

China's Political Business Cycle*

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Abstract

We present the evidence of political business cycles in China's key macro variables since the economic reform starting in 1977. We construct a theory to explain the mechanism of the political cycle, incorporating the fundamental institutional features after the reform: economic decentralization, political centralization and central government intervention when necessary. An empirical test of our theory, using a panel of provincial level data, derives a result consistent with the predictions of our theory. We also clearly define the China Mode of Growth.

1 Introduction¹

China has been very important for the current global economic recovery and macroeconomic events in China are likely to play an even larger role in the future. Despite this and the fact that China's institutions are different from those of a Western democracy, there is little empirical and theoretical understanding of the determinants of Chinese business cycles. This paper primarily aims at partly filling this gap. Moreover, by studying the mechanism of the business cycle, we clearly figure out the China Mode of governance and growth.

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¹Unless otherwise stated, the data in this paper comes from World Development Indicators Database at the World Bank.

We begin by presenting the fact that several key macroeconomic variables correspond well with the timing of leader change after the death of Mao Zedong in 1976.

First, the change of leaders at the central level becomes a regular phenomenon. Starting in 1977, there has been a Central Communist Party Congress every five years where the Central Communist Party Committee Members are changed regularly. Before the death of Mao, there was no regular change of leaders. The hierarchy of the Party at the central level is as follows. There are around 200 members in the Central Committee, above which is the Political Bureau of the Central Committee, consisting of around 25 Central Committee Members. Above the Political Bureau, there is a Standing Committee of the Political Bureau, consisting of 5-9 Political Bureau Members. Note that the top Chinese provincial leader is called the Provincial Party Secretary and most Secretaries from the thirty-one provinces of mainland China² are Central Committee Members. The Secretaries from a small number (less than five) of politically or economically influential provinces, e.g. Beijing and Shanghai, are Political Bureau Members.

Second, the growth of gross capital formation corresponds well with the timing of the Central Party Congress. In Figure 1, we plot the time series of gross capital formation growth, with the dashed lines indicating the Central Party Congress Years.

Figure 1 here

The pattern of the cycle is that gross capital formation growth increases dramatically *after* a Central Party Congress and drops sharply *before* the next. This pattern is repeated except in 1997-2000 when the Chinese economy was hit by the Asian Financial Crisis. In Figure 2, we plot the average growth rates of gross capital formation around the Central Party Congress years, with $Y(0)$ denoting the year of the Congress, $Y(-t)$ denoting the t^{th} year before $Y(0)$ and $Y(t)$ denoting the t^{th} year after the Congress for $t = 1$ and 2. On

²Three regions of China are outside the mainland. They are the Province of Taiwan, the Hongkong SAR and the Macau SAR

average, gross capital formation growth starts to increase from $Y(-1)$ to $Y(0)$, further increases dramatically in $Y(1)$ and then drops sharply. This is indeed the timing in four of the five cycles. We regress gross capital formation growth on a dummy variable indicating $Y(1)$. The estimated coefficient of the dummy variable is 10.20 and it is significant at 1%.

Figure 2 here

Third, investment growth correlates well with the growth of several other variables such as net domestic credit growth, M2 growth and *especially* inflation, indicating that there also exist political cycles for these macroeconomic variables.

We continue by explaining the mechanism of China's political business cycle. Besides the opening up of China and the market reform, one important dimension of China's post-Mao reform is the decentralization of power. The governance of the economy is delegated to the provincial governments (Lin, Tao and Liu 2005; Huang 1996; Montinola et al. 1995; Oi 1992; Qian and Weingast 1997; Weingast 1995). Meanwhile, the provincial leaders are evaluated retrospectively based on their economic performance. Specifically, provincial leaders with a better growth performance have a higher probability of being promoted to the central government, which is associated with more privilege and a better future career chance (Chen, Li and Zhou 2005; Li and Zhou 2005; and Maskin, Qian and Xu 2000). The combination of economic decentralization and political centralization constitutes China's fundamental institutions after 1976 and is called a "regionally decentralized authoritarian (RDA) regime" in Xu (2011). An conflict of interest between the central government and the provincial leaders, generated by the RDA regime, is the key to understanding the mechanism of the political business cycle. On the one hand, the evaluation standard leads the provincial leaders, upon getting power at the Central Party Congress, to stimulate economic growth in the regions under their own governance. The provincial leaders' hunger to stimulate growth has inflationary

consequences when it is constrained by the supply capacity of the economy (Kornai 1992). On the other hand, the central government bears the cost of inflation and cannot refrain from intervention when inflation increases. In the reform era, the central government intervenes by carrying out the "Macro Adjustment and Control" (Hong Guan Tiao Kong) program, which involves (1) re-centralizing the authority of investment approval; (2) re-centralizing the authority of credit allocation; and (3) administrative price control (Huang 1996; Lin 2008). Such intervention measures affect investment and credit on the aggregate level and all local economies are affected simultaneously. In Figure 3, we once more plot the time series of capital formation growth, with the shaded area indicating the period of intervention. During the intervention, there is a dramatic decrease in the growth rate. When inflation comes down to the normal level, the authorities are once more decentralized to the local leaders. The political business cycle is thus the policy cycle implemented by different decision makers in the decentralization-centralization cycle.

Figure 3 here

However, the coexistence of the relative performance based evaluation, which gives the provincial leaders a strong incentive to stimulate growth, on the one hand, and the intervention to reduce inflation due to too much growth stimulus, on the other hand, seems contradictory. If too much aggregate stimulus increases inflation, which may lead to intervention at the cost of output loss, the central government needs to consider the trade-off between the level and the variation of growth when setting the promotion rule. For example, provincial leaders with too high growth rates are promoted with a relatively lower probability. We propose a theory that explains the puzzle. The heart of our theory is that any promotion rule aiming at weakening the incentive for stimulus is not time-consistent. Specifically, the competence of each provincial leader is unknown to the central government *ex ante* and higher growth is a signal of higher competence of the provincial leader, which the central government values

ex post. Since promotion takes place after the choice of stimulus and the realization of inflation and output growth, the central government, ex post, always has the incentive to promote the provincial leaders with higher growth, which is a signal of higher expected competence. This time inconsistency problem, plus the fact that promotion is associated with more privilege and a better future career chance, leads to a rank-order tournament of stimulating growth among provincial leaders to signal their competence, without caring about the inflationary consequence of their behavior for the whole economy. Not being able to reduce the provincial leaders' incentive ex ante, the only thing the central government can do is thus to intervene when inflation increases.

Our theory shares two common features of the opportunistic political business cycle literature (Nordhaus 1975; Lindbeck 1976; Rogoff and Sibert 1988; Rogoff 1990; and Persson and Tabellini 1990. See also Drazen 2000 and 2001 for surveys).³ One is the information structure, i.e. the provincial leaders' unknown competence and signaling through growth. Another is the Markov feature of the equilibrium, i.e. signaling involves adverse selection and moral hazard which the forward-looking decisive voter (rationally) forgets when making the promotion decision. Our study makes two contributions to this literature. First, the empirical evidence for this literature is limited, especially from developed countries. Most supporting evidence lies in opportunistic political budget cycles in small developing countries with immature democratic institutions (Brender and Drazen 2005; Shi and Svensson 2006; Drazen 2006). Our paper contributes to this literature in that we find strong evidence of political cycles with a sizable magnitude in many key macroeconomic variables from low-frequency data in a large economy. Second and equally important, we extend this literature to a regime with different institutions than a standard Western democracy.

To fix ideas and guide the empirical test, we construct a three-period model

³In parallel and independently, there is a partisan political business cycle literature pioneered by Hibbs (1977) and further developed by Alesina (1987). This literature focuses on the effect of the ruling party's partisan preferences on policies. See Alesina, Roubini and Cohen (1999) for a review of this strand of literature.

based on a model by Persson and Tabellini (2000).⁴ In our model, there is one principal (central government) and several agents (provincial leaders). Production and inflation take place in the first and second period. The task of each local leader in the two periods is to manage the production of one region for the central government, which values output and dislikes inflation. In the third period, there is no production and inflation. In this period, the central government promotes some provincial leaders to the central government and derives utility from the competence of the promoted leaders, who then get the promotion rent. Output in every region in the first two periods depends on the competence of its provincial leader and his short-run growth stimulus, which are complementary to each other. The level of the competence is initially unknown to the local leader himself as well as to the central government. The stimulus is a hidden action of the provincial leader and too much aggregate stimulus inflates the whole economy. Because the competence of every local leader is not directly observable by the central government, output in every region is the only noisy signal of competence based on which the central government makes the promotion decision. The complementarity between competence and stimulus implies that a local leader with higher output has a higher estimated competence. As the central government values the competence of the promoted leaders in the third period, the time consistent promotion rule is to promote local leaders with the best output performance. This promotion rule, plus the fact that promotion is associated with the rent, gives every local leader a strong incentive to stimulate the regional economy to make himself appear more competent in order to increase the probability of promotion. This will inflate the economy. Since the central government cannot affect the local leaders' incentive ex ante, the only thing that the central government can do, if inflation is too high in period 1, is to intervene at the cost of output loss in period 2. The economy thus exhibits a stop-go feature in the first two periods.

The model has three main predictions about the local leaders' incentive:

⁴Section 4.5.1, pp. 82-85.

1. The incentive is positively related to the size of the promotion rent.
2. The incentive is negatively related to the cost of stimulus.
3. The incentive is weakest when the number of vacant positions in the central government is zero or equal to the number of provincial leaders and is strongest at a point between the two points

We test the predictions of our model with a panel of Chinese provincial level data from 1983 to 2007. The results are consistent with the three predictions. Regarding the first prediction, we show that the magnitude of the political cycle is decreasing in the Provincial Party Secretary's age. We also use an exogenous source of variation in the value of the promotion rent that comes from the mandatory retirement rule, in the spirit of Besley and Case (1996), to test the first prediction. Starting in 1982, the mandatory retirement age for provincial leaders is set to 65 years. This means that if the age of an incumbent Provincial Party Secretary is higher than 65 in the next Central Party Congress, he has no chance of promotion because he needs to retire before the Congress. We find that the magnitude of the cycle of such lame ducks is significantly smaller than that of the leaders with chances for promotion. Regarding the second prediction, we show that the magnitude of the political cycle is negatively related to the size of the state-owned sector, which the local leaders can control in a relatively easier way. Regarding the third prediction, we show there to be an inverted-U shaped relationship between the magnitude of the political cycle and the number of vacant positions at the Political Bureau, proxied by the number of leaders who are actually promoted at the end of each term.

To the very best of our knowledge, our paper is the first study to find the evidence of opportunistic political business cycle in China, explain the mechanism of the cycle taking into account the fundamental aspects of China's institutions after 1976, and derive supporting evidence of theory from the provincial data.

The remainder of the paper is organized as follows. The next section presents the stylized facts and Section 3 presents our model. Section 4 solves the model

and Section 5 presents our empirical test. Section 6 relates our study to the existing literature. Section 7 discusses and concludes the paper.

2 Stylized facts

2.1 Institutional Background

The most important set of people in China is called the Central Committee of the Chinese Communist Party, which consists of around 200 members (see the middle pyramid in the first row in Figure 8). The members of this Committee are from the Party itself, the State Council (administration), the National People's Congress (the legislature, NPC in Short), the Party's Military Committee and National Committee People's Political Consultative Conference (an institution led by the Chinese Communist Party where some other Parties and organizations are involved in politics, NCPPCC in Short).

Figure 4 here

As shown by Figure 4, the Party General Secretary (the top leader of the Party), the Prime Minister and the First Deputy Prime Minister of the State Council, the Chairman of the Military Committee and the Directors of the NPC and NCPPCC are usually in the Standing Committee of the Political Bureau. The Ministers of the Party Ministries, the Deputy Prime Ministers in the State Council, the Deputy Chairman of the Military Committee and the First Deputy Directors of the NPC and NCPPCC from the Communist Party are usually in the Political Bureau, but outside its Standing Committee. The Central Committee members outside of the Political Bureau are the leaders of the Provincial Party Committee, the Ministers of different Ministries in the State Council, the Ministers of the Army Ministries and the Deputy Directors of the NPC and NCPPCC from the Communist Party. As previously mentioned, the top provincial leader (the Provincial Party Secretary) of most provinces is a member of the Central Committee but is outside the Political Bureau and a limited number of Provin-

cial Party Secretaries from politically or economically influential provinces are members of the Political Bureau but outside its Standing Committee.

2.2 Political Cycles

Starting in 1977, there has been one Communist Party Central Congress every five years. The Congress is held either in the late autumn or in the early winter and the regular change of Central Party Committee Members takes place at the Congress. Besides the political investment cycle, there also exists a political monetary cycle. In Figures 5 and 6, we plot the time series of gross capital formation growth with net domestic credit growth and M2 growth, respectively. We can clearly see that gross capital formation growth correlates well with the two monetary variables.

