if the principal treats an agent, or the ruled region with favorable policies for economic performance, and then adopts relative performance evaluations to "fairly" select the agent? To rule out this possibility, we control for two variables specific to an agent or an region: 1. the connection between principals and agents, which is proxied by a dummy indicating whether the county party secretary shares the same hometown with the prefecture party secretary, and 2. a variable specific to a regional favoritism policy, which is proxied by fiscal transfer. Figure A3 shows that the results lend empirical support to the validity of our results.

The final concern is that the large number of independent variables may lead to spurious correlations due to chance. The argument suggests that some coefficients will be significant regardless of their economic meaning as the number of independent variables increases. To rule out this possibility, we preserve the regression format but falsify the contents of the variables. Specifically, we randomize the promotion status as well as performance ranks and then compare the resulting significances. We conducted the randomization 1,000 times, and report the results in Figure A4. In more than 95% of the cases the coefficients remain insignificant, which gives us more confidence that the baseline result is not an outcome by chance.

4.3.2. *Features of Promotion Clubs*

Having validated the model, we now proceed to its predictions. Prediction 1 suggests that club size will be larger (smaller) in economically less (more) important regions. We use provincial per capita GDP growth rates to proxy for economic significance. We apply this differentiation and conduct empirical analysis on counties located in provinces with lower vs. higher than median per capita GDP growth rates (see Figure 3). We find that clubs in economically important regions have 5 members,[18] and 11 members in other regions.[19] The results not only confirm the role of promotion club in different cases, but also verify our first prediction that economic significance is inversely correlated with club size.

[18] A slightly different from the baseline results, we also find that becoming the first rank in economically more important regions can also significant increase promotion likelihood, which may be the bonus prize of the champion.

[19] Figure 3 reports the results by using all ranks after (including) 11 as the reference, and thus no significant results are indicated in the economically less important regions, where the club size is 11. This positive and significant result can be revealed by reducing the size of the reference group and including more ranks in the comparison (e.g. using all ranks after (including) 16 as the reference).

Figure 3 Here

Prediction 2 of the model suggests that clubs should be larger at the prefectural level than at the county level, and even larger at the provincial level. To test the prediction, we employ prefectural- and provincial-level data. As with the information on county party secretaries, we collected the data on prefectural and provincial party secretaries through similar channels.[20] We report the results in Figures 4 and 5: clubs are larger higher up in the hierarchy.[21] Moreover, at the provincial level, the promotion club effect is only mildly significant (p=0.083).

We have two remarks comparing our results to the literature, especially the seminal provincial evidence from Li and Zhou (2005). First, we extend the provincial analysis to the prefectural and county levels, which complements previous findings that economic performance matters for promotion, and further suggest a subtle, club-based implementation. As shown in this paper, the promotion club preserves the meritocratic feature of a standard tournament, with added personnel flexibility. Second, by comparing results from the county and prefectural levels, we highlight the increased political survival concerns as well as highly weighted non-economic tasks,[22] at higher offices.

Figure 4 Here

Figure 5 Here

The third prediction emphasizes a large club size when the output is harder to measure. We utilize both a direct and an indirect proxy for task measurability. For the direct proxy, we follow Chen, Qiao, and Zhu (2019) to calculate GDP manipulation in each county and year, which is based on Henderson, Storeygard and Weil's (2012) approach using satellite night-

[20] E.g., Baidu Encyclopedia (Baidu Baike, www.baike.com), Zechen Web (http://www.hotelaah.com/liren/index.html), China Vitae (http://www.chinavitae.com/), CSMAR. We collect prefecture-level economic data from China City Statistical Yearbook (*Zhongguo Chengshi Tongji Nianjian*), which is compiled by Department of Urban Surveys of National Bureau of Statistics, and China Statistical Yearbook for Regional Economy (*Zhongguo Quyu Jingji Tongji Nianjian*), which is compiled by Department of Comprehensive Statistics of National Bureau of Statistics. We also collect province-level data from China Statistical Yearbook (*Zhongguo Tongji Nianjian*), which is compiled by National Bureau of Statistics.

[21] This finding is consistent with the general pattern in Yang and Zheng (2013), who find that the top ten prefecture party secretaries within their province in terms of GDP growth are more likely to be promoted than others.

[22] For example, in 2013 the party secretary of Xinjiang Uygur Autonomous Region, Chunxian Zhang, said that antiterrorism and stabilization-sustaining dominate all other tasks (http://news.ifeng.com/mainland/detail_2013_07/02/27007922_0.shtml).

time illumination data to filter out potential manipulation of official GDP data. The ratio of manipulation of official GDP data is used to proxy for the difficulty of output measurement: higher ratio corresponds to more difficulties in measuring agents' actual outputs. We take the average of the ratios within each prefecture and divide the prefectures into two groups according to the median value of the average ratios. The empirical results based on counties governed by these two groups of prefectures are reported in Figure 6, which shows that the club size for the low data manipulation group is higher than that for the high data manipulation group, which confirms our theoretical prediction.

Figure 6 Here

Additionally, we borrow the idea for the indirect proxy from Serrato, Wang, and Zhang (2019),[23] and use the coefficient of variation (COV, standard deviation divided by mean) of fiscal revenue growth within each prefecture to proxy for whether the output is easy to measure or not: the higher the COV, the more difficult it is for principals to accurately judge the actual performance of their agents, and the less meritocracy is employed in the process of political selection. We similarly divide the prefectures into two groups according to whether each within-prefecture (across-county) COV is greater than their median value. The regression exercise is conducted for counties in each prefecture group and the corresponding results are reported in Figure 7. The theoretical prediction is again verified, as the empirical evidence indicates that club size is positively related to the level of volatility, although the difference in sizes is smaller.

Figure 7 Here

Relatedly, the fourth prediction focuses on the role of campaigns in determining club size. In particular, when there are non-economic campaigns, the principal tends to exercise more discretion over campaign-related issues, and thus enlarges the club size. Empirically, we restrict our attention to two kinds of campaigns: environmental protection and maintaining social stability. We utilize whether a prefecture receives a visit on environmental issues from provincial or central leaders in a given year to capture environmental campaigns, and whether

[23] Serrato, Wang, and Zhang (2019) use the standard deviation of migration of measure the noisiness of One Child Policy performance.

a strike takes place in a prefecture in a given year to proxy for the existence of a stability maintaining campaign. Then we compare counties in prefectures with no environmental visits and strikes with those in prefectures that have at least one environmental visit or at least one strike.[24] The results are reported in Figure 8, which suggests that clubs are indeed larger when there are non-economic campaigns.

Figure 8 Here

5. EXTENSION: PUBLICLY KNOWN CRONIES

5.1. *Extended Model*

In the previous section, we showed that with homogeneous agents, promotion clubs outperform tournament when the agent population is large, but the principal tends to oversize the club. Yet in reality, agents are often heterogeneous in terms of some observable traits or connections to the principal, and thus differ in their potential to become cronies. The observable traits may be shared hometown, school alumni, colleagues, etc. In this section we maintain most parts of the model unchanged, and further assume that some of the agents are publicly known to be *connected* to the principal. We also assume that the principal selects agents in a lexicographic manner: once in the club, connected agents (cronies) are always preferred to unconnected ones (non-cronies). We assume that connected agents are all equally likely to be selected for promotion, to echo our previous setup.

For simplicity, we consider two extreme scenarios. In the first, there is only one publicly known crony among n agents. The insight speaks to cases in which cronies occupy a minority of the agent population. In the second scenario, there is only one non-crony among n agents. This speaks to the cases in which a majority of the agent population are cronies, which we call a *crony-ful* environment.

When the size of the club is fixed, which may be due to the costs of confusion if the rules alternate too frequently, replacing a non-crony with a crony necessarily increases the incentives of the new crony to work hard (compared to their non-crony colleagues) in a *proper*-sized club

[24] Here we treat these two campaigns as the same category (non-economic campaign) and consider them simultaneously. A related benefit from such exercise arises from the alleviation of small sample bias, as if we consider each campaign separately, the subsample covering the campaign would be too small to be comparable with the counterpart without campaign (e.g. 6% vs. 94%).

(m>1), because cronies always enjoy privileges in intra-club selections. Meanwhile, non-cronies' incentive to work has sharply declined if the principal selects a *proper* promotion club (m>1), because the crony will always be preferred for promotion.

Over a longer time horizon, when the size of the club is endogenous, a large club can be selected to ensure cronies are included if survival concerns are significant. In the meantime, the crony may shirk compared to a non-crony in an n-agent tournament, since he understands non-cronies' reluctance to work, and the principal's willingness to enlarge the club. As a result, creating a proper promotion club distorts the efforts of all agents when there are few cronies.

PROPOSITION 3. When there is only one crony among the agents, the principal selects the optimal club size, $m^* > 1$, if at least one of the following holds:

1. $\beta > \bar{\beta}$
2. $n > \bar{n}$

PROOF. See Appendix.

COROLLARY 1. When there is only one crony, the crony shirks, and the non-cronies shirk more, compared to their effort in an n-agent tournament.

PROOF. See Appendix.

As the proposition shows, when there are few cronies, they can almost force the principal to enlarge the club for inclusion. In a hierarchical bureaucracy, if a connected official lands among unconnected colleagues, there are two counter-balancing forces: 1. At first, club sizes are rigidly maintained at the previous level, and the connected official adapts to the local environment. We expect the crony's efforts to increase; 2. After a period of time, club sizes start to adjust, and the connected official will start to shirk, as argued in Corollary 1. This leads to the following prediction:

PREDICTION 5. When a connected official lands among unconnected colleagues, the efforts of the connected official first increase and then decrease.

Next, we analyze the case in which there are many cronies. When there is only one non-crony agent in the population, cronies compete with each other. In particular, when the club has more than two members, the non-crony stops working completely: even if he makes it into

the club, he will be dominated by at least one other crony. Consequently, the principal's problem is essentially the same as in the homogenous case with (n-1) agents. If we consider total efforts as a proxy for the public goods the bureaucracy provides, combined with the fact that the promotion club outperforms the tournament approach when the agent population is large, the effort gains from the promotion club may compensate for the loss caused by one agent's complete lack of effort. As a result, forming a promotion club in a crony-ful environment may produce higher total efforts, and thus better total public goods provision.

PROPOSITION 4. With quadratic cost, a promotion club generates more total efforts than an n-agent tournament when $n > 5$.
PROOF. See Appendix.

An immediate testable prediction follows.

PREDICTION 6. In an area with many connected officials, total public goods provision may be higher than an average area with few connected officials. But an area administered by unconnected officials may have below-average public goods provision and above-average levels of inequality.

5.2. *Further Evidence*

To empirically test Prediction 5, we first construct measures for efforts and political connections. We use performance rankings to proxy for officials' efforts, and follow the approach used in previous studies to measure political connections: we regard a county party secretary as a crony if he/she shares the same hometown (same prefecture) with his/her direct superior, the prefecture party secretary (Meyer, Shih, and Lee 2016), and if the county party secretary is at least three years younger than the prefecture party secretary to avoid a potential competitive relationship between them (Jia, Kudumatsu, and Seim 2015). We then apply these measures to the following econometric specification:

$$Rank_{ct} = \alpha + \beta_1 Connection_{ct} \times Tenure_{ct}^2 + \beta_2 Connection_{ct} \times Tenure_{ct} + \beta_3 Connection_{ct} + \beta_4 Tenure_{ct}^2 + \beta_5 Tenure_{ct} + \gamma X'_{ct} + \rho Z'_{ct} + \delta_c + \eta_t + \xi_{pt} + \varepsilon_{ct} \quad (2)$$

The specification shares the same structure as specification (1) except the dependent variable is replaced by $Rank_{ct}$ and the primary independent variables are replaced by $Connection_{ct}$, $Tenure_{ct}$ and their interaction terms. $Rank_{ct}$ refers to the performance rank, $Connection_{ct}$ refers to whether there is a political connection between the county and prefecture party secretaries, and $Tenure_{ct}$ refers to the number of years since the county party secretary took office.

