

# Political turnover and economic performance: the incentive role of personnel control in China

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Received 14 May 2003; received in revised form 23 June 2004; accepted 23 June 2004

Available online 27 September 2004

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## Abstract

In this paper, we provide empirical evidence on the incentive role of personnel control in post-reform China. Employing the turnover data of top provincial leaders in China between 1979 and 1995, we find that the likelihood of promotion of provincial leaders increases with their economic performance, while the likelihood of termination decreases with their economic performance. This finding is robust to various sensitivity tests. We also find that the turnover of provincial leaders is more sensitive to their average performance over their tenure than to their annual performance. We interpret these empirical findings as evidence that China uses personnel control to induce desirable economic outcomes. Our study adds some basic evidence to a growing theoretical literature emphasizing the role of political incentives of government officials in promoting local economic growth.

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*JEL:* H11; H7; J63; P3

*Keywords:* Political turnover; Economic performance; Personnel control

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## 1. Introduction

In the course of China's remarkable economic growth since the late 1970s, local government officials have been playing an active role in building local infrastructure,

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encouraging local businesses and attracting foreign investment. The strong pro-business role of Chinese local officials stands in stark contrast with the rent-seeking behavior (the “grabbing hand”) of local officials in other transitional and developing countries (Krueger, 1974; Frye and Shleifer, 1997).

Two principal explanations have been put forward for why Chinese officials behave so differently. The first, based on what has come to be known as “market-preserving federalism”, argues that the pro-business incentives given to Chinese local officials are a result of a policy of fiscal decentralization and high-powered intergovernmental fiscal revenue-sharing contracts (Oi, 1992; Montinola et al., 1995; Qian and Weingast, 1997; Weingast, 1995; Mckinnon, 1997).<sup>1</sup> Employing provincial-level data, Jin et al. (2000) find empirical evidence, which supports the fiscal decentralization view.

However, a more recent explanation emphasizes the role of political incentives or career concerns on the part of local officials in China. According to this view, the readiness of the Chinese central government to reward and punish local officials on the basis of their economic performance motivates them to promote the local economy (Blanchard and Shleifer, 2001). The reward and punishment mechanisms are made possible within the multidivisional-form (M-form) structure of the Chinese economic system, which allows yardstick competition among local officials (Qian and Xu, 1993; Maskin et al., 2000). Although anecdotal evidence shows that Chinese cadres are evaluated in accordance with their economic performance (Whiting, 2001), no systematic body of empirical evidence has been presented on the relationship between the career mobility of Chinese local officials and their economic performance.

In this paper, we provide empirical evidence on the relationship between the turnover of Chinese provincial leaders and their economic performance in the post-reform period. Using the ordered probit model, we find that the likelihood of promotion of provincial leaders increases with their economic performance while the likelihood of termination decreases with their economic performance. This finding is robust to various sensitivity tests. We also find that the turnover of provincial leaders is more sensitive to their average performance over their tenure than to their annual performance. We interpret these empirical findings as evidence that China uses personnel control to induce desirable economic outcomes.

Our paper draws extensively on the growing empirical literature on the political incentives of government officials both in the Chinese context and in general. In a study of the comparative advantage of M-form vs. U-form, Maskin et al. (2000) find that the political status of a Chinese province (measured by the number of Central Committee members) is correlated with the provincial economic ranking. However, they do not establish a direct link between the career mobility of provincial leaders and their economic performance.<sup>2</sup> In a different political setting, Besley and Case (1996) show that the

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<sup>1</sup> Some studies relate the positive incentives given to local officials to a number of other economic factors, such as the emergence of local government ownership as a credible institutional device to avoid state predation (Che and Qian, 1998) and inter-regional competition in the product and capital markets (Li et al., 2000; Qian and Roland, 1998).

<sup>2</sup> Also, their simple regression may be subject to the omitted variables bias.

economic performance of a state relative to neighboring states has a positive impact on the re-election prospects of US governors.<sup>3</sup>

Our paper is also closely related to the empirical literature on the career concerns of firm managers. Both our methodology and findings are similar to those of studies on career concerns of managers in western corporations (Murphy and Zimmerman, 1993; Weisbach, 1988).<sup>4</sup> In fact, the evidence presented in this paper supports the characterization of the Chinese economy as being run in such a way that provincial leaders act as middle managers of a large corporation and their internal career mobility, which is controlled by headquarters, is closely tied to their economic performance.

Our paper also has a bearing on a study by Groves et al. (1995). They show that, in the 1980s, the Chinese industrial bureaus selected managers of state-owned enterprises (SOEs) on the basis of firm performance. Since Chinese SOE managers are semi-officials situated in the bureaucratic hierarchy, this manager selection rule reflects a general shift in personnel control since the late 1970s from the political criterion to the performance criterion. While their evidence indicates that local governments were performance-conscious when selecting SOE managers, our finding about the incentive role of personnel control at the provincial level actually offers an explanation for why local governments acted in this way.

The remainder of the paper is organized as follows. The following section briefly describes the institutional background pertaining to the personnel control system in China, especially during the reform period 1979–1995. Section 3 outlines the econometric specification and puts forward our main hypothesis to be tested. Section 4 describes the data. Section 5 presents empirical results. Section 6 conducts some sensitivity tests. Section 7 concludes.

## 2. Internal career mobility and personnel control in China

China is a unitary state and its political system is broadly composed of five layers of state administration: the center (*zhongyang*), provinces (*sheng*), prefectures (*diqu*), counties (*xian*) and townships (*xiang*).<sup>5</sup> The Central Committee of the Chinese Communist Party (CCP) acts as the headquarters of this “multidivisional” system, which ultimately controls the mobility of government officials within the system. This highly centralized structure of personnel control remains intact even to this day.