Figure 5 and 6 here

2.3 Central Government and Local Leaders

Before the death of Mao in 1976, the Chinese economy is a central-planned economy by the central government. After 1976, most economic power, previously controlled by the central government, such as investment approval, entry regulation, allocation of resource and fiscal revenue, management of State Owned Enterprise, and foreign trade are delegated to the provincial governments. Lin, Tao and Liu (2005) and Huang (1996) provide a detailed description of the power decentralization. Montinola et al. (1995), Oi (1992), Qian and Weingast (1997) and Weingast (1995) focus the decentralization on the fiscal aspect.

Although the economic power is decentralized, the role of the central government is dominant, as it determines the appointment and the promotion of provincial leaders. Before 1976, the evaluation of provincial leaders is based on political stance. Since the reform, economic performance has become the main criterion for provincial leaders' promotion. Specifically, provincial leaders with better economic performance have a higher chance of being promoted to the central government. Maskin, Qian and Xu (2000) are the first to notice this.

Li and Zhou (2005) provide the first systematic study of the promotion rule. They show that the probability of promotion (termination) of provincial leaders to the central government increases (decreases) with the average economic performance in the past term, measured in the annual GDP growth rate. In a follow-up study, Chen, Li and Zhou (2005) further show that the promotion probability of the provincial leaders is also affected by the performance of their immediate predecessors, as this can reduce the noise in the evaluation. The relative economic performance evaluation also holds at lower levels of the hierarchy.⁵ Edin (2003) conducts a vivid field study about the relative economic performance evaluation and promotion of leaders at the prefecture and township levels. Li (2009) shows that prefectures with higher growth are more likely to be upgraded to cities and the ranking of the corresponding leaders will be upgraded simultaneously. Summing up, there is ample evidence that there is a yardstick competition of economic growth among Chinese local leaders.

The relative economic performance based evaluation system is essential for China's high growth. In a comparative study of China and Russia, Blanchard and Shleifer (2001) argue that China's evaluation system, which is absent in Russia, is essential for the sharp difference in the two countries' economic performance after the decentralization reform. To explain why Russia cannot use China's evaluation system, Qian and Xu (1993) and Maskin, Qian and Xu (2000) argue that it is due to the difference between the organizational forms in the two countries in the period of the Central Planned Economy. The Soviet economy consisted of approximately sixty specialized ministries in different industries (U-form), while the Chinese economy comprised a large number of self-sufficient regions where the local leaders are in charge of all industries (M-form). While the economic performance of different Chinese regional leaders is comparable, the performance of different Russian ministers is not.

⁵The structure of China's geographical hierarchy is as follows: Center-Province-City-Prefecture-Township-Village.

2.4 Inflation and Investment Control

China's incentive system is not costless, however. Since the evaluation is based on the provincial leader's performance in the past term and the promotion is associated with more power, more privilege and a better career chance, the provincial leaders have strong incentives to stimulate economic growth (i) *only* within the regions under their own governance; and (ii) *only* within their term, which is just five years. The former point leads to local protectionism⁶ and the latter point leads to a conflict of interest between the central government and the local leaders as concerns inflation. The conflict of interest is essential to explain the mechanism of China's political cycles. Under the incentive structure, the local leaders always try to maximize short-run growth. But their behavior is not unbounded. To use the terminology of Kornai (1992), the investment hunger is constrained by the supply capacity of the economy, such as the physical capacity of the consumption goods sector and the investment goods sector, and the balance of payments and foreign debts. Furthermore, when the price is kept fixed, the tension between investment demand and supply capacity is reflected in economic shortage. When the price is flexible, the tension is reflected as inflation.

Kornai's theory applies perfectly to China. In Figure 7, we plot the time series of inflation calculated based on the GDP deflator, and gross capital formation growth before 1976. In this period, the prices are kept fixed and artificially low. The inflation rate is almost constant at zero and does not respond to gross capital formation growth.⁷

Figure 7 here

In Figure 8, we plot the two series after 1976 when China's central government starts the market reform and gradually relaxes the control of prices. Inflation

⁶See Young (2001) for evidence at the aggregate level, Bai et al. (2004) for evidence at the industry level and Dollar and Wei (2005) for evidence in the banking sector.

⁷See Naughtons (1986, 1987) for studies on the shortage of consumption goods and investment growth in China before the reform.

corresponds very well to gross capital formation growth.

Figure 8 here

When inflation increases, the central government bears the cost, which involves political instability. For example, inflation is widely regarded as the main cause of the student protest in 1989. Different top leaders in China state many times that "Inflation (in China) is not only simply an economic problem, but a political one" (Huang 1996). When inflation increases too much, the central government intervenes by carrying out the "Macro Adjustment and Control" program. As mentioned in the introduction, capital formation growth decreases dramatically during the intervention.⁸

The conflict of interest between the central government and the provincial leaders on inflation translates into different preferences on the pattern of growth. The central government prefers a relatively high and stable growth with low inflation, while the provincial leaders prefer high growth, without caring about the inflation. After 1976, the central government gradually decentralizes most of the (civil) investment approval power to the provincial government, but not all. Around 20% of the (civil) investment need to be approved by the central government. In Figure 9, we plot the average growth rates of fixed asset investment⁹ administered by the local government and the central government around the party congress. The investment administered by the local government has the same growth pattern as the political cycle, while the investment project administered by the central government shows an almost constant average growth. This reveals the divergent preference of the central government and the provincial leaders.

⁸See Huang (1996) for a detailed study of the intervention.

⁹Fixed asset investment is an accounting item in the statistical system of a central planned economy. It measures all resources that are expended in fixed capital while capital formation measures the part of GDP that is expended in capital. In China Statistical Yearly Books, there is detailed information about the investment projects that are administrated by the central government and the local government, while the data on gross capital formation does not contain any such information. Administration means project approval.

Figure 9 here

3 The Model

Consider a three-period economy with a mass 1 of regions, indexed by $i \in [0, 1]$. There is a hierarchy composed of a principal and a mass 1 of agents. The principal and the agent stand for the central government and the local leader, respectively. The task of each local leader is to manage the production of one region for the central government. There is no discounting in the three periods.

3.1 The Central Government, Production and Inflation

There is production and inflation in periods 1 and 2, where the central government values output and dislikes inflation. At the end of period 2, a mass $m < 1$ of local leaders is promoted to the central government. In period 3, the central government only derives utility from the competence of the promoted local leaders. Formally, the central government's utility function in each period is

$$V_t = aY_t - b\pi_t^2 \text{ for } t = 1 \text{ and } 2, \quad (1)$$

and

$$V_3 = c \int_0^m \theta_j dj \quad (2)$$

where $Y_t = \int_0^1 y_{it} dj$ denotes total output across regions in period t , π_t is the inflation of period t and θ_j denotes the competence of the promoted local leader from region j ,

If there is no intervention, the production function in each region i is as follows

$$y_{i1} = y_{i2} = \theta_i s_i + \varepsilon_i, \quad (3)$$

where y_{it} denotes the output of region i in period $t \in \{1, 2\}$, θ_i and s_i are the competence and short-run growth stimulus chosen in period 1 by the local

leader in region i , respectively, and ε_i is a noise, realized in period 1, i.i.d across regions, and normally distributed with zero mean and variance σ_ε^2 .

Competence is a permanent feature of the local leader. At the beginning of period 1, nature randomly chooses the competence of the local leader in each region i , from a normal distribution with mean $\bar{\theta}$ and variance σ_θ^2 . Following Holmström (1982), we assume the competence of any local leader to initially be unknown to either the central government or the local leader himself.

After the competence has been determined, each local leader then chooses a short-run growth stimulus s_i , at the private cost $\frac{\lambda s_i^2}{2}$. This is a hidden action which affects the output for both periods, together with the local leader's competence and the shock ε_i .

Inflation at the beginning of period 1 is normalized to zero. At the end of periods 1 and 2, inflation takes the following forms

$$\pi_1 = \int_0^1 s_i di + \delta_1 \tag{4}$$

$$\pi_2 = \pi_1 + \eta \tag{5}$$

where s_i is the stimulus by the local leader in region i , δ_1 is a shock realized in period 1, distributed in the range $[-\bar{\delta}, \bar{\delta}]$ with the cumulative distribution function G and the probability density function g , and η is a positive parameter.

Besides linking the local leaders' stimulus to inflation, equations (4) and (5) capture the following two facts:

1. Because of the unobservability of s_i and the shock δ_1 , the central government cannot distinguish whether a given (high) level of inflation is due to the shock δ_1 or the stimulus of any specific local leader. Therefore, the central government cannot punish any specific local leader for causing high inflation.
2. Inflation is persistent: π_2 is higher than π_1 due to the positive η .

3.2 The Local Leaders

The local leaders' income in periods 1 and 2 is normalized to zero. In the third period, a promoted local leader gets the promotion rent R and an unpromoted local leader's income is once more normalized to zero. Formally, the expected utility of region i 's local leader is

$$U_i = \Pr(\text{promotion})R - \frac{\lambda s_i^2}{2},$$

where λ is a parameter capturing the stimulus cost.

Denote total output in region i in two periods as

$$Y_i = y_{i1} + y_{i2}.$$

Given our assumption about the production function, competence and stimulus are complementary and higher output is a signal of higher competence. The expected competence of local leader i for a given Y_i and an estimated stimulus \tilde{s}_i is

$$\begin{aligned} E(\theta_i | Y_i, \tilde{s}_i) &= E(\theta_i) + \frac{\text{Cov}(\theta_i, y_{it})}{\text{Var}(Y_i)} (Y_i - E(Y_i)) \\ &= \bar{\theta} + \frac{\tilde{s}_i \sigma_\theta^2}{\tilde{s}_i^2 \sigma_\theta^2 + \sigma_\varepsilon^2} (Y_i - \tilde{s}_i \bar{\theta}). \end{aligned}$$

For a given \tilde{s}_i , higher output strictly increases the expected competence of a local leader.

As promotion takes place after inflation and output have been realized in the first two periods, the central government, ex post, always has an incentive to promote local leaders with high expected competence. The time-consistent promotion rule is

$$\tilde{p}_i = \begin{cases} 1 & \text{if } \text{rank}(Y_i) \leq m \\ 0 & \text{if } \text{rank}(Y_i) > m \end{cases}$$

where \tilde{p}_i is an indicator of promotion of the local leader in region i . This promotion rule, plus the fact that promotion is associated with the rent R , gives each local leader the incentive to exert the costly stimulus to appear more competent in order to increase the probability of promotion. This will inflate the economy.

3.3 Intervention

The central government can intervene by centralizing the power to reduce inflation. Intervention can take place at the beginning of periods 1 or 2. With an intervention, the output of any region in the intervention period is equal to

$$y_i^I = w$$

and inflation at the end of the intervention period is normalized to zero. w can be regarded as the growth stimulus by the central government at the intervention period. A lower w reflects a higher intervention cost.

4 Equilibrium

We focus on a symmetric equilibrium where all local leaders choose the same level of stimulus, and all players in the game have an expectation of the stimulus that is consistent with the choice of each local leader. Formally,

$$s_i = s_j = s^* \text{ for all } i, j \in [0, 1].$$

In this equilibrium, the distribution of output in any region i in periods 1 or 2 without intervention is

$$y_{it} \sim N\left(s^* \bar{\theta}, (s^*)^2 \sigma_\theta^2 + \sigma_\varepsilon^2\right).$$

Before proceeding, we make two parameter assumptions to keep our analysis simple and non-trivial.

Assumption 1: $w < \bar{\theta}s^*$.

By the law of large numbers, total output of all regions in periods 1 or 2 without intervention is $\bar{\theta}s^*$ and total output of all regions in periods 1 or 2 with intervention is w . Assumption 1 captures the fact that the local leader has a better knowledge of the local economy than the central government.

Assumption 2: Decentralizing in period 1 and retaining the power to intervene in period 2 (timing 1) always dominates intervention in both period 1 and period 2 (timing 2).¹⁰

¹⁰We figure out this assumption mathematically in the appendix.

Assumption 2 rules out the possibility of intervention in both periods. Compared to timing 2, timing 1 has two benefits: (i) higher output ($\bar{\theta}s^* > w$) in periods 1 and 2; and (ii) a higher expected competence of the promoted leaders in period 3 due to the fact that the central government can extract the signal of local leaders' competence from their output. The cost of timing 1 is higher inflation in periods 1 and 2. Other things given, timing 1 dominates timing 2 when the intervention cost is high (low w), the disutility of inflation is low (low b), the value of output is high (high a) and the value of the promoted leaders' competence is high (high c). To make our analysis non-trivial, we focus on the set of parameters when assumption 2 holds.

With the description of the economy and the assumptions, the timing of the events in the three periods can now be summarized as follows:

1. At the beginning of period 1, nature chooses a random competence θ_i for the local leader in every region i .
2. Every local leader chooses s_i , without knowing his own competence.
3. ε_i and δ_1 are realized.
4. Output and inflation in period 1 are realized
5. The economy moves to period 2.
6. The central government makes the intervention decision.
7. Output and inflation in period 2 are realized.
8. The central government makes the promotion decision.
9. The model moves to period 3.