We investigate the interaction of $Connection_{ct}$ with $Tenure_{ct}$ and its squared term to explore the effort dynamics of connected officials. A connected official who is appointed to a new position will take advantage of a not-yet-adjusted club size to increase his effort in order to increase the probability of club inclusion. However, as time goes by, the superior officer starts to enlarge the club, and as the extended model suggests, the crony should decrease his efforts accordingly. Consequently, we predict a non-monotonic relationship between a connected official's efforts with respect to tenure years – i.e., negative β_1 and positive β_2. Table 2 reports the corresponding results for both absolute and normalized performance rank[25] and verifies this prediction.

Table 2 Here

To assess the impact of crony competition on aggregated local performance (Prediction 6), we continue to use the measure of political connections as before but aggregate them to the prefecture level. We construct the variable "Crony Share," the ratio of the number of cronies to the total number of counties within each prefecture, which we use to test the relationship between "Crony Share" and the prefectures' performance rank. Specifically, we apply the following econometric specification:

$$Rank_{pt} = \alpha + \beta Crony\_Share_{pt} + \gamma X'_{pt} + \rho Z'_{pt} + \delta_p + \eta_t + \xi_{st} + \varepsilon_{pt} \quad (3)$$

which is similar to specification (1) but the dependent variable is replaced by performance rank, the independent variable is replaced by crony share, and subscriptions c (indication county) and p (indicating prefecture) are replaced by subscription p (indication prefecture) and s

[25] We normalize the rank to [0,1] with the highest rank as 1 and the lowest rank as 0. This exercise is motivated by the concern that different numbers of counties under each prefecture may reflect a varying extent of competition, which means different levels of difficulty in moving one rank higher in different prefectures (Lü and Landry 2014). We normalize the rank to the scope of [0,1] to ensure the comparability of a one-rank promotion among various prefectures.

(indicating province), respectively. Table 3 reports the results based on the prefecture-year panel dataset and shows that as the share of cronies increases, i.e., in a more crony-ful environment, *more* fiscal revenue is procured.

Table 3 Here

The importance of the extended model and the evidence is twofold: First, we show that the intuitions of our baseline model go through, when we relax the private mindset assumption to allow for heterogeneous agents. Second, by confirming Prediction 6, we verify the incentive role of promotion clubs, that club-based promotions may provide high working incentives.

6. DISCUSSIONS AND CONCLUSION

We propose and empirically validate a tournament-like incentive scheme called the *promotion club*. In this scheme, the principal selects, from *n* agents, *m* top-performing ones into a club, and then promotes one from within the club based entirely on the principal's idiosyncratic preferences ("mindset"). We show that a proper ($m>1$) promotion club often helps to incentivize agents' efforts while maintaining some discretionary power over personnel control, and employ political turnover data from China to validate the model and test its predictions. The model includes two primary simplifying assumptions to make the economic insights clear. First, we assume that the distribution of mindsets is an improper uniform distribution. One could relax this assumption to allow a random distribution function, in which agents with mindsets closer to the distribution mean should have higher working incentives. Second, we assume that the principal can commit to a certain club size. Though the superior officer in a bureaucracy has no commitment power in reality, the dynamic nature of principal–agent interactions helps to, at least partially, solve the problem. For instance, if the principal announced a club size and then selected someone from outside the club for promotion, the agents would no longer believe in the promotion club scheme and would have a strong incentive to shirk, which is undesirable for the principal in the long run. Moreover, we abstract from the real-life practice of announcing the club size to focus on the incentive concerns, by simply allowing the principal to suggest a number. In reality, vague conversations of future visions are often provided, which strengthens the possibility of discretion on the part of the principal. However, subordinates may infer the degree of selection from such noisy signals.

One may add a noisy announcing stage of club size, but the main insight of the model remains. We also abstract from the details on how the principal manages to discover the agents' mindsets, as we abstract from the explicit form of personnel discretion gains, to highlight both the tradeoff and its alleviation using promotion clubs.

We validate the model and test its predictions using data from China. We first demonstrate the existence of a club-based promotion pattern using county-level data from 2001 to 2016. The empirical analysis shows that reaching the top five in the performance measure (in other words, joining the club) can significantly increase the promotion likelihood. Further model predictions also receive empirical support: club size expands with administrative levels; club size shrinks in regions with higher economic importance, and expands in regions with higher data volatility; club are likely to be enlarged during non-economic campaigns. By taking publicly known cronies into account, we find a non-monotonic relationship between connected officials' efforts with respect to tenure years, and we also show that as the number of cronies within a club increases, more fiscal revenue is procured, which suggests that promotion clubs are indeed better for incentive provision.

Our last remark concerns the modelling of performance. In the paper, performance consists of a single task. It is easy to extend to a multi-task setup, bearing similar insights as Holmstrom and Milgrom (1991). In fact, our empirical findings that club sizes enlarge in regions with environment-related visits from superior officers, and in regions with more strikes, have implied a multi-tasked scenario: in a standard multi-task environment, agents exert more effort in measurable tasks, and less effort in unmeasurable ones. However, in political campaigns, some specific tasks (e.g. environmental protection, social stability, etc.) are quantified and thus closely connected to short-term evaluations. Consequently, an economic-based evaluation gives room to campaign discretions, which leads to enlarged clubs.

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Figures

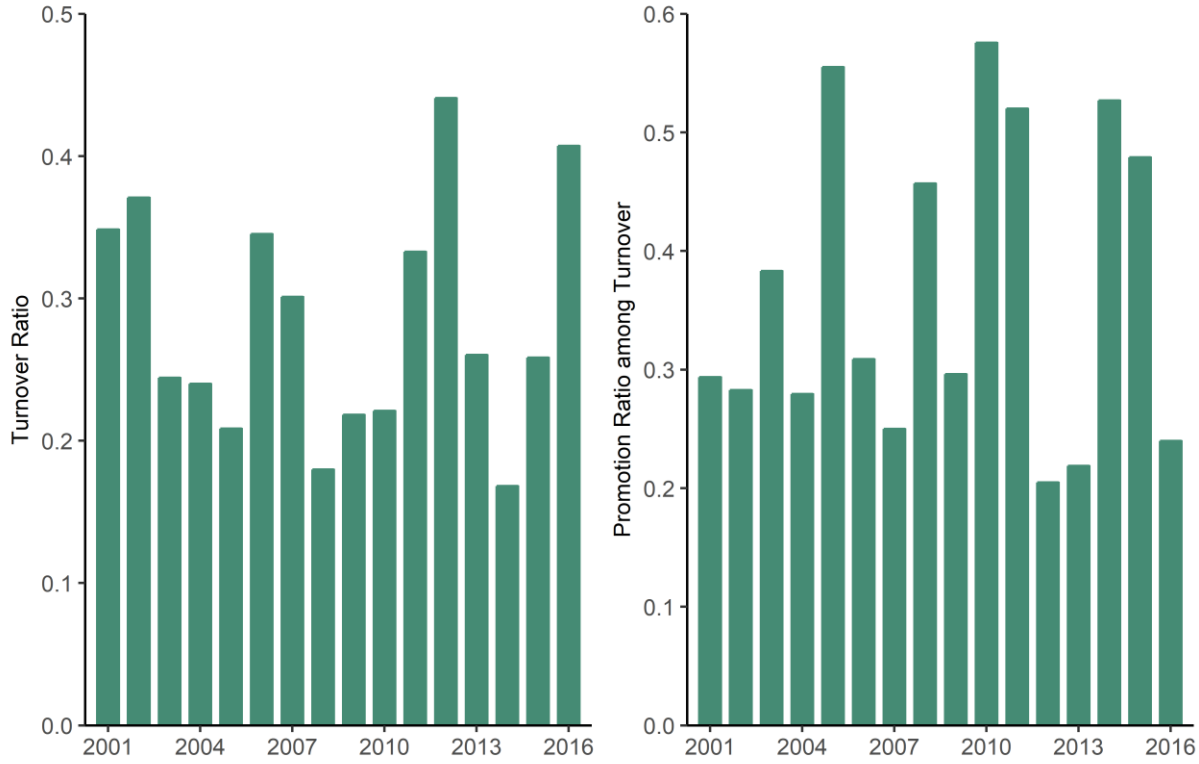

FIGURE 1

Political Turnover and Promotion

Notes: The vertical axis in the left panel indicates the turnover ratio of county-level party secretaries, which is calculated as the ratio of number of counties experiencing political turnover to total number of counties in our sample in each year; and the vertical axis in the right panel indicates the ratio of promoted county-level party secretaries among all turnover cases, which is calculated as the ratio of the number of counties whose party secretary obtained promotion to the number of counties experiencing political turnover in each year.

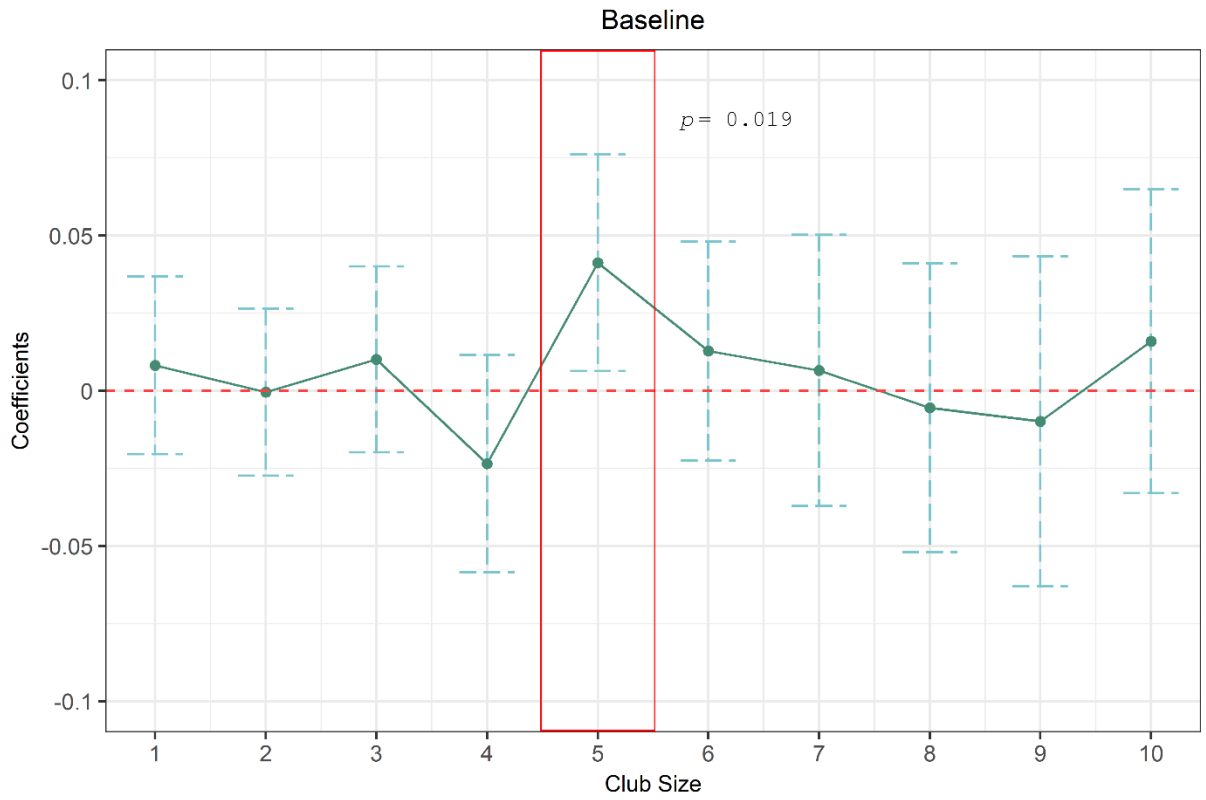

FIGURE 2

The Promotion Club

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, logged agricultural output and logged manufacture output), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The ranks after (including) 11 are used as reference groups. See table A4 for the exact numbers of these point estimates.