Provinces are the second level of China’s political hierarchy. As of today, excluding Taiwan, Hong Kong and Macau, China has 31 provincial units—4 centrally administrated cities (Beijing, Shanghai, Tianjing and Chongqing), 22 provinces and 5 autonomous regions.<sup>6</sup> A province ranks at the same level as a ministry in the central government. The top position at the provincial level is that of the provincial party

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<sup>3</sup> In a related study, Besley and Case (1995) examine how re-election probabilities of US gubernatorial officials affect their choices of economic policy.

<sup>4</sup> See also a comprehensive survey by Murphy (1999).

<sup>5</sup> See Lieberthal (1995) for a comprehensive description of the Chinese political system.

<sup>6</sup> We will call all provincial-level units provinces in the rest of the paper.

secretary, followed immediately by the provincial governor. This reflects the dual presence of the communist party and government organs at each level of China's political hierarchy.<sup>7</sup>

China began its far-reaching economic reforms in 1978. These reforms have allowed provinces to play a much more important role in economic management than the ministries at the center which were traditionally in charge of planning and coordination, reflecting the strategic importance of provincial leaders (Qian and Xu, 1993; Huang, 1996). Moreover, reforms have also empowered provincial leaders with the ultimate authority in allocating economic resources in their provinces. Their political and economic decisions greatly influence the economic performance of these provinces. For this reason, they are also held accountable for the corresponding results arising from their decisions. To a degree, provincial leaders are just like the middle-level managers in a multidivisional corporation who are responsible for their divisional performance.

China's reform of its personnel control system coincided with the beginning of its economic reforms. A crucial turnaround in personnel management was the wholesale change in the evaluation criteria for government officials. Political conformity, which was the only important pre-reform criterion for promotion, gave way to economic performance and other competence-related indicators. Although political loyalty remains important, three new elements were introduced into the evaluation process. Officials had to be of a young age, have good education and demonstrate expertise in administrative management. Above all, local economic performance became the most important criterion for higher-level officials assessing lower-level officials. One revealing indication of the importance of economic performance for local officials is their "obsession" with economic ranking among peers. Government reports or provincial yearbooks often contain detailed information on the relative rankings of the provincial performance, ranging from GDP growth, to steel production, to miles of road constructed.

In 1980, for the first time in its history, the CCP officially proposed the abolition of the lifetime appointment of party and government officials and installed a mandatory retirement system. Under this new regime, provincial leaders are required to retire at the age of 65 if they are not promoted to higher positions in the central government. According to the new policy, many senior provincial leaders were urged to leave office to make way for younger people. The reform, which was implemented in 1982, led to two large waves of retirement in 1983 and 1985. However, like many other policies in China, the mandatory retirement age was not strictly enforced, and this remained the case even in 1995, the last year of our sample period.

The economic and political reforms have made provincial leaders operate within a well-defined career structure inside the Chinese political hierarchy. The promotion opportunities that lie ahead for provincial secretaries include membership of the State Council, the vice-premiership, the premiership and membership of the Politburo or the Politburo Standing Committee. Provincial governors, at one level lower than party secretaries, can also move up to the level of provincial party secretary or to equal-ranking positions in

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<sup>7</sup> Because the governance structures at all levels are similar, the basic observations we obtain from provincial-level data may also apply to lower levels. Casual observations seem to support this conception (Whiting, 2001).

ministries or commissions at the center. A promotion in this paper means a move by a provincial leader up to one of these positions.

Apart from promotions, terminations, including retirement and demotions, can also serve as an incentive mechanism. Typically, provincial leaders do not retire in the full sense immediately after leaving office unless there are exceptional circumstances, such as poor health. Before retiring officially, they are often assigned, as a transition, to an honorary yet virtually powerless position, such as director of the provincial People's Congress or chairman of the provincial People's Political Consultative Conference. Some are given honorary positions on the National People's Congress or the National People's Political Consultative Conference. Whatever gloss may be put on it, the loss of power is what marks the end of an official's political career. Therefore, in this paper, we define *retirement* as any departure from secretaryship or governorship that is not followed by a lateral move or promotion. Although demotion is different from retirement, we have not been able to identify many demotions in the data. Publicly announced demotions were very rare and a seemingly routine retirement may well disguise a dismissal. Because of the subtle difference between retirement and demotion, we group them together and call both *terminations*.

It is worth noting one peculiarity in the career profiles of provincial leaders. Unlike corporate managers or politicians in western societies, Chinese government officials have few options outside the internal political labor market. If a provincial leader is separated from the government hierarchy, there is virtually no avenue for her/him to find a job elsewhere.<sup>8</sup> In this sense, it may be appropriate to treat the Chinese political hierarchy as a single internal labor market without outside options. The lock-in effect, coupled with the huge difference in terms of personal benefits between staying in power and relinquishing power, greatly reinforces the incentive for Chinese officials to hold onto their power.<sup>9</sup>

To summarize, the following organizational features of the Chinese personnel control system are important for the purposes of this study. First, personnel control is centralized in the hands of the central government and the economic performance of provincial leaders is a crucial indicator in personnel evaluations. Second, the M-form structure of the Chinese economy makes each provincial leader's performance individually distinguishable and comparable and thereby allows for a sensible link between performance and turnover. Third, government officials move up in the internal political labor market and there is virtually no outside opportunity. Therefore, their concerns about their prospect of promotion and termination become a very important incentive mechanism to motivate provincial leaders to build up the provincial economy.

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<sup>8</sup> This statement is valid for the sample period we study in this paper. Things have begun to change since the mid-1990s as China's private sector, relatively free from the Party's control, has grown into a large employer in the labor market.

<sup>9</sup> Terminated provincial leaders may hold leading positions in the People's Congress or People's Consultative Conference and they can retain certain privileges, such as having secretaries and cars. But since these positions carry no direct executive power, terminated officials have lost the major source of benefits associated with such power.