The equilibrium can be solved by backward induction.

4.1 Time-Consistent Promotion Rule

Given our assumptions that outputs in all the regions are equal during intervention and output within one region is equal in periods 1 and 2 without intervention, intervention does not affect the local leader's rank of total output. Moreover, the local leader's rank of period 1 output is equal to his rank of total output.

In terms of the period 1 output, the output of the local leader with rank m converges to a deterministic number by the law of large numbers. Denote this threshold as \bar{y} , which can be solved from the following equation

$$\Phi\left(\frac{\bar{y} - s^*\bar{\theta}}{\sqrt{(s^*)^2\sigma_\theta^2 + \sigma_\varepsilon^2}}\right) = 1 - m \Rightarrow$$

$$\bar{y} = s^*\bar{\theta} + \Phi^{-1}(1 - m)\sqrt{(s^*)^2\sigma_\theta^2 + \sigma_\varepsilon^2}$$

where Φ is the C.D.F of normal distribution and Φ^{-1} is the inverse of Φ .

The time-consistent promotion rule, in terms of period 1 output, is

$$\tilde{p}_i = \begin{cases} 1 & \text{if } y_{i1} \geq \bar{y} \\ 0 & \text{if } y_{i1} < \bar{y} \end{cases}.$$

4.2 Equilibrium Intervention Rule

As we have shown, intervention does not affect the local leaders' estimated competence. This implies that the central government's utility in period 3 is not affected by intervention. Therefore, when making the intervention decision, the central government's utility in period 2 is the only determinant of intervention.

By the law of large numbers, if there is no intervention, total output across regions in period 2 is

$$Y_2 = \bar{\theta}s^*$$

and inflation in period 2 is

$$\pi_2 = \pi_1 + \eta,$$

where

$$\pi_1 = s^* + \delta_1.$$

In this case, the utility of the central government in period 2 is

$$V_2 = a\bar{\theta}s^* - b(\pi_1 + \eta)^2.$$

If there is an intervention in period 2, total output in period 2 is w and inflation is zero. In this case, the utility of the central government in period 2 is

$$V_2^I = aw.$$

Denote the threshold level of period 1 inflation for intervention as $\bar{\pi}$, which can be solved by equalizing V_2^I and V_2 :

$$\bar{\pi} = \sqrt{\frac{a(\bar{\theta}s^* - w)}{b}} - \eta.$$

The optimal intervention rule is

$$I(\pi_1) = \begin{cases} 0 & \text{if } \pi_1 < \sqrt{\frac{a(\bar{\theta}s^* - w)}{b}} - \eta \\ 1 & \text{if } \pi_1 \geq \sqrt{\frac{a(\bar{\theta}s^* - w)}{b}} - \eta \end{cases}$$

where I is the indicator of intervention.

4.3 Equilibrium Stimulus

If all other leaders choose s^* , the local leader i 's promotion probability, if he chooses s_i , is

$$\begin{aligned} & \Pr[y_{i1} \geq \bar{y}] \\ &= 1 - \Pr[y_{i1} < \bar{y}] \\ &= 1 - \Phi\left(\frac{\bar{y} - s_i\bar{\theta}}{\sqrt{s_i^2\sigma_\theta^2 + \sigma_\varepsilon^2}}\right). \end{aligned}$$

Each local leader takes \bar{y} as given and chooses the optimal s_i to maximize the

life-time utility, which can be rewritten as

$$\max_{s_i} \Pr\left[1 - \Phi\left(\frac{\bar{y} - s_i\bar{\theta}}{\sqrt{s_i^2\sigma_\theta^2 + \sigma_\varepsilon^2}}\right)\right] R - \frac{\lambda s_i^2}{2}.$$

Taking the first-order condition with respect to s_i , we get

$$\lambda s_i = \left(\frac{\bar{\theta} \sqrt{s_i^2 \sigma_\theta^2 + \sigma_\varepsilon^2} + \frac{1}{2} (\bar{y} - s_i \bar{\theta}) \frac{2s_i \sigma_\theta^2}{\sqrt{s_i^2 \sigma_\theta^2 + \sigma_\varepsilon^2}}}{s_i^2 \sigma_\theta^2 + \sigma_\varepsilon^2} \right) \phi \left(\frac{\bar{y} - s_i \bar{\theta}}{\sqrt{s_i^2 \sigma_\theta^2 + \sigma_\varepsilon^2}} \right) R \quad (6)$$

where ϕ is the p.d.f of normal distribution.

Applying the symmetric equilibrium condition $s_i = s^*$ in equation (6), we get

$$\lambda s^* = \left(\frac{\bar{\theta} \sqrt{(s^*)^2 \sigma_\theta^2 + \sigma_\varepsilon^2} + \Phi^{-1}(1-m) s^* \sigma_\theta^2}{(s^*)^2 \sigma_\theta^2 + \sigma_\varepsilon^2} \right) \phi(\Phi^{-1}(1-m)) R. \quad (7)$$

The LHS of (7) is the marginal cost of increasing s^* and the RHS is the marginal benefit of increasing s^* . Other things given, an increase of R leads to an increase in the marginal benefit and thus an increase of s^* . An increase of λ leads to an increase in the marginal cost and therefore leads to a decrease of s^* . The change of m has two effects on s^* . If there is a decrease of m (less vacancies at the center), competition among all local leaders becomes tougher. On the one hand, this leads to an increase in the output threshold for promotion, captured in the first term on the RHS of (7). We call this effect a competition effect. On the other hand, the probability that any local leader is among the leaders with top m competence is lower, which implies that the absolute probability of promotion becomes lower. This second effect is captured in the second term on the RHS of (7) and we call this effect a competence risk effect. When $m < \frac{1}{2}$, the directions of the two effects are opposing and the total effect of m on s^* is ambiguous. When $m \geq \frac{1}{2}$, the direction of the competence risk effect is changed. A decrease of m leads to an increase of $\Phi^{-1}(1-m)$ and an increase of $\phi(\Phi^{-1}(1-m))$, due to the fact that the p.d.f of normal distribution is increasing on the left-hand side. Intuitively, when $m \geq \frac{1}{2}$, each local leader expects the probability of having a relatively low competence to be low and a tougher competition gives the local leaders the incentive to choose more stimulus to separate themselves from the low competence local leaders. Therefore, when $m \geq \frac{1}{2}$, a decrease of m leads to an increase of s^* . Note that the comparative statics of m on s^* is

due to the normal distribution of competence and production shock. For more general distributions, we only expect s^* to be zero when m is zero or one and there should be at least one peak in the middle. Intuitively, the local leaders have no incentive to signal their competence when the promotion probability is zero or one and this incentive is maximized when the promotion is between zero and one. Summing up the analysis, we have the following propositions:

Proposition 1 s^* increases with R and decreases with λ .

Proposition 2 For a normal distribution of competence and output shock, s^* increases with m if $m \geq \frac{1}{2}$. If $m < \frac{1}{2}$, m has an ambiguous effect on s^* . For more general distributions of competence and output shock, $s^* = 0$ when $m = 0$ or 1 and s^* is maximized at a point where $m \in (0, 1)$.

4.4 Equilibrium Inflation, Intervention and Output

Plugging the equilibrium stimulus s^* in equation (4), we have

$$\pi_1 = s^* + \delta_1.$$

The probability of intervention is

$$\begin{aligned} \text{prob}(\pi_1 > \bar{\pi}) &= \text{prob}[s^* + \delta_1 > \bar{\pi}] \\ &= 1 - G[\bar{\pi} - s^*]. \end{aligned}$$

Simple algebra will establish the following proposition:

Proposition 3 Output and inflation in period 1 are $\bar{\theta}s^*$ and $s^* + \delta_1$, respectively. With probability $G[\bar{\pi} - s^*]$, there is no intervention and output and inflation in period 2 are $\bar{\theta}s^*$ and $s^* + \delta_1 + \eta$, respectively. With probability $1 - G[\bar{\pi} - s^*]$, there is intervention and output and inflation in period 2 are w and 0, respectively.

Note that the economy starts with zero stimulus and zero output. At period 1 the equilibrium growth stimulus in every region is s^* . At period 2, the stimulus

is either s^* or w , depending on whether there is an intervention. s^* can be seen as a measure of the political business cycle and therefore, the comparative statics of s^* with respect to R, λ and m also applies to the magnitude of the cycle.

5 Empirical Test

Our model predicts that the size of the political cycle is affected by three factors. In this section, we first describe our data. Then, we will test the predictions of the model with a panel of provincial data.

5.1 Data and Measurement

We will test our theory with provincial level data in the period of 1983 to 2007, which covers five terms of the Provincial Party Secretaries. Our provincial data of capital formation growth is from the Database of China Data Center at University of Michigan. There are currently 31 provinces in mainland China. Two provinces were set up after 1983 (the province of Hainan in 1988 and the province of Chongqing in 1997). We drop these two provinces in our analysis. We also drop Tibet because of the unavailability of data for the complete period. Our data on the background of Provincial Party Secretaries is from public sources.

5.1.1 Proxies of Stimulus Cost

There are four types of firms in China: state-owned, collectively-owned, private and foreign. The collectively-owned firm is owned by a group of people but effectively controlled by the local government. We construct three proxies for the stimulus cost of local leaders. Our first proxy, denoted as $state_output_ratio_{it}$, is defined as the ratio of output by state-owned and collectively-owned firms over total output in province i at year t . It measures the relative size of the firms that can easily be manipulated by the provincial leaders in terms of output. Correspondingly, we define two other variables, $state_labor_ratio_{it}$ and $state_fai_ratio_{it}$, to proxy the manipulation cost in terms of labor and fixed

asset investment.

5.1.2 The Size of Promotion Rent

We test the effect of promotion rent on the size of the political cycle in two ways.

First, we define RPL_{it} as a measure of the Provincial Party Secretary's remaining political life. It equals 65 minus the age of province i 's Party Secretary in the next Central Party Congress after year t . Since younger leaders care more about the future and have a higher promotion rent, we expect the size of the political cycle to be positively related to our measure of age. As the RPL does not change within one term, we will cluster the errors of our estimated coefficients at the provincial level.

Second, we use an exogenous source of variation in the value of the promotion rent that comes from the mandatory retirement rule. Before 1982, Chinese leaders typically hold power till death and there is no rule for the retirement age. In 1982, the central government sets 65 to be the mandatory retirement age for the leaders at the provincial level and a massive replacement of old leaders takes place after the announcement of the rule. Note that although the mandatory retirement age for leaders at the provincial level is set at 65, there is no clear rule for the retirement age of leaders in the Political Bureau. This implies that if a Provincial Party Secretary cannot be a member of the Political Bureau before 65, he must retire at the age of 65. Given this fact, RPL_{it} measures how many years province i 's incumbent Party Secretary at year t can work as a leader at the provincial level after the upcoming Central Party Congress. For example, the next Central Party Congress will be held in 2012. If the age of province i 's party secretary is 60 in 2009, then his age in 2012 will be 63 and he can be a leader at the provincial level for another two years after the Congress. Thus, $RML_{i2009} = 2$. While if RPL_{it} is negative, the Provincial Party Secretary must retire before the next Central Party Congress and is therefore a lame duck. We expect that the size of the political cycle of a

lame duck is smaller than that of a Provincial Party Secretary with the chance of promotion. This is in the spirit of Besley and Case (1996).

Based on the mandatory retirement rule, we define a dummy variable $young_{it}$ to indicate whether the Provincial Party Secretary at Province i in year t has a promotion chance:¹¹

$$young_{it} = \begin{cases} 1, & \text{if } RPL_{it} \geq 0 \\ 0, & \text{if } RPL_{it} < 0 \end{cases}$$

5.1.3 Proxies for the Number of Vacant Seats in the Political Bureau

The number of vacant seats at the Political Bureau cannot be fully forecasted before every Congress for two reasons. First, the total number of seats is not fixed at every Congress. Second, there is no clear rule about the retirement age of the members of the Political Bureau. We use the number of new leaders who are promoted to the Political Bureau in each Congress to proxy the number of vacant seats at the Bureau before each Congress. Implicitly, we assume that all local leaders have rational expectations about the number of vacant seats before the Congress.