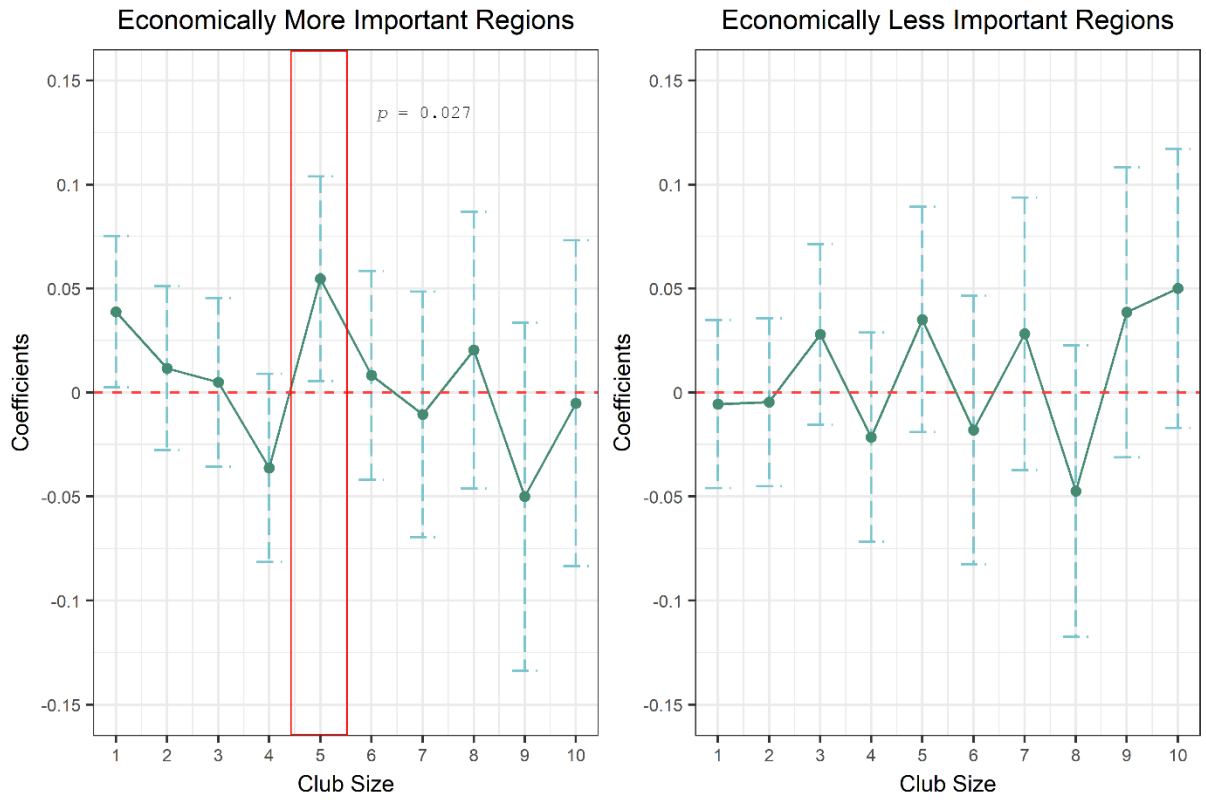

FIGURE 3

Club Size in terms of Economic Significance

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The economically more important regions include counties in provinces with per capita GDP growth rates no lower than the median level, and the economically less important regions contain counties in provinces with below-median per capita GDP growth rates. The ranks after (including) 11 are used as reference groups.

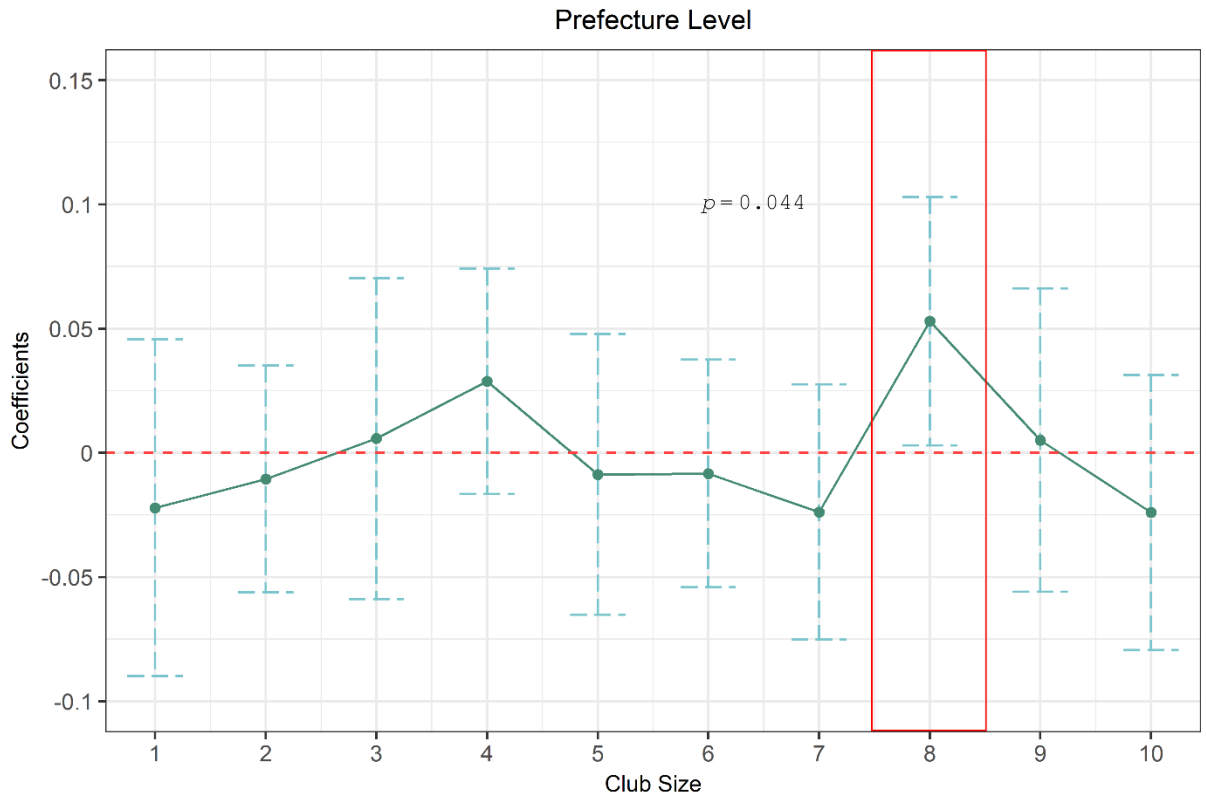

FIGURE 4

Promotion Club at the Prefectural Level

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The ranks after (including) 11 are used as reference groups. See table A4 for the exact numbers of these point estimates.

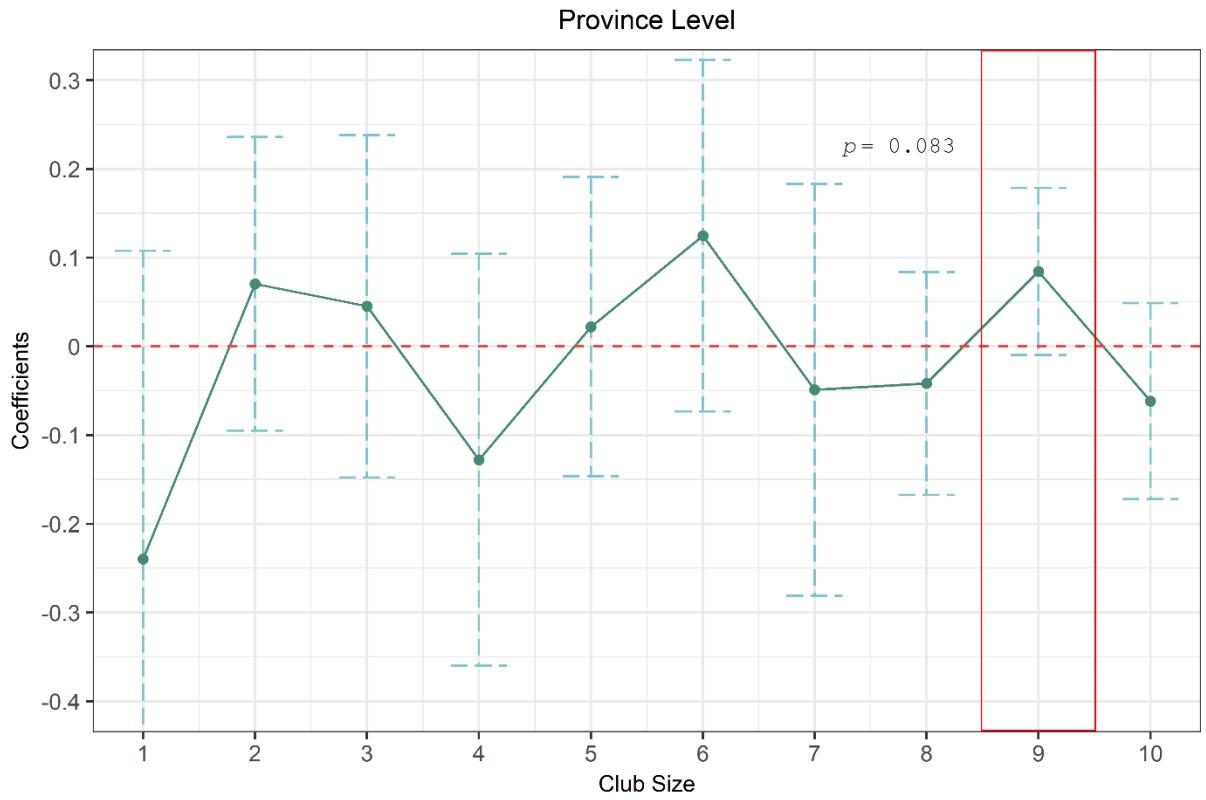

FIGURE 5

Promotion Club at the Provincial Level

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The ranks after (including) 11 are used as reference groups. See table A4 for the exact numbers of these point estimates.