### 3. Econometric specification

Our aim in this paper is to examine the incentive role of personnel control in China by exploring the link between political turnover and economic performance. Given the fact that the crucial sources of career concerns for Chinese provincial leaders are the prospects of promotion and termination, a natural approach is to examine directly how these turnover prospects relate to the economic performance achieved by leaders while they are in the post.

We employ the ordered probit model to examine the probability of promotion and termination for provincial leaders. Suppose that the central government gives each provincial leader an evaluation score,  $y^*$ ,<sup>10</sup> every year, and makes promotion and termination decisions based on this score. However, we do not observe this score. We only observe the turnover of a provincial leader, or the variable  $y$ , which equals 0 for a termination, 1 for remaining at the same level (including lateral moves as well as staying in the same position) and 2 for a promotion. Assume that the latent evaluation score  $y^*$  is a linear function of our independent variables  $x$ , or  $y^* = x\beta + \epsilon$ , where  $\beta$  is a vector of coefficients and  $\epsilon$  is assumed to follow a standard normal distribution. Define  $\alpha_1$  and  $\alpha_2$  as the two cutoff points of  $y^*$ , which the turnover decisions are based on. More specifically, a provincial leader is terminated ( $y=0$ ) if  $y^* \leq \alpha_1$ , stays at the same level ( $y=1$ ) if  $\alpha_1 < y^* \leq \alpha_2$  and is promoted ( $y=2$ ) if  $y^* > \alpha_2$ . Following the notation in Wooldridge (2002), the ordered probit model is expressed as

$$\text{Prob}(y_i = 0|x) = \Phi(\alpha_1 - x\beta), \quad (1)$$

$$\text{Prob}(y_i = 1|x) = \Phi(\alpha_2 - x\beta) - \Phi(\alpha_1 - x\beta), \quad (2)$$

$$\text{Prob}(y_i = 2|x) = 1 - \Phi(\alpha_2 - x\beta), \quad (3)$$

where  $\Phi$  is the cumulative standard normal distribution function.

Since we are more interested in the marginal effects of  $x$  on the probability of promotion and termination than the coefficients  $\beta$  themselves, we need to transform the estimated  $\beta$  into the marginal effects. Define the probability of termination, remaining at the same level and promotion as  $p_0$ ,  $p_1$  and  $p_2$ . Following Wooldridge (2002, p. 506), the marginal effects for the  $k$ -th variable are calculated according to the following formula:

$$\partial p_0 / \partial x_k = -\hat{\beta}_k \phi(\hat{\alpha}_1 - x\hat{\beta}), \quad (4)$$

$$\partial p_1 / \partial x_k = \hat{\beta}_k \left[ \phi(\hat{\alpha}_1 - x\hat{\beta}) - \phi(\hat{\alpha}_2 - x\hat{\beta}) \right], \quad (5)$$

$$\partial p_2 / \partial x_k = \hat{\beta}_k \phi(\hat{\alpha}_2 - x\hat{\beta}), \quad (6)$$

<sup>10</sup> To simplify notation, we ignore the subscript  $i$  for a leader and  $t$  for a year.

where  $\phi$  is the standard normal density function and the variables with hats are estimated parameters from the model. In the empirical section, we report the coefficients for variables, but interpret results by calculating these marginal effects.

The key variable in  $x$  is the economic performance of a province. In this paper, we use the provincial GDP growth as the measure of provincial economic performance. As introduced in more detail in Section 5, we use both the annual growth rate and the weighted average growth rates during a leader's tenure as performance measures. Using these performance measures, our main hypothesis is as follows.

**Hypothesis 1.** The probability of promotion (termination) for provincial leaders increases (decreases) with the provincial economic performance.

Besides the GDP growth rate, the characteristics of provincial leaders may affect their likelihood of promotion and termination. Provincial leaders' personal attributes such as education, age and tenure of office are included in our estimations to control their effects on turnover.<sup>11</sup> Education, an indicator variable that equals one for leaders with college education and zero otherwise, measures a leader's human capital, and thus we expect it to have a positive (negative) effect on promotion (termination). Age has become a critical variable determining turnover, especially terminations after the age-based retirement rule was implemented in 1982. To capture the potential nonlinear effect of age on the probability of turnover, and in particular the effect of the 65-years-of-age retirement rule, we add a dummy variable "age65", which equals one if the leader is 65 or older and 0 otherwise. We also control tenure in the regressions, which measures how many years a leader has been in the post.

Provincial leaders' connections with the central government could also affect the likelihood of turnover. A provincial leader's experience in the central government may allow her/him to maintain stronger connections with the center and better knowledge of the workings of central appointment procedures, which will result in better turnover prospects. The central experience can also help the leader cultivate informal connections with central leaders who can influence personnel evaluations.<sup>12</sup> Although connection with the center is so important, to the best of our knowledge, no empirical study has been undertaken that directly links this factor to the career mobility of provincial leaders. We will include central connection in our empirical analysis to examine the effect of political connections on career mobility. The central connection variable is an indicator that equals one for leaders having previous experience or holding joint-appointment in the central government, and equals zero otherwise.

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<sup>11</sup> Given the fact that there is a time lag between the steps taken by provincial leaders and the results of their efforts in the form of economic growth, we match provincial GDP growth with leaders in the following way: the current year's provincial GDP growth rate applies to a leader if he/she is promoted/terminated after July of this year; otherwise, the previous year's GDP growth rate applies as the performance measure.

<sup>12</sup> Local officials' connections with the central government have attracted a lot of attention in the literature of the Chinese political economy (Huang, 1996; Jin et al., 2000). It is believed that provincial leaders with prior or current central experience tend to have more attachment to the center and to be thereby more compliant with central policies. Alternatively, the central experience may also indicate a lack of local knowledge, which may have a negative effect on economic performance.