5.2 Empirical Strategy and Results

The specification of our test takes the following form

$$g_{it} = \theta_i + v_T + X_{it} + peakyear_t + X_{it}peakyear_t + \epsilon_{it}.$$

g_{it} is province i 's real capital formation growth in year t . θ_i is the province fixed effect. To avoid convoluting shocks, we also control for term fixed effect v_T in the regression. X_{it} is the determinant of the size of the political cycle. $peakyear_t$ is an indicator of the year when capital formation growth peaks. In the term 1983-1987, $peakyear_t$ takes the value of one in 1985 when most old

¹¹As **mentioned**, the mandatory retirement rule only applies to the leaders at the provincial level, while a limited number of Provincial Party Secretaries are members of the Political Bureau. Such Provincial Party Secretaries are not affected by the retirement rule and we **do not** treat them as lame ducks, even when their RPL is negative.

leaders are replaced, and zero otherwise. In all subsequent years, $peakyear_t$ takes the value of one only in the first year after each Party Congress. These years are 1988, 1993, 1998 and 2003. $X_{it}peakyear_t$ is the interaction of X_{it} and $peakyear_t$. We will be interested in the estimated coefficients of the interaction term. ϵ_{it} is the error. In all subsequent tests, we estimate robust standard errors adjusted for clustering at the province level.¹²

In column 1 of table I, we report the size of the political cycle during 1983-2007. On average, real capital formation growth is 7.3 percentage points higher in peak years than in the other years. This difference is significant at 1%. In columns 2, 3 and 4 of table I, we report the estimation for the effect of the stimulus cost on the size of the political cycle. Our estimates are not only statistically significant, but also economically important. For example, column 2 shows that privatizing roughly 50% of the firms in terms of output can completely eliminate the political cycle, at least from the yearly data. This is consistent with the evidence at the national level. The massive privatization starts in 1997 and the size of the political cycle indeed becomes much smaller than before.

In column 1 of table II, we report the estimation for the effect of the remaining political life on the size of the political cycle. This effect is quantitatively large but only significant at 10%. In columns 2, 3 and 4 of table II, we control for the stimulus cost in the regression. The estimated coefficient for RML_{it} increases slightly and becomes significant at 5%. The reason for this change is as follows. The size of the political cycle is large (see Figure 1) in early years during which the stimulus cost is relatively low. Moreover, there are more old leaders in early years. If we do not control for the stimulus cost as in column 1 of table II, the estimation will be downward biased, as if old leaders generate a larger political cycle. Once the stimulus cost has been controlled for, a clear

¹²One concern about the errors is that they may be correlated across province for two reasons. First, intervention by the central government affects all provinces simultaneously. Second, the rational expectation for the number of vacant seats at the center affects the behavior of all Provincial Party Secretaries within the same term. We report our results separately in tables V-IIIIV with two-way clustered errors which can be regarded as a sensitivity test. The significance levels of all estimated coefficients are only affected slightly.

picture emerges. On average, if the remaining political life increases by one year, the size of the political cycle increases by 0.6 percentage points, which is equivalent to 8.2% of the difference in growth rates between peak years and the other years.

In table III, we report our estimation for the effect of a lame duck on the size of the political cycle. In column 1, we show that the effect is quantitatively large but insignificant when we only include the lame duck factor in the regression. In columns 2 and 3, the estimate coefficient for the lame duck effect becomes larger and significant on the margin of 5% when we control for the stimulus cost in terms of output and labor. There is a discontinuity in the size of the political cycle at the age of 65. The size of the discontinuity is roughly 5 percentage points, equivalent to 68.5% of the difference in growth rates between the peak years and the other years. In column 4, the estimate coefficient for the lame duck effect is also larger than that of column 1 and it is marginally significant at 10%.

In table IV, we report the estimation for the effect of the number of central seats on the size of the political cycle. In column 1, we estimate the linear relationship. The estimated coefficient is quantitatively large and significant at 1%. In column 2, we include the interaction between the square of the number of central vacant seats and the peak year. The results show that there is an inverted U relationship between the number of vacant seats at the central government and the size of the political cycle. Specifically, the size of the political cycle is largest when there are 13 vacant seats, roughly 50% of the total number of Political Bureau Members, and it becomes smaller when the number of vacant seats increases or decreases. In Figure 10, we plot the number of vacant seats on the X-axis and real capital formation growth in the peak years on the Y-axis. We can clearly see the inverted-U relationship between the two variables in the raw data.

Figure 10 here

In the remaining columns of table IV, we include all determinants for the size of the political cycle in our model in the regressions. In columns 3-5 (6-8), we estimate the effect of the remaining political life (lame duck), the stimulus cost with our three respective proxies and the number of vacant central seats on the size of the political cycle. When we include all determinants predicted in our model for the size of the political cycle in the regression, all estimated coefficients have the right signs, which are quantitatively large, and they are all significant at least at 5%.

6 Related Literature

Our theory is related to the investment cycle theory in the Central Planned Economy (Goldmann and Kouba 1969; Oliveira 1960; Kornai 1980; and Bauer 1978, 1988). The main idea of the CPE investment cycle theory is that top leaders in socialist countries are eager to catch up with capitalist countries and therefore stimulate growth whenever possible. When the stimulus is constrained by the production capacity of the bottleneck sectors, the growth rate goes down and when the production capacity recovers, a new round of stimulus begins. Like the investment theory, we show the cause of Chinese inflation after 1976 to be driven by investment growth. But unlike this theory, we show that (i) with the decentralization reform, instead of the central government being driven by the catching-up ideology, the career concern motivated local leaders should account for the economic overheating; (2) with the institutional reform of regular leader change, the timing of the political cycle corresponds to the Party Congress. The difference between the investment cycle theory and our theory can best be illustrated in Figure 11, which plots China's gross capital formation growth since the 1950s, with the red dashed line indicating the year 1977. While regular leader changes since 1977 make the timing of the cycle predictable, market reform makes the price a better signal of economic shortage, based on which the central government can intervene at an earlier stage. Therefore, we can clearly see that the magnitude of the cycle becomes smaller after 1976. Moreover, the

graduate ownership reform after 1976 makes it harder for the local leaders to manipulate the economy and the magnitude of the cycle after 1976 is shrinking.

Figure 11

Regarding the studies on China's growth fluctuations, a small literature notes the stop-go feature of the Chinese economy, but without relating the feature to politics (e.g. Brandt and Zhu 2000, Imai 1994). Zou (1994) is the first to relate the timing of the growth fluctuation to political events, but not to the Party Congress. This study argues that the business cycle is the result of a power struggle in the central government and is driven by leaders' ideology. Specifically, there is an economic boom when the pro-capitalism reformists hold the economic planning power and the economic downturn is due to the fact that the dogmatic adherents of socialism seize the power from the reformists. Zou's study is problematic in the following three respects. First, it is based on anecdotal evidence rather than systematic empirical evidence as in our study. Second, combining Zou's theory with our finding of the correspondence between the timing of the Party Congress and the business cycle, it is very hard to explain why the pro-capitalism central leaders always get power in the first year after the Party Congress and always lose power in the following year. Third, before 1992 there is a debate at the central level about the necessity of reform. But after Deng's 1992 Southern tour, reform becomes the consensus of the whole Party (see e.g. Song, Storesletten and Zilibotti 2011 for a brief description). However, the pattern of the political business cycle still holds after 1992, which is inconsistent with Zou's theory.

Hu (1994) is the only paper¹³ to notice the correlation between the GDP growth rate and Party Congress when applying the investment cycle theory in CPE to explain China's growth fluctuation after 1949. Using Hu's terminology, high growth follows the "political mobilization shock", which involves an

¹³There are two informal articles with the same idea of Hu (1994) by someone at a Japanese institute. The links are as follows: 1) <http://www.rieti.go.jp/en/china/04071401.html>

2) <http://www.rieti.go.jp/en/china/10102901.html>

expansionary policy from the central government, while the stagnation is due to the "political order shock", which involves a contractionary policy from the central government. When studying the growth fluctuation in the post Mao period (1977-1993, see Figure 12), Hu finds that China's GDP growth rates in this period are most likely to peak in either the Party Congress Year (1987 and 1992) or in the first year after the Party Congress Year and, on average, there is a jump in the GDP growth rate in the Party Congress Year (Figure 13).

Figure 12 and 13 here

Hu argues this occurs since after 1976, the central government initiates the "political mobilization" of expansion at the regular Party Congress and then the central government changes to the "political order" of contraction when the economy is overheated. Hu's explanation is problematic in the following respects. First, since every Party Congress is held near the end of the year, the "political mobilization", if it exists, should only account for the increase in the GDP growth rate after the Congress Year, but not the increase in the Congress year. Second, there is one Plenum of the Central Committee every year and many important decisions are made in the Plenum. If the "political mobilization" needs the consensus of the Central Committee, the central government can initiate it in any year and the Party Congress year may not always be the right point in time. Third, there has indeed been no "political mobilization" in the Party Congresses held after 1976. The focus of the Party Congress is the Party's political issues, among which leader change is the most important. The major economic issues are discussed in the Central Economic Work Conference, which has regularly been held by the central government at the end of every year since 1994.¹⁴ At this conference, the central leaders review the country's economic work in the past year, and map out economic plans for the coming year. "Political mobilization" has never been the theme of the Conference. There are two major differences between the studies of Hu and our study:

¹⁴http://news.xinhuanet.com/ziliao/2005-12/01/content_3860628.htm

First, instead of GDP growth, we focus on capital formation growth, which has been the driving force of China's GDP growth and is more volatile. A clear picture emerges. Reexamining Figure 3, we can see that while the capital formation growth rate increases whenever the central government intervention has been completed, it is most likely to peak in the first year after the Congress when the new provincial leaders get power. As most interventions finish in the year before the Party Congress Years, capital formation growth (GDP growth) starts to increase in the Party Congress Year. This explains Hu's finding. But the dramatic increase in capital formation growth after each Party Congress year, which is the evidence motivating our study, is not obvious in the GDP growth rate. Therefore, focusing on GDP growth can be misleading as it seems to show that some pre-Congress factors are driving the increasing GDP growth rate in the Congress Year.

Second, we argue that following the decentralization reform, the problem of economic overheating is due to the provincial leaders rather than the central government. In Figure 14, we plot the time series of gross capital formation growth and the number of provinces with a change of the Provincial Party Secretary.

Figure 14 Here

Besides the high correlation of the two series in the Party Congress Years, we can see that when the number of leader changes increases sharply in 1985, which is not a Party Congress Year, there is also a dramatic increase in the capital formation growth rate. The sequence of the political events in 1982-1985 indeed provides a natural experiment to test the theories of Hu and ourselves. In 1982, the central government announces the mandatory retirement rule on leader's age. This rule stipulates that a provincial leader who is not in the Political Bureau must retire at the age of 65. At that point in time, most Provincial Party Secretaries are older than 65. At the Congress in 1982, the old provincial leaders are not replaced by the central government, however. Most replacements

take place in early 1985. At the end of 1985, a special Congress is held and the old provincial leaders formally resign from the Central Committee. The capital formation growth rate increases moderately between 1982 and 1984, as the new rule affects the incentive of the old Provincial Party Secretaries. Once the young Provincial Party Secretaries get into power in 1985, there is a dramatic increase in growth and the central government intervenes in 1986. This is just as if there is a normal Congress held at the end of 1984 and growth increases dramatically after the Congress. This is a clear example showing that it is the provincial leader change at the Party Congress, not the Party Congress itself, that affects the timing of the business cycle.

More broadly, our paper is part of the extensive studies on the distortion of the agent's incentive arising from career concerns in principal-agent models. While the argument has initially been that the career concern serves as an implicit incentive, i.e. a substitute for the explicit incentive, for the agents to exert more effort (Fama 1980), later studies show that although career concerns may affect the agents' incentive in the right direction, the magnitude is wrong in general (see e.g. Holmström 1982; Narayanan 1985; Holmström and Ricart i Costa 1986; Scharfstein and Stein 1990; Zwiebel 1995; Prendergast and Stole 1996; Dewatripont, Jewitt, and Tirole 1999a,b). Consistent with the main result of this literature, our theory shows that too strong a career concern by the local leaders hurts the central government. Specifically, our model predicts that the short-run growth stimulus, inflation and the probability of central government's intervention are all positively related to the size of the ego rent that is due to promotion. One normative implication of our theory is thus that reducing the size of the ego rent, i.e. basically the power and the privilege of the leaders at all levels, is economically beneficial to the central government. For various political and other reasons that we will discuss in later sections, however, such a fine-tuning of incentives may be difficult to achieve.

7 Discussions

The fundamental cause of China's political business cycle after 1976 is the political institutions. Like a Western democratic regime, the change of Chinese leaders is regular and institutionalized. Unlike a Western democratic regime, the appointment of China's leaders to a large extent depends on the central government. In the post-reform era, the local leaders are evaluated according to their economic performance. This gives the local leaders a strong incentive to promote local growth and their behavior inflates the whole economy. Intervention by the central government reduces inflation and also hurts output growth. The cycle is thus an inevitable outcome of the political institutions.

We conclude our study with a few discussions.

7.1 Broader Interpretation of S

In our paper, we focus on the local leaders' effort in investment to stimulate growth. More broadly, the S in our model can be explained as any effort of the local leaders to stimulate growth within their term. Such behavior may affect the composition of the investment project, i.e, the local leader has an incentive to choose the project with high short-run growth while disliking the project with low short-run growth but perhaps with a larger net present value. Such a current bias may also involve the abuse of power. For example, the local leader may kick out a farmer from his house and turn the land into a factory, which increases current growth. In this sense, corruption and growth are not mutually exclusive (see Lindbeck 2008 for a detailed analysis of this point). Another interesting issue is public debt, which can increase current growth at future cost and generate a conflict of interest between successive local leaders. We leave these as future research topics.