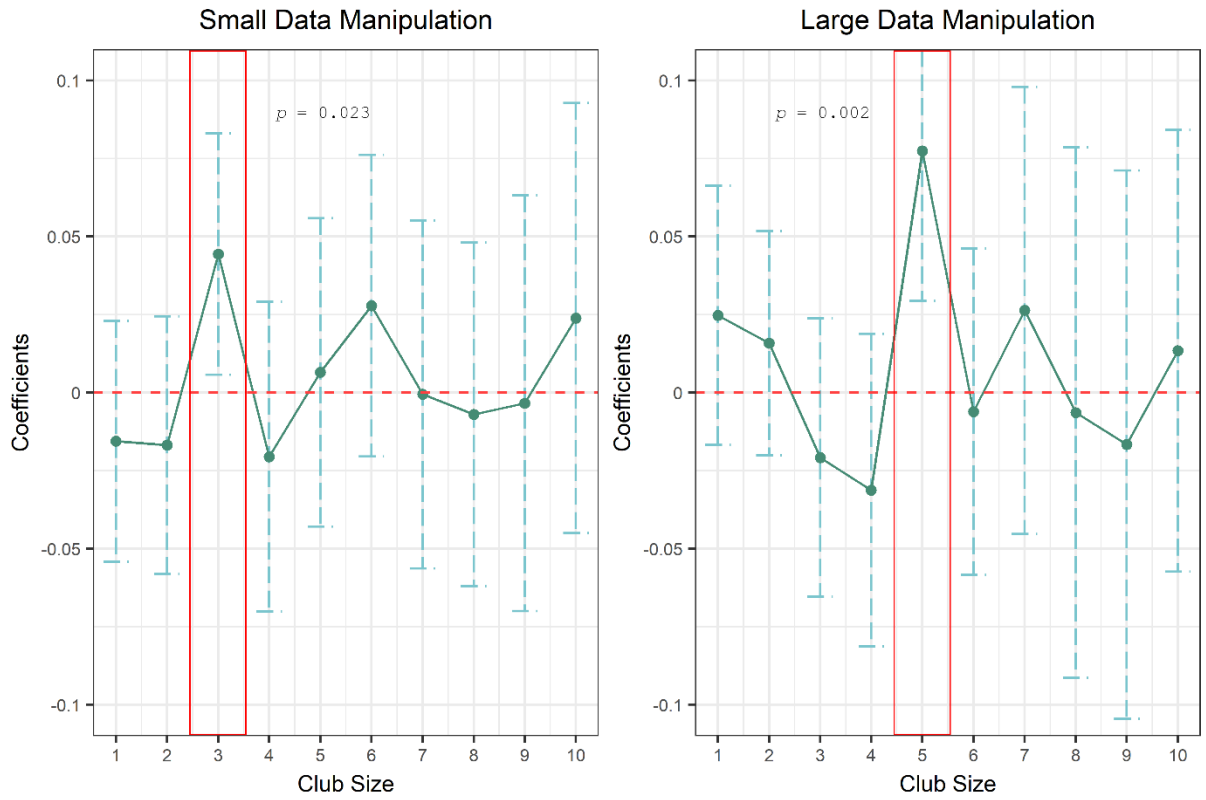

FIGURE 6

Club Size in terms of Data Manipulation.

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. Data manipulation is measured by the gap between official GDP and estimated "true" GDP; the latter is estimated following Henderson, Storeygard and Weil's (2012) approach, which utilizes satellite night-time illumination data to filter out manipulated official GDP data. The high data manipulation regions include counties in prefectures where the average gaps are no lower than the median value, and the low data manipulation regions contain counties in prefectures where the average gaps are lower than the median value. The ranks after (including) 11 are used as reference groups.

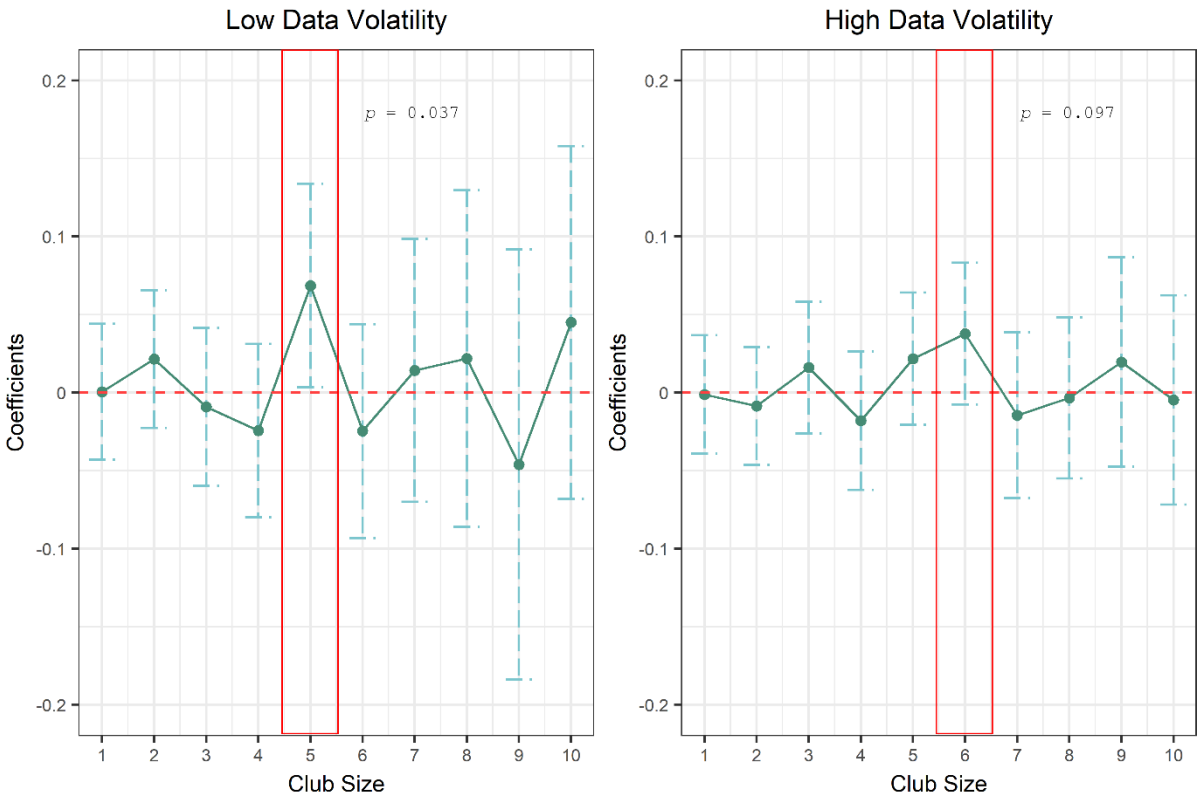

FIGURE 7

Club Size in terms of Data Volatility

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. Data volatility is measured by the coefficient of variation (COV, standard deviation divided by mean) of fiscal revenue growth among counties within each prefecture. The high data volatility regions include counties in prefectures where COV is no smaller than the median value, and the low data volatility regions contain counties in prefectures where COV is smaller than the median value. The ranks after (including) 11 are used as reference groups.

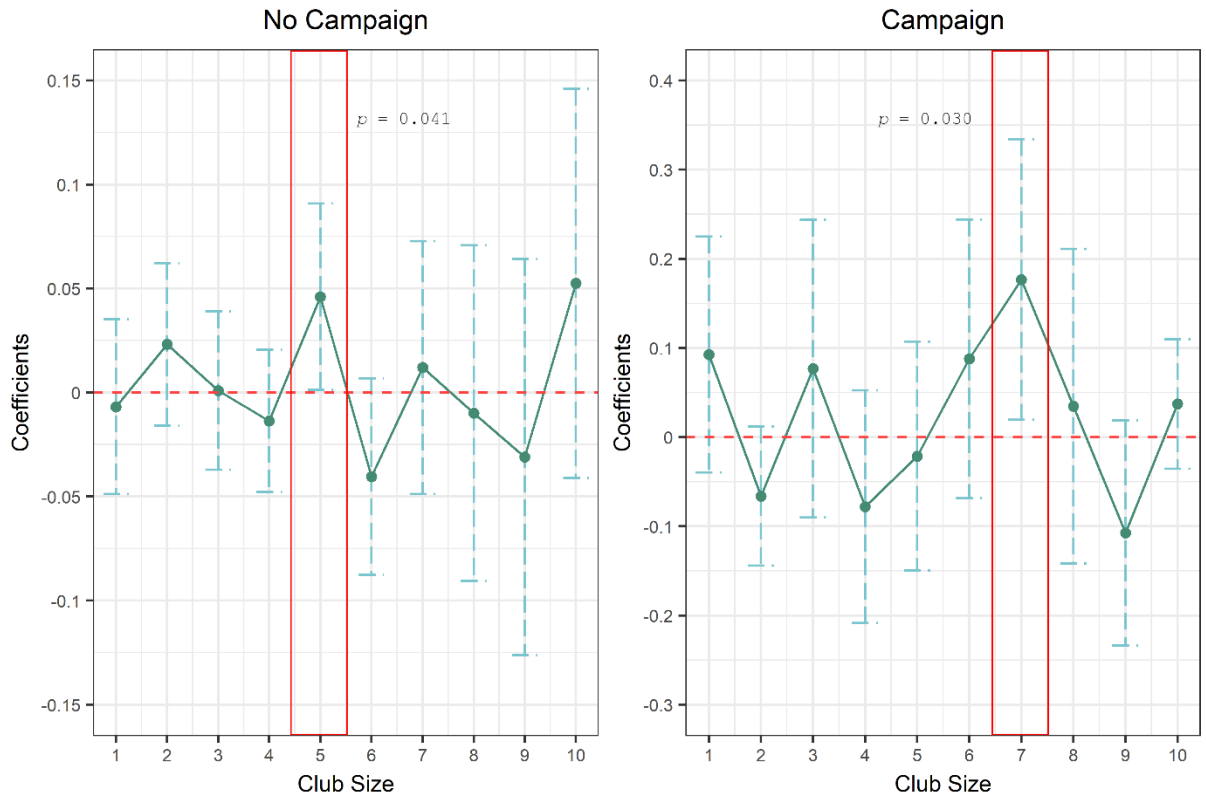

FIGURE 8

Club Size in terms of Campaign

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. An environmental campaign is measured by a visit from provincial or central leaders on environmental issues. "No Non-economic Campaign" indicates that no provincial or central leaders visited the prefecture that year on environmental issues and no strikes took place in a prefecture in that given year; "Non-economic Campaign" indicates there was at least one such environmental visit or there was at least one strike. The visiting data (2007-20010) is borrowed from Wang, Cao and Chen (forthcoming), and The strike data (2007-2010) comes from the China Labor Bulletin (https://clb.org.hk/).[26] The ranks after (including) 11 are used as reference groups.

[26] Here we focus on the period 2007-2010 due to data availability.

Tables

TABLE 1

Summary Statistics

Variables	Observations	Mean	Standard Deviation	Data Source
Promotion dummy	24,017	0.420	0.494	A
Moving average fiscal revenue growth rate	30,284	0.156	0.164	B
Age	25,762	47.079	4.096	A
Years of education	22,546	16.850	2.572	A
Tenure	32,846	2.558	1.623	A
Population density	35,077	0.073	2.348	B
Fiscal revenue share within prefecture	34,840	0.152	0.133	B
Agricultural output (log)	35,044	10.393	1.194	B
Manufacture output (log)	34,944	11.009	1.661	B
Dummy for provincial per capita GDP growth rate	32,783	0.524	0.499	C
Dummy for within-prefecture fiscal revenue growth rate volatility	32,337	0.559	0.496	B
Dummy for gap between official and estimated "true" GDP	34,146	0.497	0.500	D
Environmental visiting	11,239	0.117	0.458	E
Strike	14,150	0.102	0.391	F
Connection dummy	21,436	0.041	0.197	A
Crony share within prefecture	30,339	0.037	0.133	A

Notes: A: collected by authors; B: China County Statistical Yearbook (*Zhongguo Xin(shi) Shehui Jingji Tongji Nianjian*), compiled by Department of Rural Surveys of National Bureau of Statistics; China Statistical Yearbook for Regional Economy (*Zhongguo Quyu Jingji Tongji Nianjian*), compiled by Department of Comprehensive Statistics of National Bureau of Statistics; C: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), compiled by National Bureau of Statistics; D: Chen, Qiao and Zhu (2019); E: Wang, Cao and Chen, forthcoming; F: China Labor Bulletin (https://clb.org.hk/).