Our regressions also take into consideration the effect of both provincial characteristics and cyclical policy shocks common to all provinces.<sup>13</sup> The level of development of a province could affect the career prospects of its leaders. We use the lagged provincial per capita GDP to control for this potential effect. The provincial location could also matter in a leader's likelihood of promotion. For example, starting from 1979, the central government introduced a variety of preferential economic policies that favor coastal provinces, such as Guangdong and Fujian. One may wonder whether the central government has a special preference towards the leaders in those coastal areas. In order to control for the potential bias of turnover decisions in favor of certain areas, we include a set of provincial indicators in  $x$ .

Evidence shows that central policies regarding personnel management change over time. For example, our data show that there were two large waves of retirement in 1983 and 1985 after the central government implemented the mandatory retirement rules (see Section 4). There is also a cyclical pattern in that many personnel changes occur around the time of the party congress and people's congress held every 5 years. To control for the effect of policy changes over time and political cycles, we include a set of year indicators in estimating the ordered probit model.<sup>14</sup>

To summarize, we have the following control variables in the ordered probit model that estimates the effect of economic performance on turnover: the leader's age, age65, education, tenure, a central connection indicator, the lagged provincial per capita GDP, and a whole set of provincial and year indicators.

#### 4. Data

The data used in this study cover 254 provincial leaders (provincial party secretaries and governors) who served in 28 Chinese provincial units from 1979 to 1995.<sup>15</sup> Information on these leaders is compiled from two books published in Chinese: *Who's Who in the Chinese Communist Party* (1997) and *The Documentation of Administration in the People's Republic of China* (1996). The dataset contains detailed personal information about these leaders, including their age, education and work experience prior to the current appointment, with special note taken of whether they have ever held a position in the central government. The data also track down the month and year in which they took and/or left office and the nature of the turnover—promotion, lateral moves, staying at the same position or retirement. Economic performance data come from the relevant issues of the China Statistical Yearbook.

Some leaders may hold multiple positions at different times, or even simultaneously. For example, 37 provincial governors were promoted to party secretaryship during the

<sup>13</sup> We are very thankful to an anonymous referee for making this suggestion.

<sup>14</sup> Controlling for both cyclical and provincial effects provides us with a difference-in-difference estimate of the effects of performance on the likelihood of turnover. It also helps address the concerns about the effects of performance relative to national or provincial benchmarks on the probability of turnover.

<sup>15</sup> Two provincial units, Tibet and Hainan, are excluded from the sample because Tibet has a very special policy status while Hainan is a spin-off from Guangdong province, only becoming a separate province in 1988. In any event, including Tibet and Hainan in the sample does not change the qualitative results.

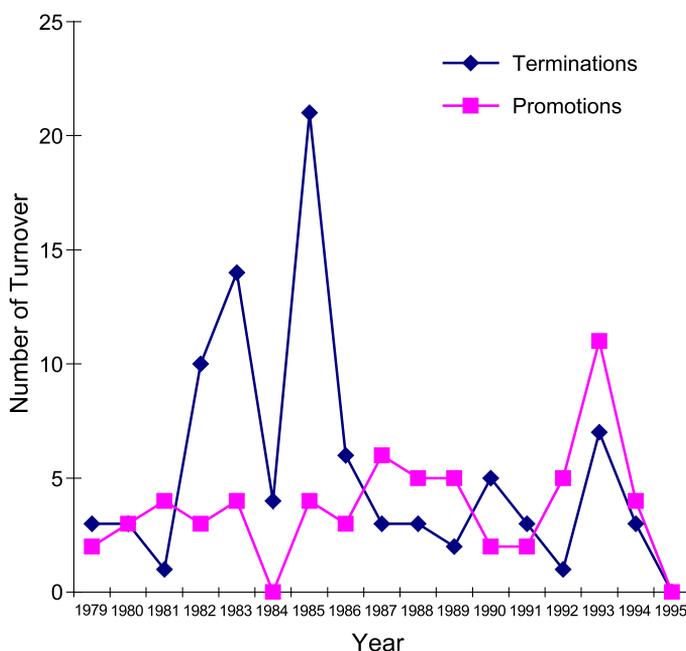


Fig. 1. The time trend of provincial official turnover 1979–1995.

sample period. These party secretaries are treated as different persons from the time of their promotion, because the promotion has already reflected their past performance and any future evaluations need to be based on their performance in the new job. Ten party secretaries were jointly appointed as governors in the same province. We count them as party secretaries since this reflects their real political rank. In four instances, a party secretary or governor moved laterally to another province. Again, we treat them as different persons once the lateral moves have occurred. In total, we have 864 leader-year observations with complete information.

In order for us to see the disciplinary and incentive roles played by centralized personnel control, the turnover in this “internal labor market” needs to be sufficiently frequent. This is indeed the case.<sup>16</sup> More than 70% of leaders in our sample experienced turnover in the sample period. The average annual turnover rate is more than 20%, which is very close to that of U.S. top executives (generally around 20%) documented in Denis and Denis (1995) and Warner et al. (1988).<sup>17</sup>

To examine the trend of the turnover rate, we plot the frequencies of both promotions and terminations for each year in Fig. 1. As seen from the figure, the termination rate is more

<sup>16</sup> Another necessary condition is that the central government has the ultimate authority to appoint or remove provincial leaders. The authority of the center is beyond any doubt, since the political system in China is highly centralized.

<sup>17</sup> Following Denis and Denis (1995), this rate is defined as the total turnover number divided by the total number of province-years in the sample. Since each province has two top leaders, we double the total number of province-years to calculate the overall annual turnover rate.

volatile than the promotion rate. There were two large waves of retirements in 1983 and 1985 after the central government implemented the mandatory retirement rules. Many provincial secretaries and governors were urged to step down during that period. Compared to retirement, the incidence of promotion was relatively stable, around four incidences per year.