7.2 China Mode

There has been a growing interest in the China Mode of governance (growth) after the crisis. However, no study is clear about what actually is the China Mode. Although our motivation in this paper is to study the mechanism of China's growth fluctuation, we have implicitly explored, at least from the political economist's perspective, the nature of the China Mode, which can be summarized as follows:

1. Government directed economic growth.
2. Decentralization of economic power to the local government.
3. Political centralization of local leaders' evaluation and promotion.
4. Central government intervention when necessary.

Many rules in China have changed since 1976. But the above four points have never been changed and are very unlikely to be changed in the near future. They can be regarded as the fundamental institutions after 1976. Among the four points, 3 and 4 are essential for the speed and sustainability of growth in the short run, both involving a high degree of centralization. In this sense, our study is in the spirit of Blanchard and Shleifer (2001) who point out that some degree of political centralization is essential for the success of decentralization. However, centralization creates rents for central leaders. This gives the local leaders the incentive to signal the competence that the central government values, to get promoted. The political cycle is thus likely to be repeated in the future unless there is institutional change. If the degree of centralization cannot be reduced, we expect, based on our model, that any institutional change that can check and balance the power of local leaders can reduce the size of the cycle. Political modernization, which involves democracy and free media, may be a solution, although not necessarily the only one. Qian et al. (2011) indeed show that at the village level, the Chinese village leaders chosen through election carry out more pro-villager policies. Summing up, the China Mode does

not differ fundamentally from the Western Mode and reforming in the Western direction actually makes the China Mode work better.

7.3 The Future of Political Business Cycles in China

After China's entry into WTO in 2001, the Chinese economy is being increasingly integrated into the world economy and the inflationary pressure from the international dimension has been increasing. Specifically, the Chinese Central Bank has to purchase an increasing amount of foreign currency, which comes from trade surplus, foreign direct investment and the owners hot money that expect the Chinese Yuan's to appreciate (see Figure 15 for the time series of the ratio of the Central Bank's position for the foreign exchange purchase over loans, M1 and M2).

Figure 15 here

Such a purchase does not only lead to the accumulation of a huge foreign reserve, but also to an increase in the money supply. This source of inflationary pressure is particularly important after July 2005 when the exchange rate of Yuan starts to float. In the year 2007, which is a Party Congress Year, the Chinese central government intervenes for the first time in the Party Congress Year. The growth rate has been decreasing until late 2008 when the central government starts to stimulate the economy, following the financial crisis. With this additional source of inflationary pressure from the international dimension, the timing of the investment growth peak is affected. The beginning of period 1 in our model does not coincide with the Party Congress and the time when the local leaders have the economic decision power. This is important for analyzing China's business cycle in the future.

We re-state our result with some caution: without external shocks, the peak year of China's capital formation growth most probably comes in the first year after the Central Party Congress year, where most top provincial leaders are replaced. Moreover, political cycles may spread to other dimensions used by

the central government to evaluate the local leaders in the future.

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9 Appendix: Assumption 2

If the central government intervenes in both periods, **total** output in **periods** 1 and 2 is $2w$ and **inflation** will be zero in both periods. Moreover, as there is no signal about the competence of any local leader, the competence of any promoted local leader in the third period is the average, $\bar{\theta}$. In this case, the aggregate utility of the central government in three periods is

$$W^I = 2aw + cm\bar{\theta}.$$

If the central government decentralizes the power in the first **periods** and **retains** the right to intervene in the second period, the utility of the central government in three periods is

$$W = (a\bar{\theta}s^* - b\pi_1^2) + \Pr(I = 1)aw + [1 - \Pr(I = 1)] [a\bar{\theta}s^* - b(\pi_1 + \eta)^2] + c \int_0^m \theta_j dj.$$

Comparing W^I and W , the benefits of decentralization **are first**

(1) Higher expected output in the first two periods ($\bar{\theta}s^* > w$).

(2) Higher expected competence of the promoted leaders in the third period.

This is due to the fact that the central government can extract the signal of local leaders' competence from their output.

The cost of decentralization **is** first higher inflation in both periods.

Other things given, decentralization first dominates centralization in both periods when the intervention cost is high (low w), the disutility of inflation is low (low b) and the value of the promoted leaders' competence is high (high c). To make our analysis non-trivial, we focus on the set of parameters which ensures $W > W^I$.