TABLE 2

Crony Efforts Dynamics

Dependent Variable: Fiscal Revenue Growth Rank	Absolute Rank		Normalized Rank	
	(1)	(2)	(3)	(4)
Connection dummy × Tenure squared	-0.073**	-0.090***	-0.011***	-0.013***
	(0.030)	(0.032)	(0.004)	(0.004)
Connection dummy × Tenure	0.308	0.336	0.063**	0.066**
	(0.220)	(0.243)	(0.028)	(0.033)
Connection dummy	-0.151	-0.112	-0.073	-0.076
	(0.399)	(0.520)	(0.052)	(0.069)
Tenure squared	-0.028**	-0.035**	-0.003***	-0.004***
	(0.012)	(0.016)	(0.001)	(0.001)
Tenure	0.218***	0.266***	0.027***	0.035***
	(0.075)	(0.101)	(0.007)	(0.010)
Personal characteristics	Yes	Yes	Yes	Yes
Socioeconomic characteristics	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Prefecture -Year FE		Yes		Yes
Observations	17,263	16,636	17,211	16,636
R-squared	0.541	0.593	0.305	0.380

Notes: Standard errors in parentheses are clustered at the provincial level. The constant term is included but not reported. Personal characteristics include party secretaries' age, education year and tenure; socioeconomic characteristics include population density, fiscal share in the prefecture, agriculture output (log), as well as manufacture output (log). The connection dummy equals 1 if the county party secretary is connected (same hometown/prefecture level) to the prefecture party secretary, where the age difference is larger than 3 years (county secretary is younger), and equals 0 otherwise. Tenure denotes the number of years since the county party secretary took office. * denotes significance at 10 percent. ** denotes significance at 5 percent. *** denotes significance at 1 percent.

TABLE 3

Crony Share and Aggregate (Prefectural) Performance

Dependent Variable: Fiscal	Absolute Rank		Normalized Rank	
Revenue Growth Rank	(1)	(2)	(3)	(4)
Crony share	1.268**	1.223**	0.099*	0.097*
	(.533)	(.568)	(.048)	(.050)
Personal characteristics	Yes	Yes	Yes	Yes
Socioeconomic characteristics	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Province -Year FE		Yes		Yes
Observations	4,284	4,277	4,283	4,277
R-squared	0.355	0.377	0.231	0.262

Notes: Standard errors in parentheses are clustered at the provincial level, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The constant term is included but not reported. Personal characteristics include party secretaries' age, education year and tenure; socioeconomic characteristics include population density, fiscal share in the prefecture, agriculture output (log), as well as manufacture output (log). The crony share is the share of connected county secretaries with each prefecture. * denotes significance at 10 percent. ** denotes significance at 5 percent. *** denotes significance at 1 percent.

Appendix Figures

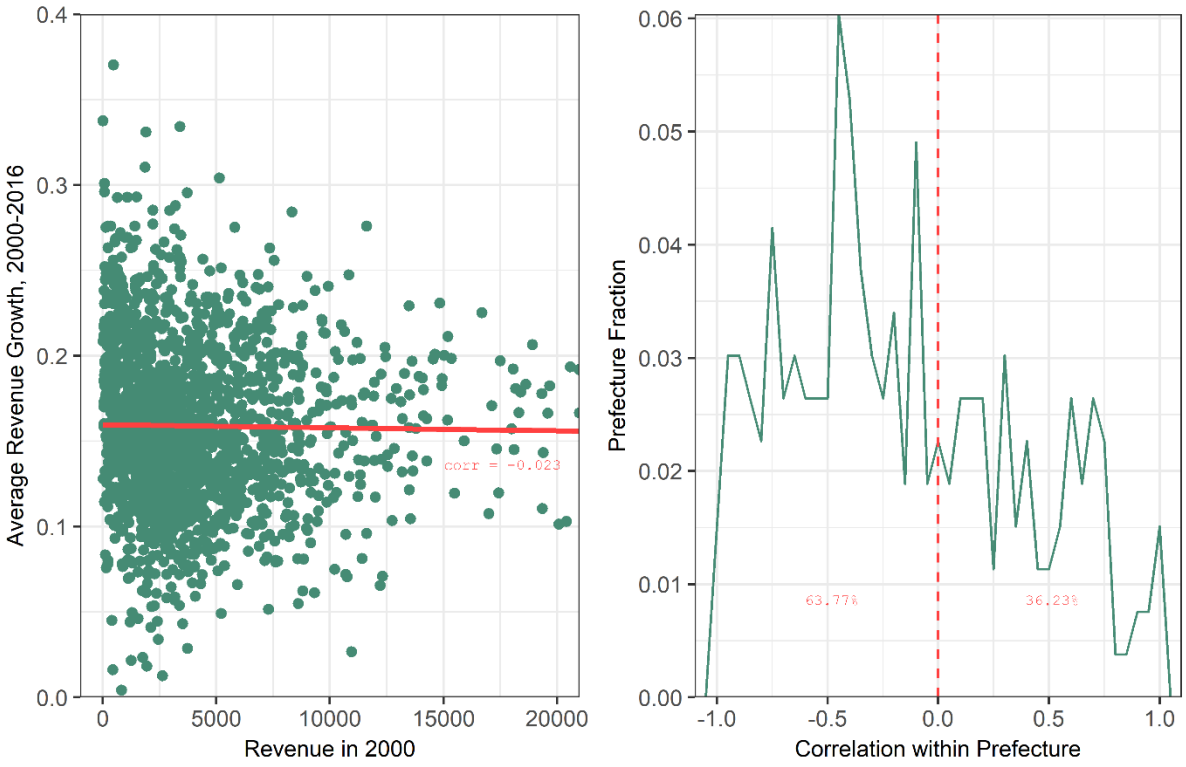

FIGURE A1

Correlation between Initial Revenue Level and Subsequent Revenue Growth

Notes: The left figure plots this correlation for the whole country, where each point indicates one county. The correlation is -0.023. The right figure presents the distribution of this correlation within each prefecture. There 63.77% prefectures where the within-prefecture correlation is negative, and 36.23% with positive correlations.

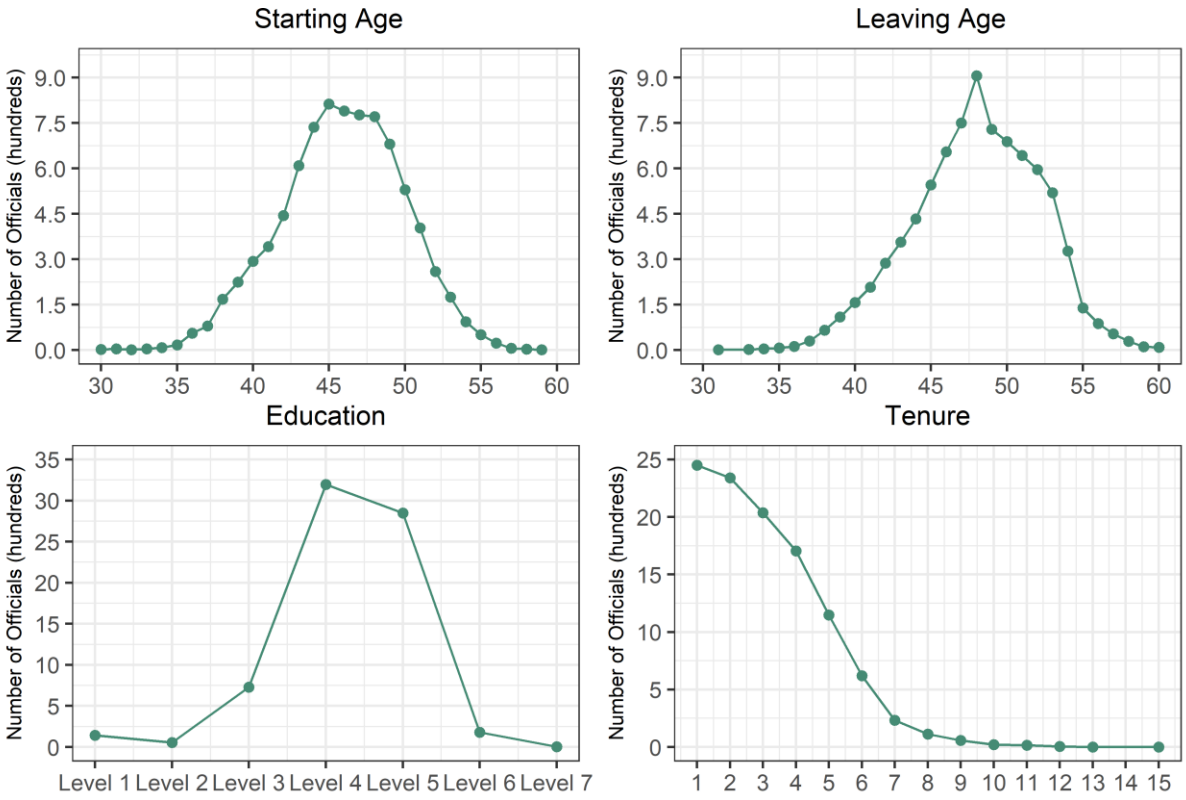

FIGURE A2

Personal Characteristics

Notes: For education, levels 1-7 indicate secondary school degree, high school degree, college degree, bachelor degree, master degree, PhD degree, and post-doctorate degree, respectively.