An important variable for the study of turnover is the age of provincial leaders. Table 1 shows that the average age of provincial leaders is about 60.4 years, varying from 43 to 75 years. To examine the correlation between turnover and age, we describe the distribution of turnover by age group for both the whole sample and the post-1985 subsample in Table 2. There are three categories of turnover: promotion, termination and remaining at the same level (including staying in the same position and lateral moves). Note first that, even though there are a significant number of provincial leaders younger than 50, none of them were promoted or terminated below the age of 50. The majority of promotion cases were leaders between the ages of 50–64 for both the whole sample and the post-1985 subsample. Terminations are more evenly distributed, but peak at the ages of 65–67.

In the study of terminations, we need to make sure that at least some of the terminations are disciplinary terminations rather than normal retirements, in particular for the post-1985 sample. Comparing the whole sample with the post-1985 subsample (Table 2), we can see that forced retirement at the age of 65 indeed has a significant role. No provincial leaders were older than 68 in the post-1985 subsample. Moreover, in the post-1985 subsample, a significant number of terminations happened at exactly the age of 65 (25% of the termination cases). However, the age of retirement rule was still not strictly enforced. Even in the post-1985 subsample, for the group of leaders at age 65 or above, there are more cases of leaders remaining at the same level (24 cases) than terminations (21 cases). Two leaders were even promoted at the age of 66. Examining the termination cases only, a

Table 1  
Summary statistics of variables

Variables	N	Mean	Standard deviation	Min	Max
Promotion	864	0.075	0.264	0	1
Termination	864	0.103	0.304	0	1
Age	864	60.37	5.82	43	75
Age65	864	0.250	0.433	0	1
Education (college=1, lower=0)	864	0.618	0.486	0	1
Central connection	864	0.234	0.423	0	1
Tenure	864	3.032	2.115	1	12
Second term indicator (tenure>5)	864	0.082	0.275	0	1
Provincial annual GDP growth	864	0.104	0.060	-0.159	0.504
Average GDP growth	864	0.098	0.045	-0.159	0.296
Lagged provincial per capita GDP (1-year lag) (1000 yuan)	864	0.950	0.870	0.194	6.939

The observation unit is provincial leader-year. Promotion is an indicator variable that equals one if a provincial leader (the provincial party secretary or governor) is promoted and zero otherwise. Termination includes both retirement and demotion for provincial leaders. It equals 1 if termination occurs and 0 otherwise. Age65 equals 1 if a leader is 65 or older and 0 otherwise. Central connection is 1 if the leader has previous working experience or currently holds a joint appointment in the central government and 0 otherwise. Tenure is the number of years a leader has been in the post. Second term indicator equals 1 if the leader has been in the post for more than 5 years and 0 otherwise. Average GDP growth rate is the GDP growth rate averaged over the tenure of a provincial leader. All GDP measures are calculated at 1980 constant prices.

Table 2  
The frequency of political turnover by age

Age	Whole sample			Post-1985 subsample		
	Promotion	Termination	Same level	Promotion	Termination	Same level
40–49			35			23
50–59	28	5	296	24	3	229
60	8	1	44	7	1	40
61	4	2	47	4	2	37
62	3	4	52	3	2	35
63	7	6	49	3	3	24
64	5	4	48	2	2	23
65		12	42		8	15
66	5	13	28	2	7	7
67	2	13	21		3	2
68	1	9	13		3	
69		5	10			
70–75	2	15	25			
Total cases	65	89	710	45	32	458

The observation unit is provincial leader-year.

significant number of terminations (more than 40% of the total number) occurred beyond the retirement age of 65. The fact that some provincial leaders were terminated at the “normal” retirement age or even younger, but others stayed or were promoted at the same or older ages implies that certain variables other than age must have played a disciplinary role in leader turnover. We will examine whether economic performance is such a disciplinary variable in Section 5.

Table 1 also shows that, in the period 1979–1995, China achieved a very rapid growth rate. The average annual growth rate was more than 10%.<sup>18</sup> However, the growth rate varies widely across provinces and over time with a standard deviation of 6%. The fastest growth rate (more than 50%) occurred in Yunnan Province in 1994, while the slowest (negative 16%) occurred in Gansu Province, also in 1994. The large variation of the growth rate is important for us to identify how it is correlated with leader turnover.

Other independent variables are also described in Table 1. More than half (62%) of provincial leaders have a college degree, which shows that the central government indeed tried hard to promote well-educated cadres. About 23% of provincial leaders have connections with the center. The average tenure of office in the sample is 3.03 years, with some leaders staying as long as 12 years. Since the official term for a provincial leader is five, the average of 3.03 years indicates a considerable degree of turnover.

## 5. Turnover and economic performance: the evidence

In this section, we present evidence on the impact of economic performance on the turnover of provincial leaders. We use both the annual GDP growth rate and the average GDP growth rate over a leader’s tenure as performance measures.

<sup>18</sup> The annual provincial GDP is calculated at 1980 prices.

### 5.1. Turnover and annual performance

Table 3 reports maximum likelihood estimation results of an ordered probit model using the entire sample that pools party secretaries and governors together. To allow for heterogeneity across observations, we estimate the ordered probit model with the robust standard errors option.

In the first column of Table 3, we report a regression with the annual GDP growth and provincial and year indicators as independent variables. Consistent with our hypothesis, the annual GDP growth rate has a positive impact on the probability of promotion and a negative impact on the probability of termination. The sign of the coefficient of annual growth rate is positive and is significant at the 5% level. Moreover, the marginal effects of economic growth on turnover are reasonably large. The marginal effects of the annual growth rate when evaluated at the mean of the independent variables are 0.188 for promotion and  $-0.251$  for termination. These numbers mean that when the annual growth rate increases by one standard deviation (0.06) from the mean (0.10), the probability of promotion will increase by 0.011 or 15% of the average probability of promotion (0.075),

Table 3  
Ordered probit regressions estimating the effect of economic performance on the turnover of provincial leaders (whole sample)