Figure 1: Political Investment Cycle

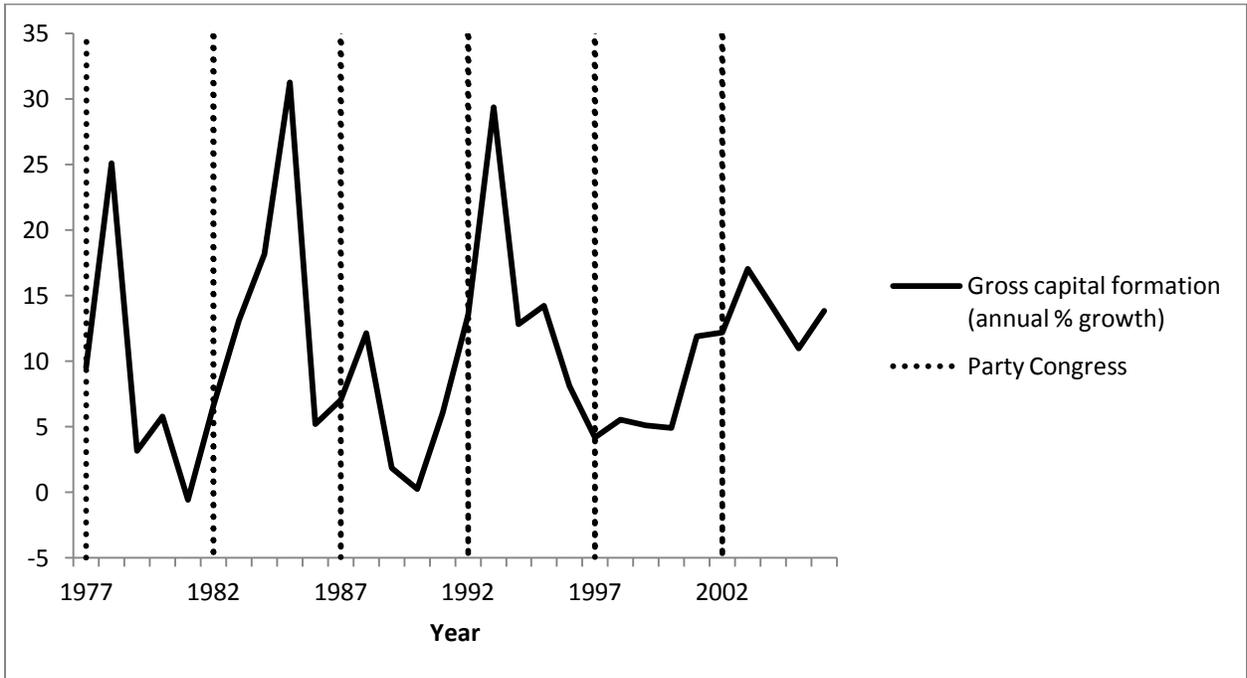


Figure 2: Average Capital Formation Growth around the Party Congress

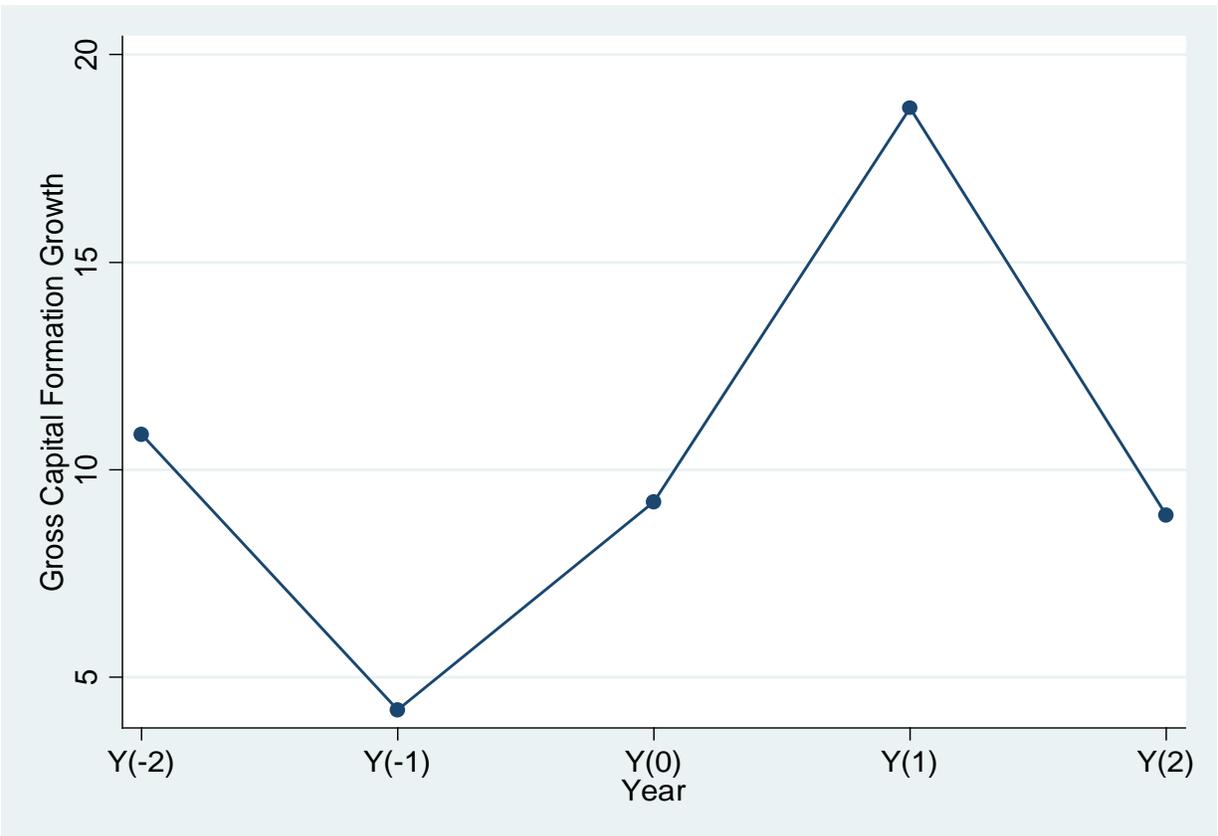


Figure 3: The Timing of Interventions

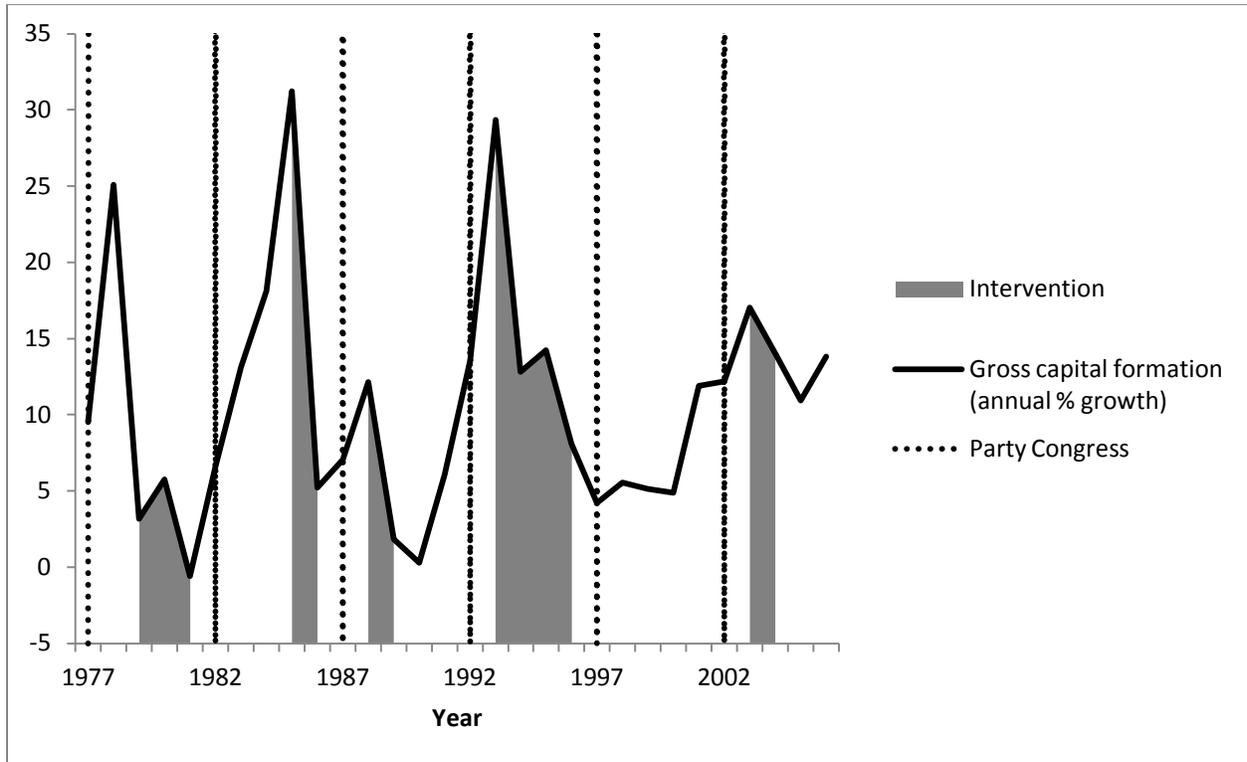


Figure 4: The Political Structure

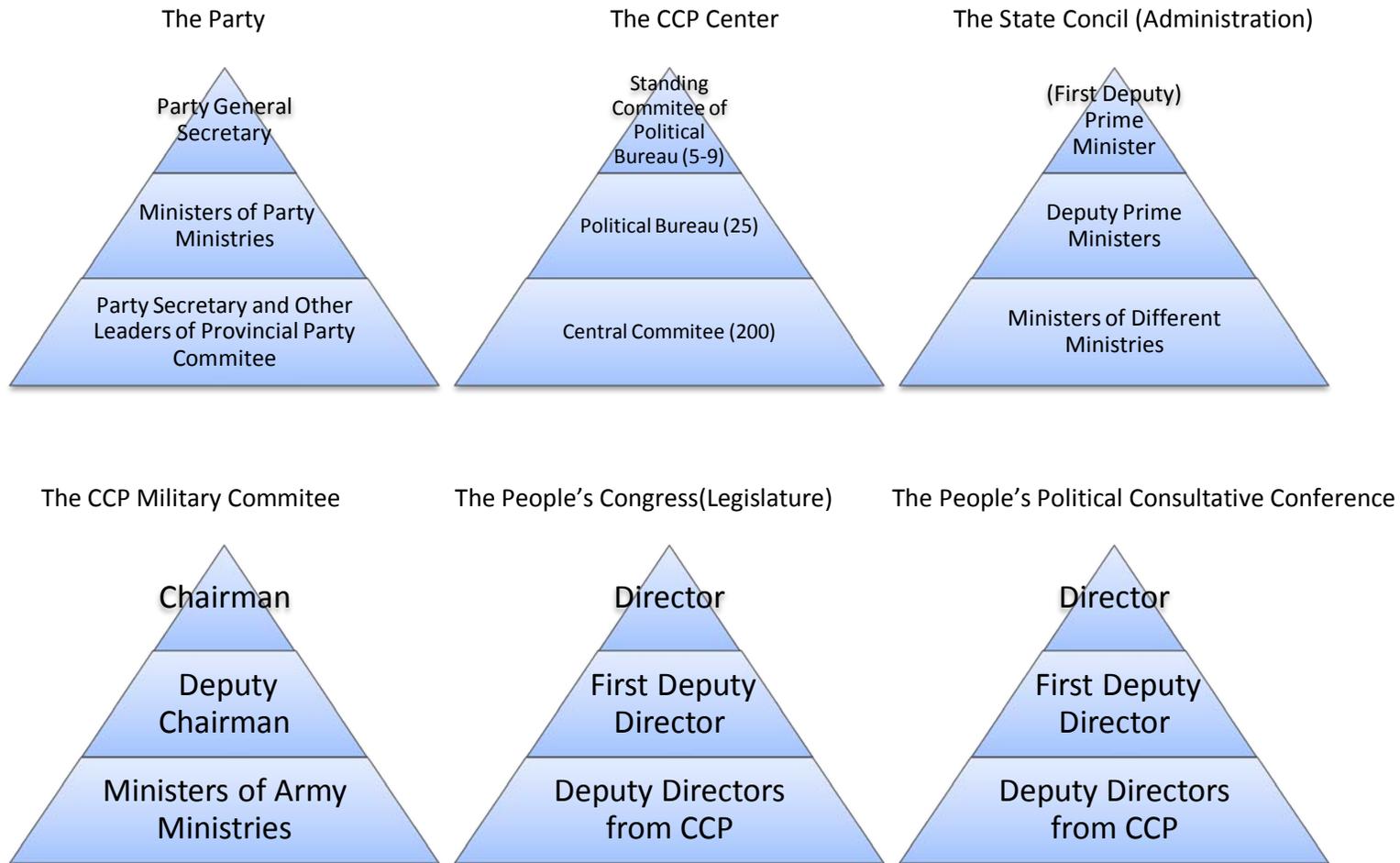


Figure 5: Capital Formation Growth and Net Domestic Growth

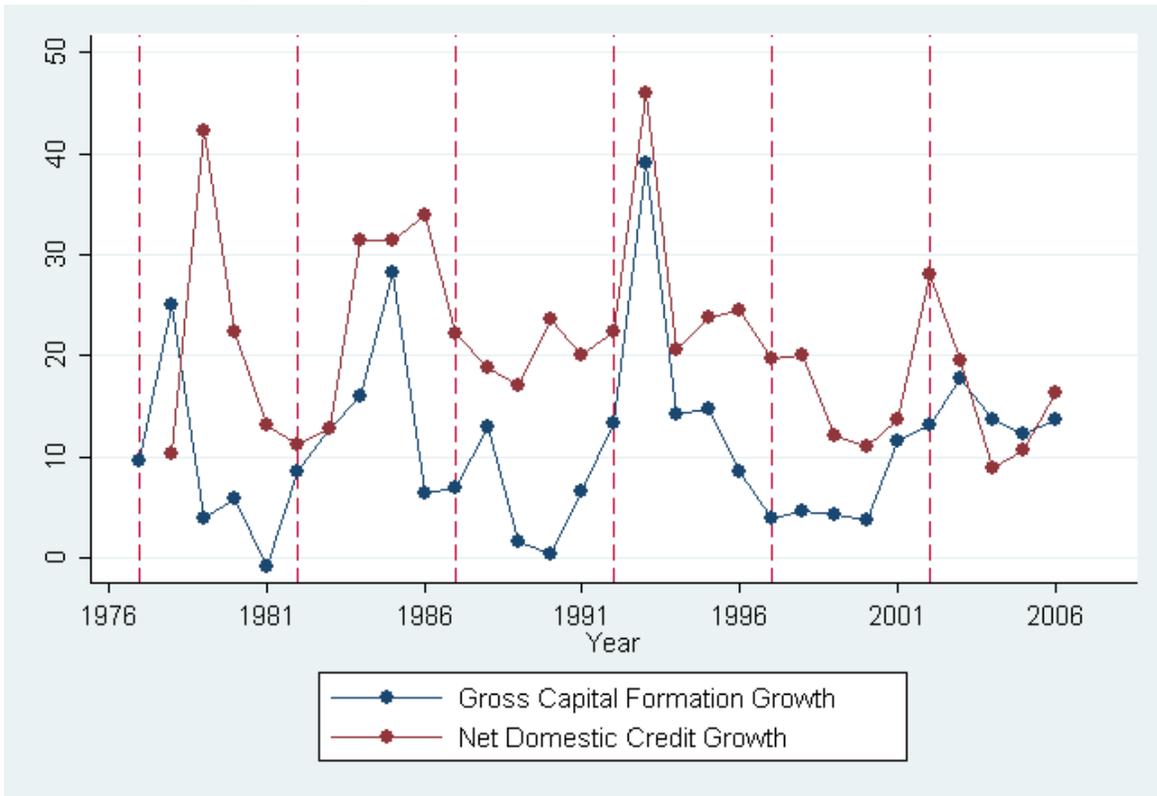


Figure 6: Gross Capital Formation Growth and M2 Growth

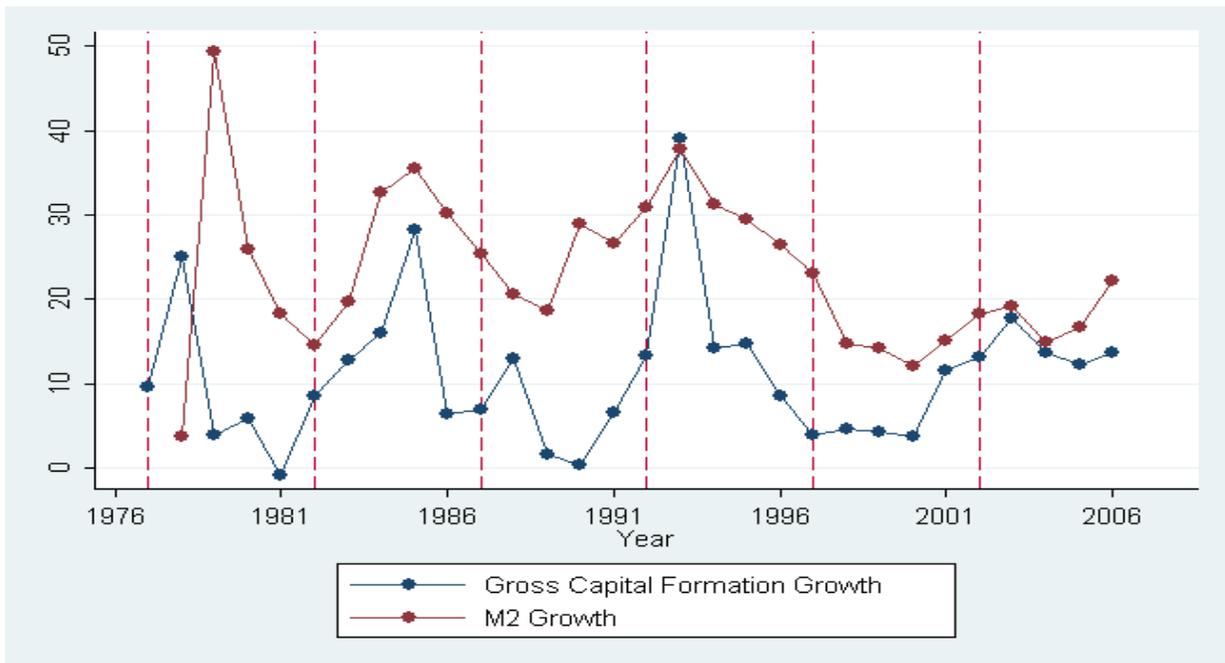


Figure 7: Gross Capital Formation Growth and Inflation before 1977

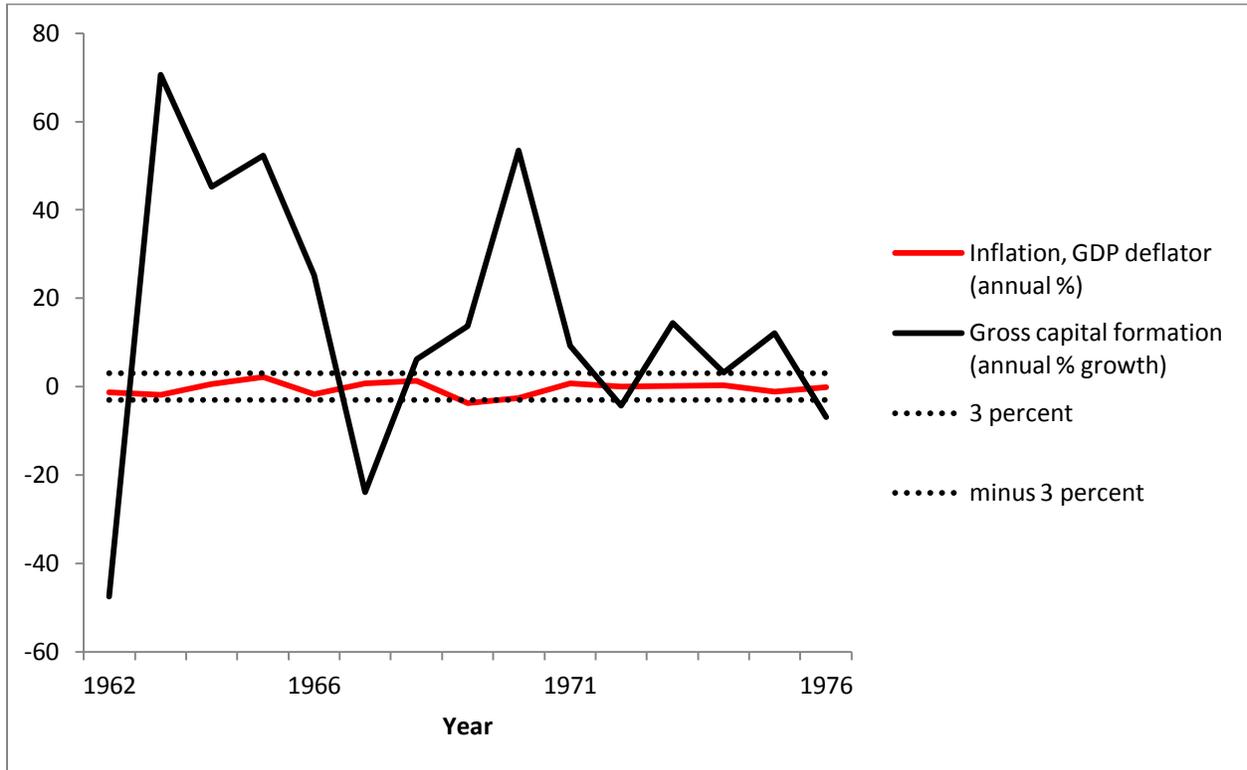


Figure 8: Gross Capital Formation Growth and Inflation after 1977

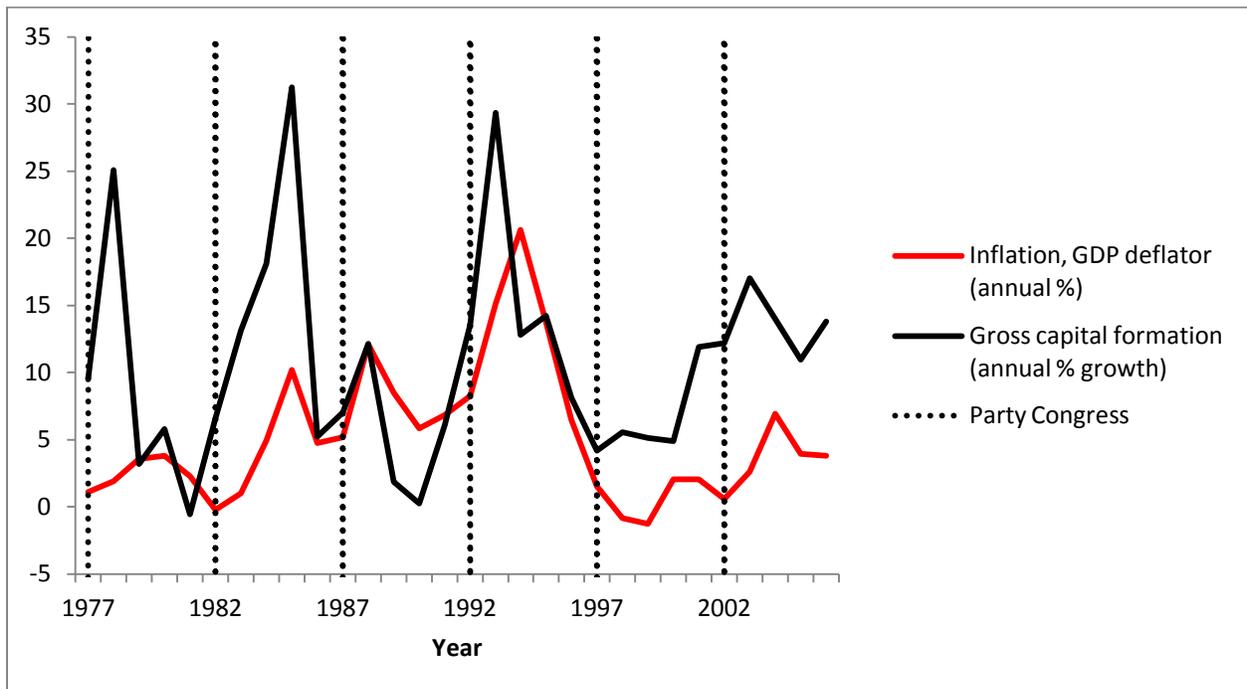


Figure 9: Fixed Asset Investment Growth, Central vs Local

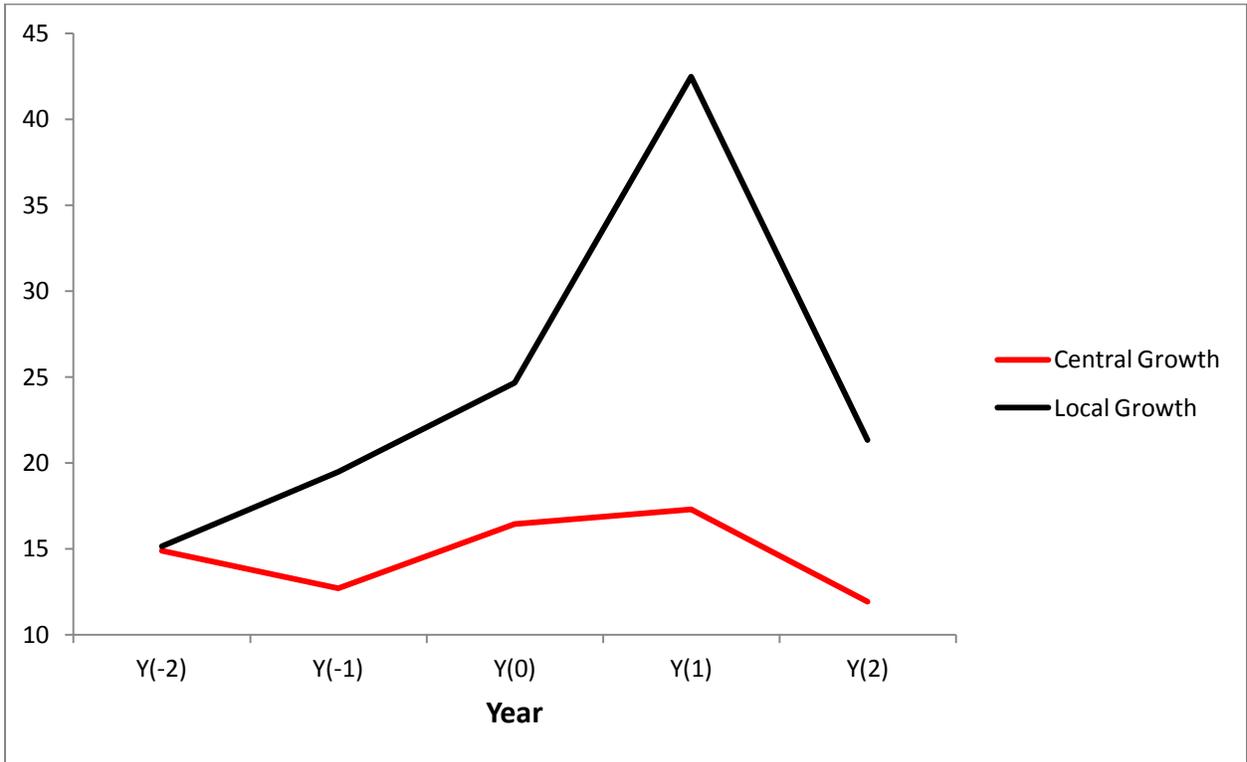


Figure 10: The Number of Central Vacancies and the Growth in Peak Years

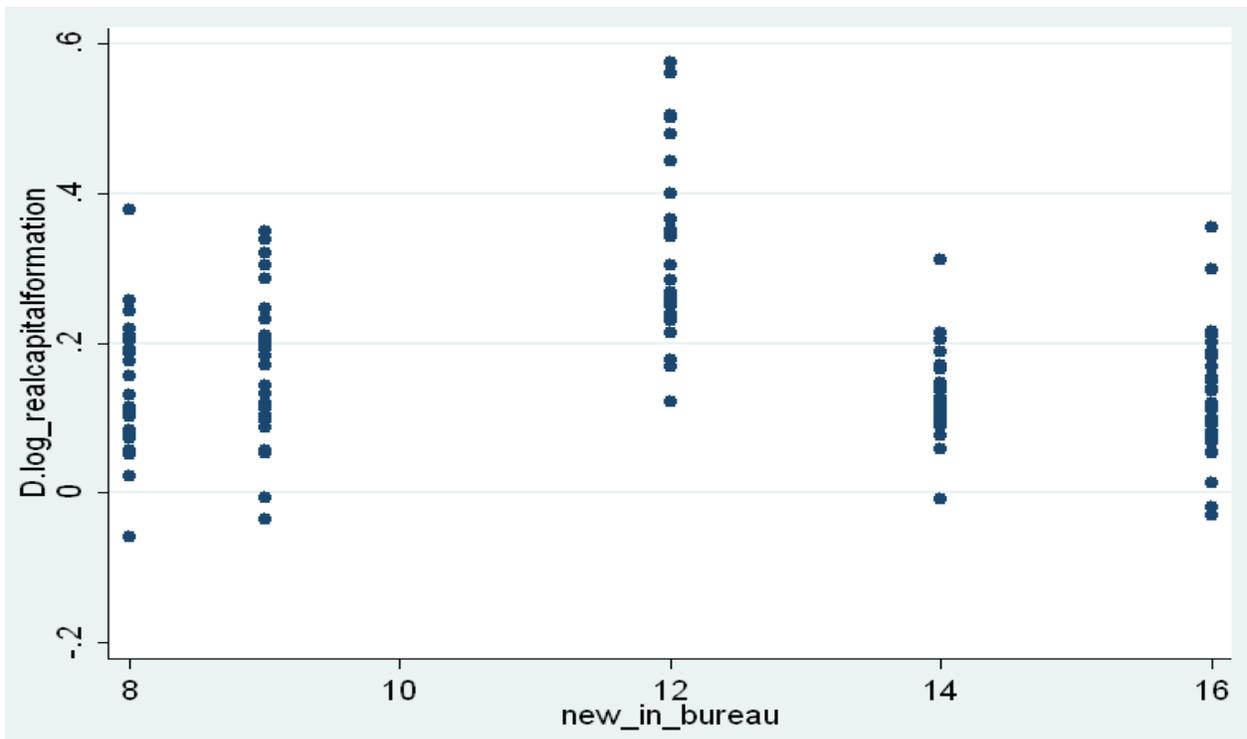


Figure 11: Capital Formation Growth before and after 1977

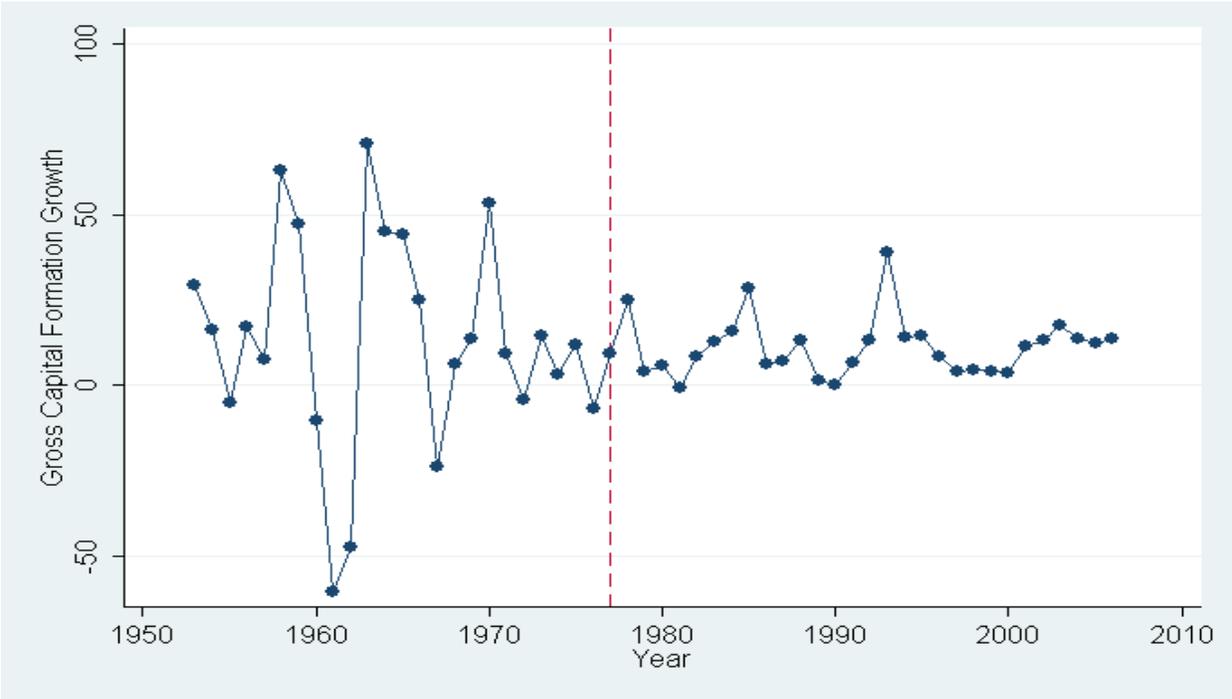


Figure 12: GDP Growth

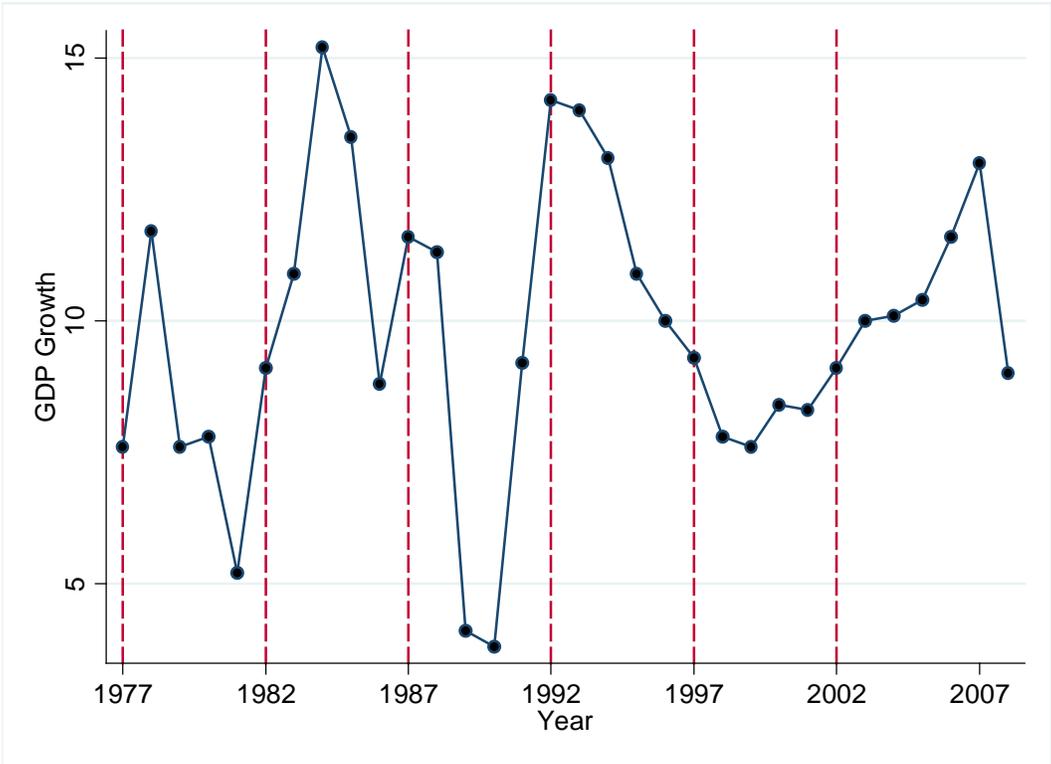


Figure 13: Average GDP Growth Rate around the Party Congress

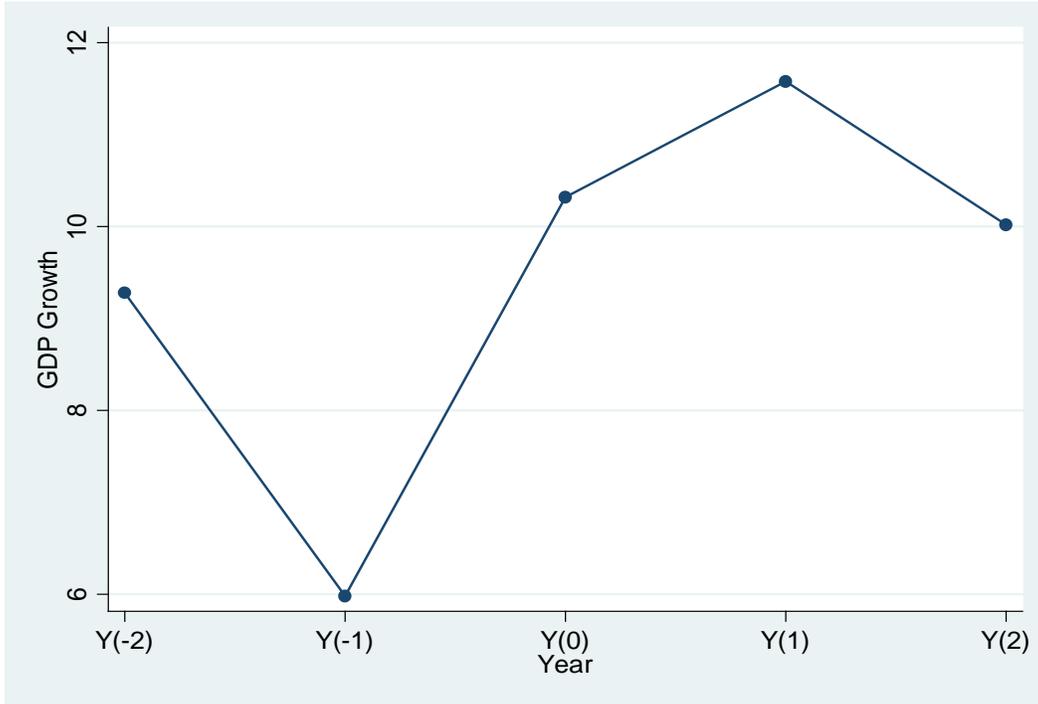


Figure 14: Number of Provinces with a Secretary Change and Gross Capital Formation Growth