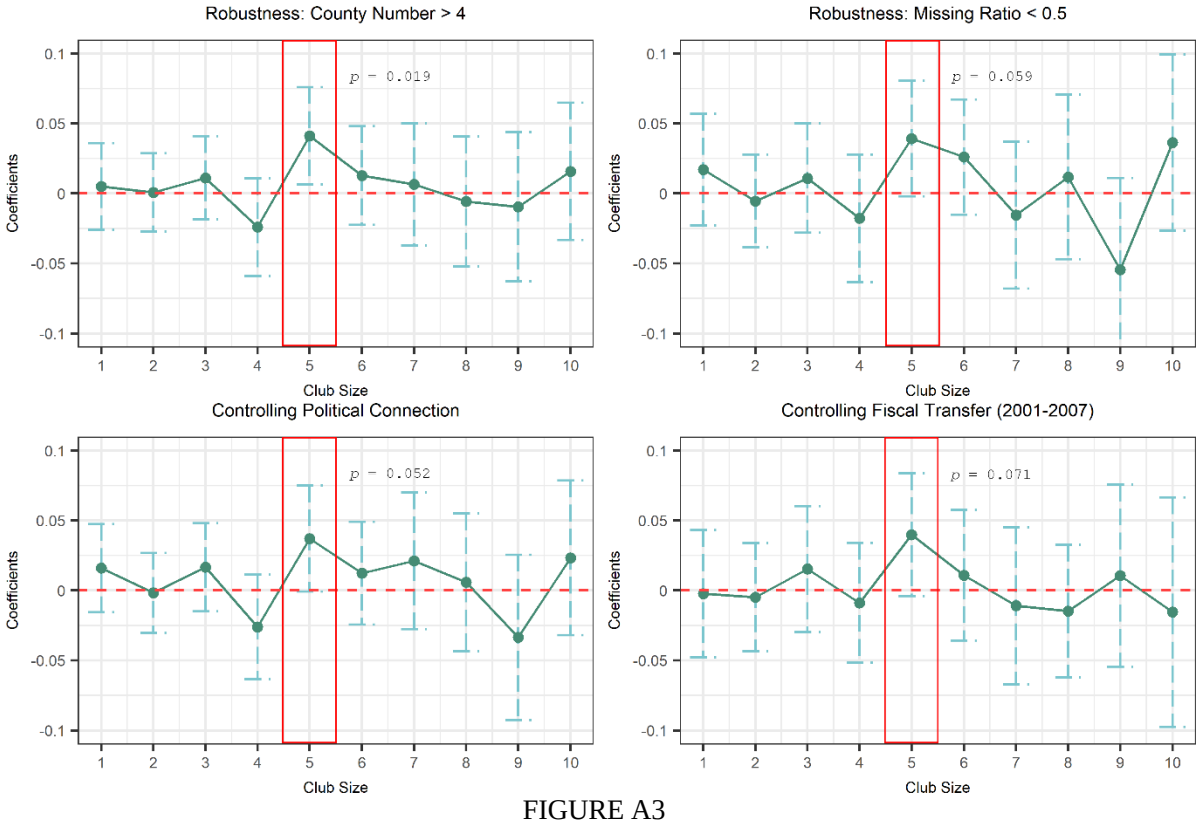

FIGURE A3

Robustness Checks

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The political connection is a dummy that equals 1 if the county party secretary is connected to the prefecture party secretary, where "connected" is defined as sharing the same hometown (prefecture level) and the age difference is larger than 3 years (county secretary is younger), and equals 0 otherwise. The ranks after (including) 11 are used as reference groups.

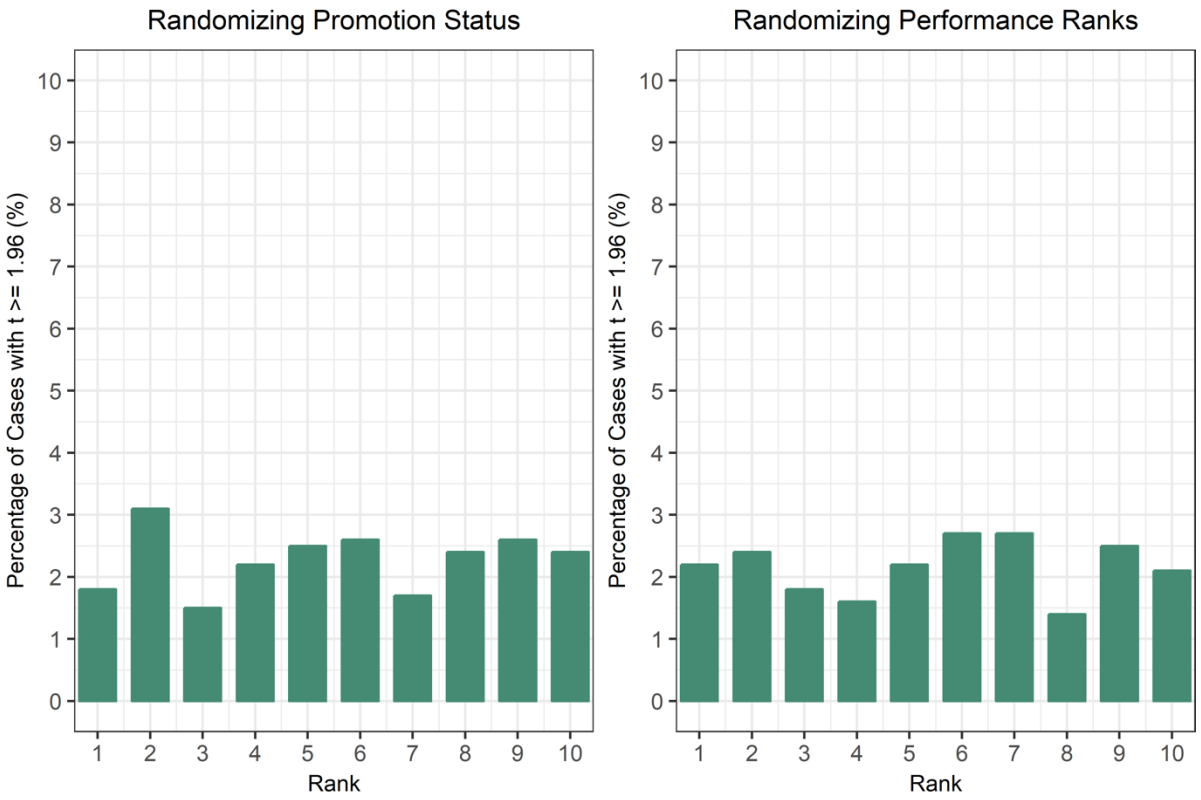

FIGURE A4

Randomization

Notes: In the left figure, we randomly assign the promotion status among party secretaries according to its actual distribution in our sample; in the right figure, we randomly assign performance ranks among party secretaries within each prefecture. We do the randomization and then run the regression following specification (1) 1,000 times. The bars in the figure report the percentage of all 1,000 randomizations for which we can get significant results with $t \geq 1.96$ for each rank.

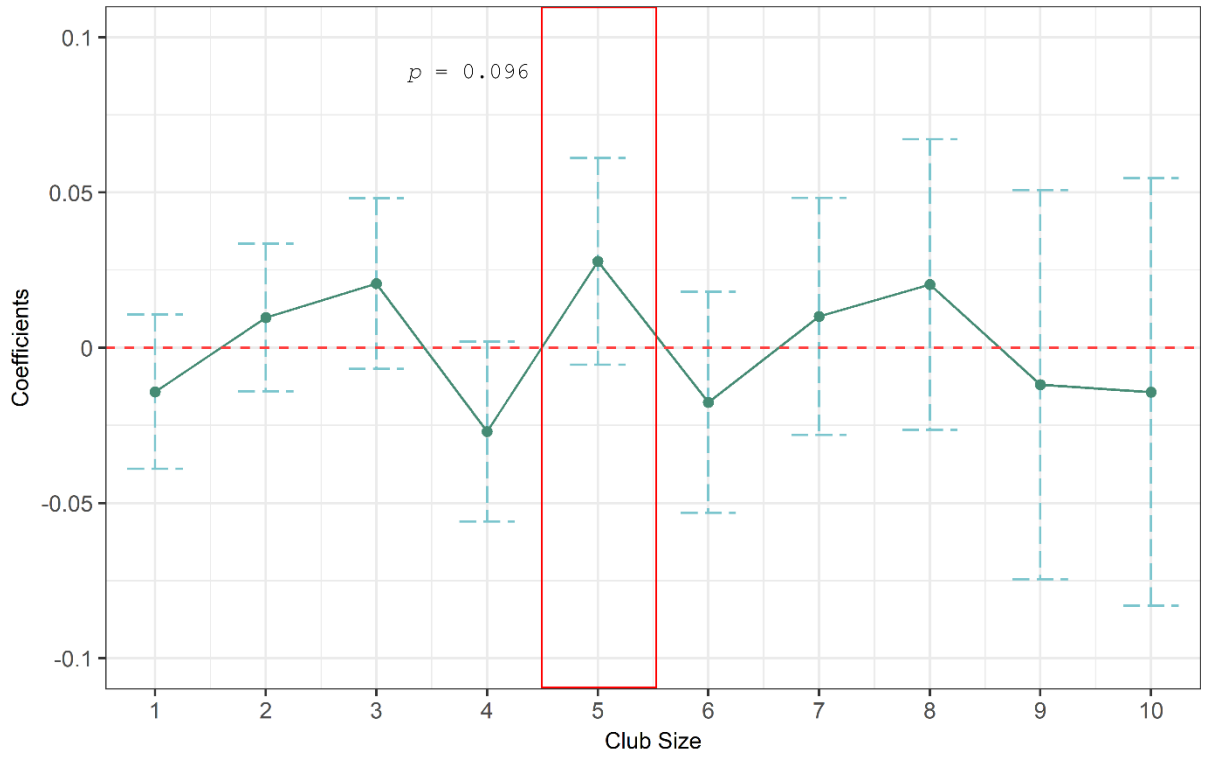

FIGURE A5

De jure Promotion

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. *De jure* promotion is defined as the actual promotion plus the following cases: the county party secretary attains Director of prefectural party committee agencies and governmental agencies, Vice Chairman of the Standing Committee of Prefectural People's Congress, Vice Chairman of the Prefectural People's Political Consultative Conference, Chief Justice of the Intermediate People's Court, Chief Procurator of the Intermediate People's Procuratorate, at the end of his/her term. The ranks after (including) 11 are used as reference groups.

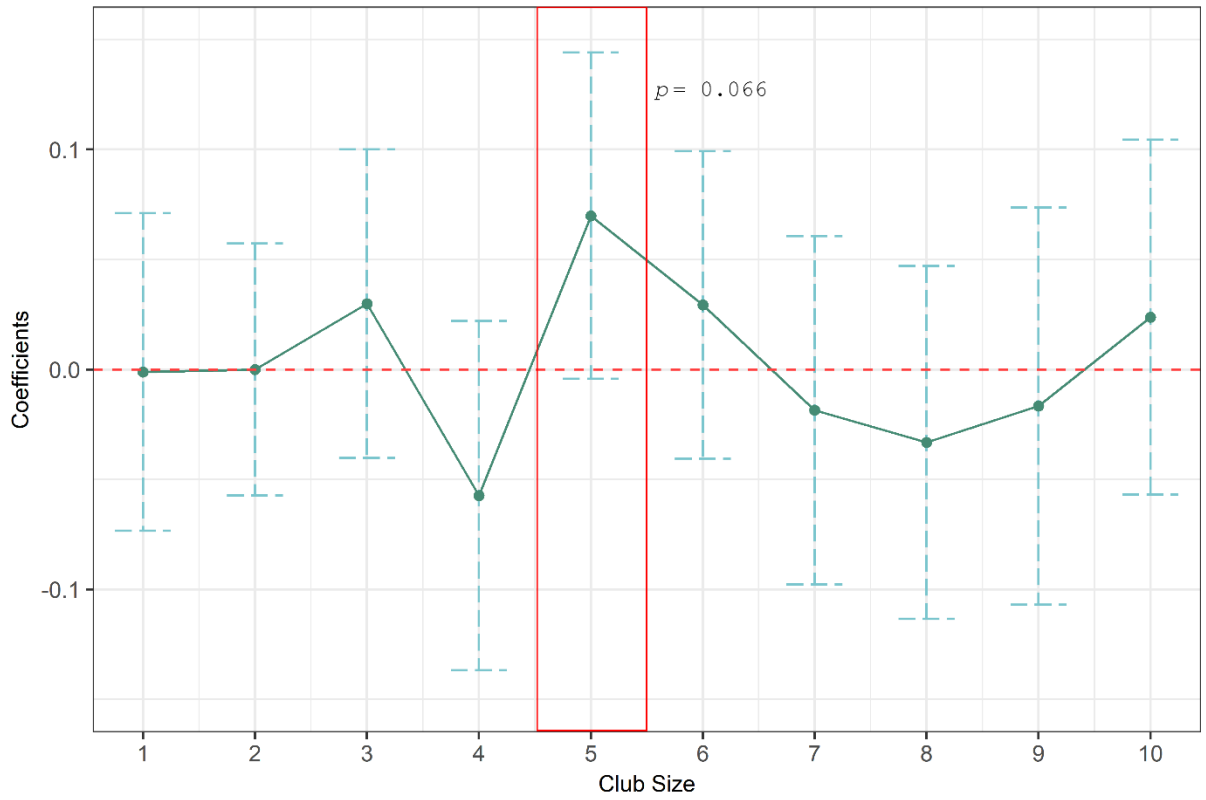

FIGURE A6

Robustness Check based on Low Correlation Subsample

Notes: The Low Correlation Subsample indicates prefectures where the within correlation between counties' initial revenue level and subsequent revenue growth is in [-0.2,0.2]. The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes.