	Dependent variable: turnover (0=termination, 1=same level, 2=promotion)			
	(1)	(2)	(3)	(4)
Annual GDP growth rate	1.615** (2.05)	1.581* (1.87)		
Average GDP growth rate			4.727*** (4.34)	4.540*** (3.90)
Age		-0.026* (-1.91)		-0.023* (-1.68)
Age65		-0.974*** (-5.27)		-0.976*** (-5.25)
Education		0.154 (0.96)		0.187 (1.17)
Central connection		0.384*** (2.79)		0.404*** (2.89)
Tenure		-0.053* (-1.74)		-0.055* (-1.78)
Lagged per capita GDP (million yuan)		0.080 (0.43)		0.010 (0.05)
Cutoff point 1 ( $\alpha_1$ )	-1.320*** (-3.67)	-3.162*** (-2.98)	-2.850*** (-2.64)	-2.850*** (-2.63)
Cutoff point 2 ( $\alpha_2$ )	1.621*** (4.63)	0.106 (1.01)	0.455 (0.43)	0.455 (0.43)
Number of observations	864	864	864	864
Log pseudo-likelihood	-468	-414	-462	-410

The numbers in parentheses are t-ratios based on robust standard errors. The significance levels of 1%, 5% and 10% are noted by \*\*\*, \*\* and \*. All regressions include the provincial and year indicators.

and the probability of termination will decrease by 0.015, which is also 15% of the average probability of termination (0.103).

We next report a regression that includes age, age65, tenure, education, central connection and the lagged provincial per capita GDP as control variables (Table 3, column 2). With these variables controlled, the annual GDP growth has about the same marginal effects on the probabilities of promotion and termination. The effects of both age and age65 are negative and significant at the 1% level. The marginal effect of age for promotion is slightly smaller in absolute value than that for termination (−0.003 vs. 0.004). An increase of age by 1 year from the mean of 60 will decrease the probability of promotion by 0.3 percentage points and will increase the probability of termination by 0.4 percentage points. The effect of age65 on promotion is very large. Reaching the age of 65 will reduce the probability of promotion by 0.055, or 73% of the average probability of promotion, and will increase the probability of termination by 0.09, or 87% of the average probability of termination.

The regression also shows that previous or current work experience in the central government increases (decreases) the probability of promotion (termination). The central connection indicator has a positive coefficient, and it is significant at the 1% level. Moreover, the magnitude of this effect is large. Having central connections increases the probability of promotion by 3.4 percentage points and decreases the probability of termination by 3.5 percentage points. This result seems to be consistent with the argument that experience at the center helps cultivate informal connections with central leaders who can influence the personnel evaluation process. Another significant variable in column 2 is the tenure variable, the negative sign of which means that promotion (termination) is less likely for leaders with longer (shorter) tenure. One plausible interpretation for this result is that longer tenure without promotion may be a bad signal indicating lack of ability.

## 5.2. Turnover and average performance

The above analysis implicitly assumes that the central government makes decisions on the turnover of provincial leaders solely on the basis of annual economic performance. While this assumption is easy to justify empirically, it overlooks the fact that provincial leaders are appointed officially for a 5-year term. While no detailed evidence is available on how the central government evaluates provincial leaders, casual observation suggests that evaluations may rely on the cumulative or multiple-year performance rather than simply on annual performance. The central government may prefer the average performance over a span of years because it is a less noisy measure than the simple annual performance, which puts too much weight on short-term shocks. Evaluations based on cumulative or average performance can average out short-term shocks.

Although the official term of a provincial leader is 5 years, in reality the term varies from 1 to 12 years (Table 1). In order to incorporate the effect of past performance so as to make it fit the personnel evaluation procedure discussed above, we create an average measure of the relative GDP growth rate over the tenure  $T$ ,  $\tilde{g}_T$ , which is defined as

$$\tilde{g}_T = \frac{1}{T} \sum_{t=1}^T g_t,$$

where  $T$  is the number of years on the post up to the point of calculation,  $t$  is the  $t$ -th year ( $t=1,2,\dots,T-1,T$ ) and  $g_t$  is the GDP growth in year  $t$  for a province. Thus,  $\bar{g}_T$  is the moving average of GDP growth from the start year up to the current year in office, or the GDP growth rate averaged over the tenure. This measure corresponds to a personnel assessment mechanism in which there is an annual evaluation, but where the evaluation is based on both the past and current performance in the post.

The last two columns of Table 3 report the results of regressions with the average growth rate as the performance measure. Overall, regressions using the average growth rate perform similarly to those using the annual one. Consistent with previous findings, the promotion (termination) probability of provincial leaders increases (decreases) with the average performance. Moreover, promotion and termination appear more sensitive to the average growth rate than to the annual growth rate, because both the estimated coefficients and the corresponding marginal effects of the average GDP growth rate are larger than those of annual measures. The marginal effect of average growth on promotion is 0.408 and that on termination is  $-0.521$  (estimated by specification (4)), both are more than double those of the annual growth. These numbers mean that when the average growth rate increases 0.06, the probability of promotion will increase by 33% of the average probability of promotion, and the probability of termination will decrease by 30% of the average probability of termination. This result is consistent with the argument that the average measure is less likely to be subject to short-term shocks than the annual measure, and thus weights more in turnover decisions made by the central government.

Our empirical findings lend support to the notion that the Chinese central government, which holds complete power in relation to personnel control, acts in a way which is very similar to the way in which the board of directors of a western corporation monitors and disciplines its managers.<sup>19</sup> The functioning of China's personnel control system is remarkable in that it is made possible through centralized political control by the Communist Party in an M-form economic structure.

## 6. Sensitivity tests

In this section, we conduct several sensitivity tests to make sure that our major findings are robust to alternative specifications. We first check how sensitive our main findings are when we use different weights in calculating the average growth rates. We then test whether nonlinearity of the tenure variable and the potential measurement error in the age65 variable could cause any bias. Finally, we conduct some sensitivity tests to make sure our findings are not mainly a result of the new retirement policy implemented in early 1980s.