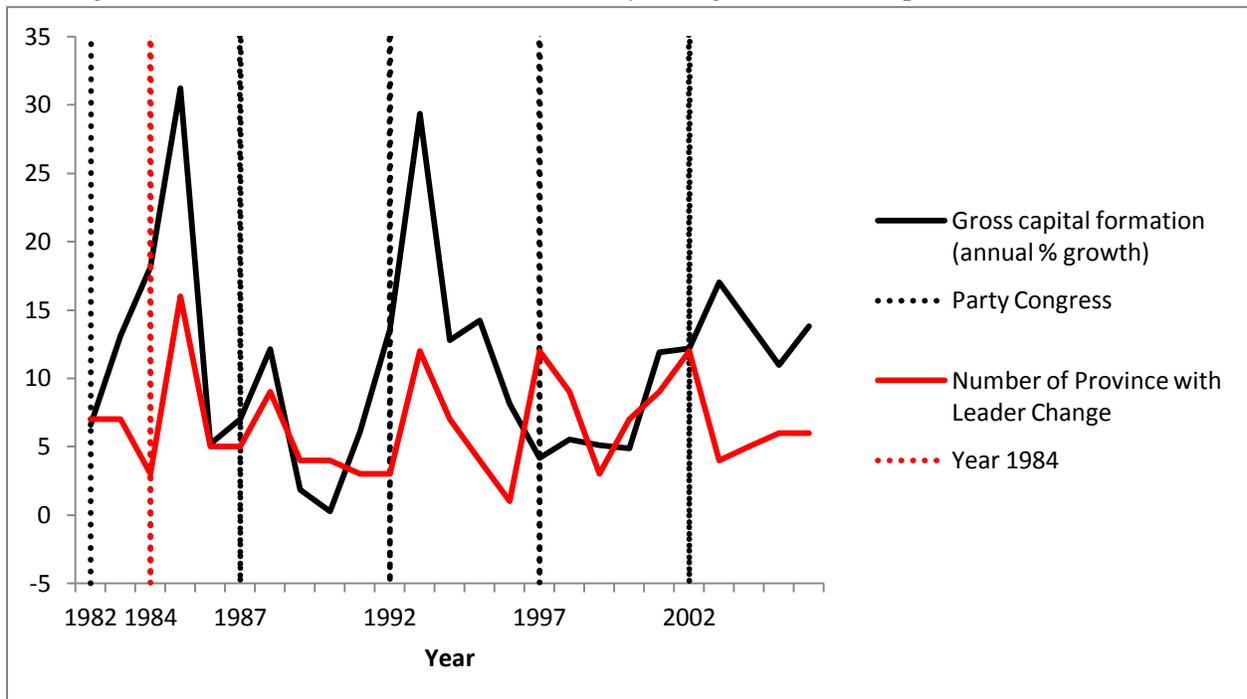


Figure 15: International Inflationary Pressure

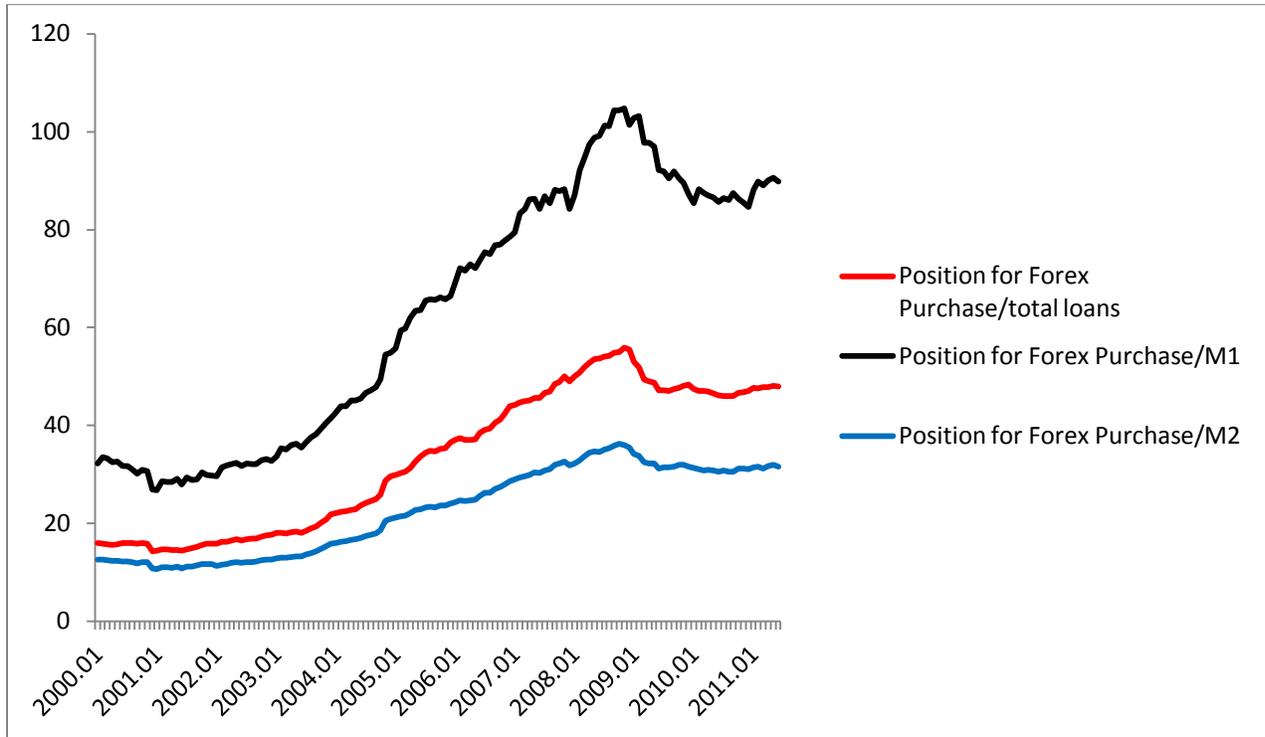


Table I: Stimulus Cost and the Magnitude of Cycle

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
peakyear	0.073***	-0.043	-0.244***	-0.128***
	(0.010)	(0.026)	(0.055)	(0.036)
sc_output_ratio		-0.053		
		(0.034)		
sc_output_ratio*peakyear		0.167***		
		(0.032)		
sc_labor_ratio			0.077	
			(0.055)	
sc_labor_ratio*peakyear			0.345***	
			(0.060)	
sc_fai_ratio				-0.070*
				(0.063)
sc_fai_ratio*peakyear				0.280***
				(0.054)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.217	0.248	0.241	0.237

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering at the province level. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table II: Remaining Political Life and the Magnitude of Cycle

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
peakyear	0.059***	-0.061**	-0.281***	-0.162***
	(0.012)	(0.025)	(0.047)	(0.039)
rpl	-0.002**	-0.002**	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
rpl*peakyear	0.005*	0.006**	0.006**	0.006**
	(0.003)	(0.002)	(0.002)	(0.003)
sc_output_ratio		-0.055*		
		(0.033)		
sc_output_ratio*peakyear		0.171***		
		(0.028)		
sc_labor_ratio			0.069	
			(0.057)	
sc_labor_ratio*peakyear			0.369***	
			(0.050)	
sc_fai_ratio				-0.073
				(0.061)
sc_fai_ratio*peakyear				0.305***