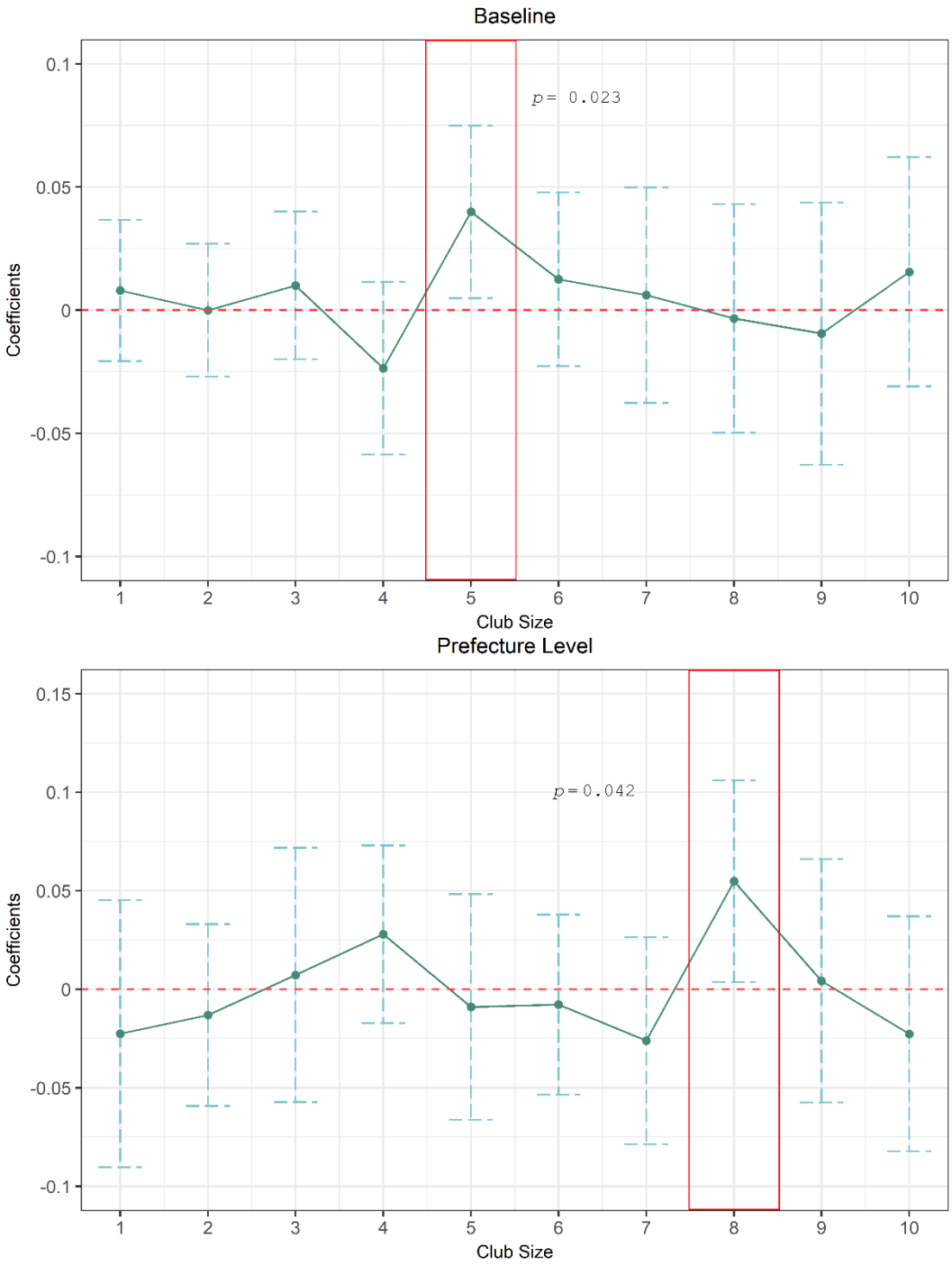

FIGURE A7

County and Prefecture Results with Only the First 10 Ranks

Notes: The horizontal axis corresponds to R_is and the vertical axis corresponds to β. The econometric specification follows equation (1), which controls for officials' personal characteristics (including age, education year and tenure), counties' socioeconomic characteristics (including population density, fiscal revenue share within prefecture, agricultural output (log) and manufacture output (log)), county fixed effects, year fixed effects and prefecture-year fixed effects. The club sizes are indicated by red boxes. The ranks after (including) 16 are used as reference groups. This figure replicates figures 2 and 4 but drops all observations with ranks after. We skip the corresponding results for the provincial level, because in such a restricted subsample, there is insufficient freedom for us to conduct estimation and statistical inference.

Appendix Tables

TABLE A1

Institutional Procedure for County Party Secretary Evaluation

（1）	The representatives from Provincial Organization Department and prefecture leaders (including party secretary, deputy secretaries, and officials from Prefecture Organization Department) form a group to start the evaluation procedure and discuss specific details.
（2）	Democratic recommendations (through public conference and private talks) would be conducted in counties, and the recommended officials would be submitted to prefecture party committee.
（3）	Prefecture party committee would investigate those recommended, especially paying attention to pay attention to officials' virtue, competence, diligence, and performance, and then they nominate the promotion candidates to provincial representatives. Provincial representatives would further investigate those candidates, and then provide investigation feedbacks to prefecture party committee.
（4）	Prefecture party committee and provincial representatives exchange ideas and finally decide the promotion list.
（5）	The promotion list would be announced to public for 7-15 days.
（6）	Then the promoted officials would take office for one year of probation and finally start his/her new position formally.

Notes: This procedure is summarized according to "Regulation on the Selection and Appointment of the Party and Government Leaders"(2014).

TABLE A2

Prefecture- And Province-Level Summary Statistics

Variables	Observations	Mean	Standard Deviation	Data Source
	Prefecture Level			
Promotion dummy	5,526	0.240	0.427	A
Moving average fiscal revenue growth rate	5,167	0.153	0.128	B
Age	5,367	51.691	3.892	A
Years of education	5,311	18.686	2.646	A
Tenure	5,526	2.639	1.611	A
Population density	5,504	0.042	0.218	B
Fiscal revenue share within prefecture	5,512	0.083	0.099	B
Agricultural output (log)	5,514	3.280	1.050	B
Manufacture output (log)	5,514	4.482	1.413	B
	Province Level			
Promotion dummy	526	0.209	0.407	A
Moving average fiscal revenue growth rate	495	0.159	0.086	C
Age	526	59.086	4.227	A
Education year	526	17.909	2.685	A
Tenure	526	2.952	1.899	A
Population density	527	0.041	0.058	C
Fiscal revenue share within prefecture	527	0.032	0.028	C
Agricultural output (log)	527	5.598	1.175	C
Manufacture output (log)	527	7.081	1.278	C

Notes: A: collected by authors; B: China City Statistical Yearbook (*Zhongguo Chengshi Tongji Nianjian*), compiled by Department of Urban Surveys of National Bureau of Statistics; China Statistical Yearbook for Regional Economy (*Zhongguo Quyu Jingji Tongji Nianjian*), compiled by Department of Comprehensive Statistics of National Bureau of Statistics; C: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), compiled by National Bureau of Statistics.

TABLE A3

Promotion Definition

	A party secretary is "promoted" if he/she attains one of the following positions upon the end of term:
County party secretary	Provincial- or national-level position Deputy Secretary, Secretary-General, or Member of the Standing Committee of Prefectural Party Committee Mayor, Vice Mayor, Acting Mayor, Assistant Mayor, or Secretary-General of Prefectural Government Director of Prefectural Party Committee General Office, Minister of Prefectural Party Committee Organization Department, Minister of Prefectural Party Committee Propaganda Department, Minister of Prefectural Party Committee United Front Work Department, Secretary of Prefectural Discipline Inspection Commission, Secretary of Prefectural Politics and Law Committee Chairman of the Standing Committee of Prefectural People's Congress, Chairman of Prefectural People's Political Consultative Conference
Prefecture party secretary	National-level position Deputy Secretary, Secretary-General, or Member of the Standing Committee of Provincial Party Committee Governor, Vice Governor, Acting Governor, Assistant Governor, or Secretary-General of Provincial Government Director of Provincial Party Committee General Office, Minister of Provincial Party Committee Organization Department, Minister of Provincial Party Committee Propaganda Department, Minister of Provincial Party Committee United Front Work Department, Secretary of Provincial Discipline Inspection Commission, Secretary of Provincial Politics and Law Committee
Province party secretary	Chairman of the Standing Committee of Provincial People's Congress, Chairman of Provincial People's Political Consultative Conference Member of the Standing Committee of the Political Bureau of the CPC Central Committee, Member of the Political Bureau of the CPC Central Committee Vice Premier, State Councilor of Central Government

	Secretary of Central Party Committee Secretariat, Minister of Central Party Committee Organization Department, Minister of Central Party Committee Propaganda Department, Minister of Central Party Committee United Front Work Department, Secretary of Central Discipline Inspection Commission, Secretary of Central Politics and Law Committee Chairman of the Standing Committee of National People's Congress, Chairman of National People's Political Consultative Conference

TABLE A4

Performance and Promotion

	Dependent Variable: Promotion Dummy			
Panel A	(1)	(2)	(3)	(4)
Absolute performance rank	0.006***	0.007***	0.007***	0.006**
	(0.002)	(0.002)	(0.002)	(0.002)
Personal characteristics		Yes	Yes	Yes
Socioeconomic characteristics			Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Prefecture -Year FE				Yes
Observations	22,385	17,547	17,376	16,660
R-squared	.451	.526	.527	.666
Panel B	(5)	(6)	(7)	(8)
Normalized performance rank	0.032**	0.034**	0.040**	0.037**
	(0.015)	(0.016)	(0.016)	(0.018)
Personal characteristics		Yes	Yes	Yes
Socioeconomic characteristics			Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Prefecture -Year FE				Yes
Observations	22,130	17,350	17,314	16,660
R-squared	0.451	0.527	0.527	0.666

Notes: Standard errors in parentheses are clustered at the prefecture level. The constant term is included but not reported. Personal characteristics include party secretaries' age, education year and tenure; socioeconomic characteristics include population density, fiscal share in the prefecture, agriculture output (log), as well as manufacture output (log). The performance rank is constructed based on the moving average fiscal revenue growth rate: the values of the absolute rank increase with the rank of the moving average fiscal revenue growth rate within the prefecture, with 1 indicating the lowest; we normalize the absolute rank in the range of [0,1] to get the normalized performance rank. * denotes significance at 10 percent. ** denotes significance at 5 percent. *** denotes significance at 1 percent.