### 6.1. Weights in average performance

Our previous measure of average growth performance implicitly assumes that each year during a leader's tenure has the same weight in the personnel evaluation. In reality, the

<sup>19</sup> See Murphy and Zimmerman (1993) and Weisbach (1988) on studies of the relationship between CEO turnover and firm performance.

weight on each year may not be the same. To test how sensitive our major findings are when we use different weights in calculating the average growth rates, we allow the weight to differ across years.<sup>20</sup> More specifically, we create a weighted measure of the GDP growth rate over the tenure  $T$ ,  $g_{wT}$ , which is defined as

$$g_{wT} = \frac{\sum_{t=1}^T g_t r^{T-t}}{\sum_{t=1}^T r^{T-t}},$$

where  $r$  is the time-discount factor.

We allow  $r$  to take twenty different values, which start from 0 and have an increment of 0.1. For each value of  $r$ , we calculate the weighted growth rate and use it to estimate Eqs. (1)–(3). Note that both the annual growth and the average growth measures used above are special cases of  $g_w$ . The annual growth rate corresponds to the case  $r=0$ , while the average growth rate corresponds to the case  $r=1$ . When  $r>1$ , the average performance measure has more weights in earlier years.

Regressions alternating all twenty performance measures generate the results that support Hypothesis 1. The marginal effects on all the weighted growth rates are positive and significant.<sup>21</sup> The magnitudes of the marginal effects rise with  $r$  for  $r<1.1$ , reach the peak of 0.411 for promotion and  $-0.526$  for termination at  $r=1.1$ , and then start to decrease from  $r>1.2$ . However, none of these marginal effects are statistically different from each other. Thus, even if the magnitude of the marginal effect of the weighted growth rate varies with the discount factor, this variation is not statistically significant. Since the average performance almost yields the largest marginal effect,<sup>22</sup> we use it for the following sensitivity tests.

## 6.2. Nonlinearity in the effect of tenure

Our next sensitivity test addresses the nonlinearity in the effect of tenure. While we only allow tenure to have a linear effect on turnover in the above estimations, its effect may well be nonlinear. On the one hand, longer tenure means more experience, which may in turn translate into an asset for promotion. On the other hand, long years in the same post without promotion may signal lack of ability. Thus, the net effect may be either positive or negative and it could be nonlinear. To allow for nonlinearity, we add the square term of tenure as an independent variable. With the square term, both tenure and the square term are insignificant, and they are also jointly insignificant (Table 4, column 1). This result suggests that tenure may not have a quadratic effect on turnover. However, tenure may still have a nonlinear effect in a non-quadratic way. For example, leaders on their second term

<sup>20</sup> We thank Roger Gordon for making this suggestion.

<sup>21</sup> We do not report regression results due to space limitations. Interested readers can contact the authors for these results.

<sup>22</sup> The likelihood function is also maximized around  $r=1$ , lending support to our focus on the average growth rate as the performance measure.

Table 4

Ordered probit regressions estimating the effect of economic performance on the turnover of provincial leaders (sensitivity tests using the whole sample)

	Dependent variable: turnover (0=termination, 1=same level, 2=promotion)				
	(1)	(2)	(3)	(4)	(5)
Average GDP growth rate	4.539*** (3.90)	4.567*** (3.90)	4.900*** (4.11)	4.436*** (3.88)	4.743*** (4.01)
Age	-0.023* (-1.71)	-0.025* (-1.79)	-0.034** (-2.50)	-0.040*** (-3.05)	-0.023* (-1.65)
Age65	-0.977*** (-5.25)	-0.995*** (-5.31)			-0.402 (-1.64)
Age64			-0.682*** (-3.90)		
Age66				-0.712*** (-3.54)	
Age65*post-1982					-0.979*** (-3.36)
Education	0.187 (1.17)	0.179 (1.12)	0.163 (1.02)	0.223 (1.40)	0.095 (0.58)
Central connection	0.403*** (2.89)	0.397*** (2.84)	0.342* (2.46)	0.385*** (2.76)	0.427*** (3.08)
Tenure	-0.043 (-0.49)	-0.001 (-0.02)	-0.016 (-0.43)	-0.007 (-0.18)	0.016 (0.42)
Tenure squared	-0.001 (-0.13)				
Second term indicator (tenure>5)		-0.562** (-2.19)	-0.489* (-1.94)	-0.554** (-2.15)	-0.616** (-2.41)
Lagged per capita GDP (million yuan)	0.008 (0.04)	0.008 (0.04)	-0.016 (-0.09)	-0.008 (-0.04)	-0.013 (-0.07)
Cutoff point 1 ( $\alpha_1$ )	-2.850*** (-2.64)	-2.944*** (-2.73)	-3.546*** (-3.19)	-3.853*** (-3.63)	-2.567** (-2.33)
Cutoff point 2 ( $\alpha_2$ )	0.455 (0.43)	0.378 (0.35)	-0.266 (0.24)	-0.604 (0.58)	0.778 (0.71)
Number of observations	864	864	864	864	864
Log pseudo-likelihood	-410	-408	-417	-416	-402

The numbers in parentheses are t-ratios based on robust standard errors. The significance levels of 1%, 5% and 10% are noted by \*\*\*, \*\* and \*. All regressions include the provincial and year indicators.

in the same post may have a disadvantage in upward mobility. We test this idea by including a second term indicator. Indeed, the second term indicator has a strong negative effect on turnover, while the tenure itself is statistically insignificant (column 2). These results suggest that leaders who have served for one term without promotion are in an unfavorable position for turnover.

### 6.3. Measurement error in the age of 65

In our data, we only observe the birth year of a provincial leader but not the birth month. This poses a potential measurement problem because in the year a leader reaches 65, a turnover evaluation may be carried out in the months the leader is either below or

above 65. To address this measurement error problem, we experiment using the age64 or age66 indicators rather than the age65 indicator. While the age64 and age66 indicators continue to have a strong negative effect on turnover, their effects are smaller than that of age65 (Table 4, columns 3 and 4). These results suggest that age65 may still be the best variable to measure the effect of the forced retirement rule.

Because the implementation of the forced retirement rule at 65 only started in 1983, the indicator variable age65 by itself may not accurately measure the effect of the retirement rule. To solve this problem, we include the age65 indicator interacted with a post-1982 indicator to pick up the additional effect of the forced retirement rule since 1982. The regression with such an interaction term indeed shows that age65 only has a significant effect for the post-1982 period (Table 4, column 5). The coefficient on the age65 indicator itself is not significant, while that on age65\*post-1982 indicator is highly significant.<sup>23</sup>

#### 6.4. Normal retirements vs. disciplinary separations

Another possible problem with the regressions in Section 5 is that many terminations in the sample were the result of forced retirement at the age of 65 since 1983. Since normal retirements are not disciplinary and we are not able to differentiate disciplinary separations from normal retirement, our estimates of the disciplinary effect of economic performance on terminations may be biased. Results from summary statistics and regressions are mixed. On the one hand, reaching the age of 65 indeed has a significant impact on turnover. On the other hand, the retirement rule was far from strictly enforced in the sample period, which means that certain variables other than age must have played a role in terminations.

We employ two methods to more rigorously examine whether the forced retirement at 65 could cause a bias.<sup>24</sup> First, we estimate the ordered probit model using a sample of leaders younger than 65. Since these leaders have not reached the retirement age, their promotions and terminations are most likely disciplinary. Second, we use the pre-1983 subsample to do the same estimations. Since the age-based retirement was not introduced until 1983, turnover in the pre-1983 subsample are more likely to be disciplinary.

Regression results of both methods are reported in Table 5. Even though we have two much smaller samples than before (648 observations for the first subsample and only 191 observations for the second subsample),<sup>25</sup> regression results continue to support the hypothesis that the probability of promotion (termination) increases (decreases) with a provincial leader's economic performance. The average growth rate has a positive coefficient, and it is significant at least the 5% level. The magnitudes of these coefficients and the marginal effects are even larger than those using the full sample, which clearly implies that our main results are not driven by the retirement rule launched in early 1980s.

<sup>23</sup> We also tried using the age65 indicator interacted with a post-1984 or post-1985 indicator, and the results are similar.

<sup>24</sup> We thank an anonymous referee for suggesting these methods.

<sup>25</sup> The variable second term indicator does not have enough variation in the second subsample and is therefore dropped in the estimations.

Table 5

Ordered probit regressions estimating the effect of average economic performance on the turnover of provincial leaders (two subsamples)

	Dependent variable: turnover (0=termination, 1=same level, 2=promotion)			
	Subsample for age<65		Pre-1983 subsample	
	(1)	(2)	(3)	(4)
Average GDP growth rate	4.891*** (3.43)	5.257*** (3.45)	5.323** (2.37)	5.090** (1.98)
Age		-0.005 (-0.29)		-0.077** (-2.10)
Age65				-0.437 (-1.49)
Education		0.477** (2.14)		-0.639** (-2.10)
Central connection		0.292 (1.54)		0.293 (0.77)
Tenure		0.034 (0.70)		-0.020 (-0.12)
Second term indicator (tenure>5)		-0.782** (-2.32)		
Lagged per capita GDP (million yuan)		-0.301 (-1.13)		0.001 (0.31)
Provincial indicators	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes
Cutoff point 1 ( $\alpha_1$ )	-1.477*** (-2.46)	-2.246 (-1.64)	-1.204** (-2.45)	-5.400 (-1.05)
Cutoff point 2 ( $\alpha_2$ )	2.191*** (3.71)	1.568 (1.14)	2.038*** (3.97)	-1.911 (0.37)
Number of observations	648	648	191	191
Log pseudo-likelihood	-241	-231	-97	-90

The numbers in parentheses are t-ratios based on robust standard errors. The significance levels of 1%, 5% and 10% are noted by \*\*\*, \*\* and \*. All regressions include the provincial and year indicators.

In summary, the regression results in Tables 3–5 show that the Chinese central government tends to promote provincial leaders who perform well economically and terminate provincial leaders who perform poorly. Regressions show that the average performance over years has a larger marginal effect on turnover than the annual performance. Overall, the main finding that economic performance matters for provincial leaders' career prospects is robust to various sensitivity tests.

## 7. Conclusion

In this paper, we have examined the relationship between the turnover of provincial leaders and their economic performance. We find that the likelihood of promotion (termination) of provincial leaders increases (decreases) with their economic performance. This finding supports the view that the Chinese central government uses personnel control

to motivate local officials to promote local economic growth. We also find that the turnover of provincial leaders is more sensitive to their tenure-averaged performance than to their annual performance. These results support the hypothesis that the Chinese economy is run in such a way that provincial leaders act like middle managers of a large corporation and their internal career mobility is closely tied to their economic performance (Blanchard and Shleifer, 2001).

China started its transition from a planned economy to a market economy with some bold reforms in the government system. In particular, it decentralized the fiscal system in 1980 so that the central and local governments shared fiscal revenues according to certain sharing contracts. The fiscal decentralization has motivated local officials to lend a “helping hand” in pushing forward local economic growth (Jin et al., 2000). Another equally important reform, the reform of the personnel management system, was carried out at almost the same time, but its significance has long been overlooked in the literature. In this sense, our findings should help to draw attention to the role of China’s internal political market, which not only provides incentives to local officials to promote economic growth, but also integrates the decentralized central-local fiscal mechanism in China.

## Acknowledgement

We are very grateful to Masahiko Aoki, Douglas Bernheim, Roger Gordon (Editor), Avner Grief, Jean Oi, Antonio Rangel, two anonymous referees and seminar participants at Stanford University and Peking University for very helpful comments.

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