TABLE A5

Promotion Club

	Dependent Variable: Promotion Dummy		
	(1)	(2)	(3)
	County Level	Prefecture Level	Province Level
The first 1 rank	0.008	-0.022	-0.240
	(0.014)	(0.034)	(0.174)
The first 2 ranks	-0.000	-0.011	0.071
	(0.013)	(0.023)	(0.083)
The first 3 ranks	0.010	0.006	0.045
	(0.015)	(0.032)	(0.096)
The first 4 ranks	-0.023	0.029	-0.128
	(0.017)	(0.023)	(0.116)
The first 5 ranks	**0.041****	-0.009	0.022
	(0.017)	(0.028)	(0.084)
The first 6 ranks	0.013	-0.008	0.125
	(0.018)	(0.023)	(0.099)
The first 7 ranks	0.007	-0.024	-0.049
	(0.022)	(0.026)	(0.116)
The first 8 ranks	-0.005	**0.053****	-0.042
	(0.023)	(0.025)	(0.063)
The first 9 ranks	-0.010	0.005	**0.084***
	(0.027)	(0.031)	(0.047)
The first 10 ranks	0.016	-0.024	-0.062
	(0.024)	(0.028)	(0.055)
Personal characteristics	Yes	Yes	Yes
Socioeconomic characteristics	Yes	Yes	Yes
County FE	Yes		
Prefecture FE		Yes	
Province FE			Yes
Year FE	Yes	Yes	Yes
Prefecture -Year FE	Yes		
Province-Year FE		Yes	
Province specific nonlinear year trend			Yes
Observations	16,660	4,858	495
R-squared	0.666	0.497	0.923

Notes: Standard errors in parentheses are clustered at the prefecture level in column (1) and at the province level in columns (2) and (3). The constant term is included but not reported. Personal characteristics include party secretaries' age, education year and tenure; socioeconomic characteristics include population density, fiscal share in the prefecture, agriculture output (log), as well as manufacture output (log). The performance rank is constructed based on the moving average fiscal revenue growth rate. Province-specific nonlinear year trend contains the interactions of province dummies with year (to the power of 1 to 5). The ranks after (including) 11 are used as reference groups. * denotes significance at 10 percent. ** denotes significance at 5 percent. *** denotes significance at 1 percent.

TABLE A6

Missing Values and Ranks

	(1) Missing	(2) Missing
Rank 1	0.004	0.004
	(0.011)	(0.025)
Rank 2	-0.013	0.000
	(0.011)	(0.025)
Rank 3	-0.003	0.013
	(0.012)	(0.025)
Rank 4	-0.001	0.016
	(0.011)	(0.025)
Rank 5	-0.000	0.017
	(0.013)	(0.025)
Rank 6	0.014	0.017
	(0.016)	(0.025)
Rank 7	-0.014	0.003
	(0.017)	(0.024)
Rank 8	0.025	0.017
	(0.019)	(0.024)
Rank 9	-0.002	-0.008
	(0.022)	(0.024)
Rank 10	-0.006	-0.006
	(0.023)	(0.023)
County FE	Yes	Yes
Year FE	Yes	Yes
Prefecture -Year FE	Yes	Yes
Observations	29798	29798
R-squared	0.508	0.508

Notes: Standard errors in parentheses are clustered at the prefecture level. The constant term is included but not reported. In column (1), Rank i indicates the first i ranks, and in column (2), Rank i indicates the $i-th$ rank. * denotes significance at 10 percent. ** denotes significance at 5 percent. *** denotes significance at 1 percent.

Appendix Proofs

Proof of Proposition 1.

Proof. The investigation of the monotonicity of the effort curve takes three steps.

Step 1. FOC. FOC for the agent is:

$$\left[\frac{W}{m}\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ n-k \end{array}\right)\Pi_{\#=n-k}\Phi\left(a_i-a_j\right)\Pi_{\#=k-1}\left(1-\Phi\left(a_i-a_j\right)\right)\right)\right]^{'}=c^{'}\left(a_i\right)$$

We look for symmetric equilibrium, where $a_i^*=a_j^*$, $\Phi\left(a_i^*-a_j^*\right)=\Phi\left(0\right)=\frac{1}{2}$.
To simplify it,

$$\frac{W\phi\left(0\right)}{2^{n-2}}\left[\frac{1}{m}\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ n-k \end{array}\right)\left(n-2k+1\right)\right)\right]=c^{'}\left(a^*\right)$$

$$\Rightarrow\frac{W\phi\left(0\right)}{2^{n-2}}\left[\frac{1}{m}\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)\right]=c^{'}\left(a^*\right)$$

.

Step 2. Monotonicity of $\Delta\left(m\right)$.

Denote $\Delta\left(m\right)=\frac{1}{m}\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)$, then:

$$\Delta\left(m\right)-\Delta\left(m+1\right)=\frac{1}{m}\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)-\frac{1}{m+1}\sum_{k=1}^{m+1}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)$$

$$\Rightarrow=\frac{1}{m(m+1)}\left[\left(m+1\right)\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)-m\sum_{k=1}^{m+1}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)\right]$$

$$\Rightarrow=\frac{1}{m(m+1)}\left[\sum_{k=1}^{m}\left(\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)\right)-m\left(\left(\begin{array}{c} n-1 \\ m \end{array}\right)\left(n-2m-1\right)\right)\right]$$

Step 3. Monotonicity of $g\left(k\right)$.

Denote $g\left(k\right)=\left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)$, then, for $n\geq 2$:

$$\begin{aligned} g\left(k\right)-g\left(k+1\right) &= \left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1\right)-\left(\begin{array}{c} n-1 \\ k \end{array}\right)\left(n-2k-1\right) \\ &= \left(\begin{array}{c} n-1 \\ k-1 \end{array}\right)\left(n-2k+1-\frac{n-k}{k}\left(n-2k-1\right)\right) \end{aligned}$$

$$g(k) - g(k+1) = \frac{\binom{n-1}{k-1}}{k}\left((n-2k)k + k - (n-k)(n-2k-1)\right)$$
$$= \frac{\binom{n-1}{k-1}}{k}\left(n - (n-2k)^2\right)$$

Therefore, $g(k = m-1) > g(m)$ if and only if $\frac{n-\sqrt{n}}{2} + 1 < m < \frac{n+\sqrt{n}}{2} + 1$. Since $n \geq 2$, $1 \leq k < n$, g decreases in k when $n \leq 4$. g first increases, then decreases, and then increases in k again, when $n \geq 5$. It is easy to show that, at its minimal, $g < 0$. And $g(n) < 0$.

Back to $\Delta(m) - \Delta(m+1)$, it essentially compares the average value of first m terms of $\binom{n-1}{k-1}(n-2k+1)$ and the value of $\binom{n-1}{k-1}(n-2k+1)$ at $k = m+1$. Consequently, $\Delta(m)$ first increases and then decreases, thus the hump shape when $n \geq 5$.

□

Proof of Proposition 2.

Proof. Denote the optimal club size for effort as m_{club} . Then $s(m_{club}) < s(m_{club}+1)$, while $a(m_{club}) > a(m_{club}+1)$. It is then easy to see that $m_{club} < m^*$ if $\beta[s(m_{club}+1) - s(m_{club})] > \alpha n[a(m_{club}) - a(m_{club}+1)]$, and $m_{club} = m^*$ otherwise.

□

Proof of Proposition 3.

Proof. The first part of the proposition is straightforward. When β is sufficiently large, i.e., the weight of survival concerns are significant, the principal biases towards large club size. To see the second part, we only need to compare the principal's choice between a tournament, and the club where $m = 2$. When the total agent population gets larger, increasing the club size from one to two does not distort working incentives of the non-cronies, while the benefit of discretionary power remains. Therefore for sufficiently large population, $m = 2$ is a better choice than $m = 1$.

□

Proof of Corollary 1.

Proof. The crony shirks because he knows he has better chances to be promoted, once in the club. The non-cronies shirk more because they know that, even if they make it to the club, they have no chances to be promoted, should another crony be in the club. We use a 3-agent case for illustration here. It is easy to extend to n-agent case.

Denote the crony agent as 1, and the non-connected $2, 3$. Denote equilibrium effort as $a_{c,m}$ and $a_{nc,m}$. Suppose $m = 2$. For the connected agent 1: $\max_{a_i} p(club) W - c(a_i)$, $p(club) = 1 - \Phi(a_j - a_1)\Phi(a_i - a_1)$. FOC gives: $2W\Phi(a_{nc,2} - a_{c,2})\phi(a_{nc,2} - a_{c,2}) = c'(a_{c,2})$

For the non-connected agent i: $\max_{a_i} p(1\ ranks\ bottom)\frac{W}{2} - c(a_i)$, $p(1\ ranks\ bottom) = \Phi(a_j - a_1)\Phi(a_i - a_1)$. FOC gives: $\frac{W}{2}\phi(a_{nc,2} - a_{c,2})\Phi(a_{nc,2} - a_{c,2}) = c'(a_{nc,2})$

Lastly the pdf of noise is symmetric, $\phi(a_{nc} - a_c) = \phi(a_c - a_{nc})$, we have $a_{c,2} > a_{nc,2}$.

Now suppose $m = 1$, which is a standard tournament. Base on previous results, $\frac{(n-1)W\phi(0)}{2^{n-m-1}} = c'(a^*)$, plug in $n = 3, m = 1$ to get: $W\phi(0) = c'(a_c^*)$.

Notice that $\Phi(a_{nc,2} - a_{c,2}) < \Phi(0) = \frac{1}{2}$, and $\phi(a_{nc,2} - a_{c,2}) < \phi(0)$ (distribution is symmetric), we have the proposition.

□

Proof of Proposition 4.

Proof. Without loss of generality assume the quadratic cost to be $c(a) = \frac{1}{2}a^2$. Recall the FOC: $\frac{W\phi(0)}{2^{n-2}}\left[\frac{1}{m}\sum_{k=1}^{m}\left(\begin{pmatrix} n-1 \\ k-1 \end{pmatrix}(n-2k+1)\right)\right] = c'(a^*)$. In a tournament, $a^* = \frac{W\phi(0)}{2^{n-2}}(n-1)$, total effort $e_{Tournament} = na^* = \frac{W\phi(0)}{2^{n-2}}(n-1)n$.

In a crony-ful environment, when n is large, the optimal club size coincides with the size with optimal effort. This is because a crony is selected anyway. When $n > 5$, we know that a two-agent club is better than tournament, in terms of individual effort. In this case, if we compare the total effort between a two-agent club and the tournament, we have:

$$\begin{aligned} e_{2-agent\ club} &= (n-1)\frac{W\phi(0)}{2^{n-2}}\left[\frac{1}{2}\sum_{k=1}^{2}\left(\begin{pmatrix} n-1 \\ k-1 \end{pmatrix}(n-2k+1)\right)\right] \\ &= (n-1)\frac{W\phi(0)}{2^{n-2}}\left[\frac{1}{2}(n-1)(n-2)\right] \end{aligned}$$

Therefore, $e_{2-agent\ club} - e_{Tournament} = \frac{W\phi(0)}{2^{n-1}}[(n-1)(n-2) - 2n] = \frac{W\phi(0)}{2^{n-1}}(n^2 - 5n + 2) > 0$, when $n \geq 5$, thus completes the proof.

□