				(0.053)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.226	0.260	0.253	0.250

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering at the province level. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table III: Lame Duck and the Magnitude of Cycle

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
peakyear	0.049*	-0.089**	-0.307***	-0.167***
	(0.025)	(0.038)	(0.063)	(0.047)
Young	-0.020	-0.029*	-0.022	-0.025
	(0.017)	(0.016)	(0.017)	(0.017)
young*peakyear	0.031	0.051*	0.049*	0.040
	(0.028)	(0.026)	(0.027)	(0.026)
sc_output_ratio		-0.066**		
		(0.032)		
sc_output_ratio*peakyear		0.178***		
		(0.033)		
sc_labor_ratio			0.068	
			(0.058)	
sc_labor_ratio*peakyear			0.373***	
			(0.060)	
sc_fai_ratio				-0.082
				(0.064)
sc_fai_ratio*peakyear				0.290***
				(0.054)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.220	0.255	0.247	0.242

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering at the province level. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table IV: The Number of Central Seats and the Magnitude of Cycle

Dependent Variable	Real Capital Formation Growth							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
peakyear	-0.028	-1.002***	-0.783***	-1.026***	-0.980***	-0.906***	-1.144***	-1.092***
	(0.037)	(0.178)	(0.183)	(0.170)	(0.172)	(0.197)	(0.193)	(0.197)
RPL			-0.002**	-0.002**	-0.002**			
			(0.001)	(0.001)	(0.001)			
RPL*peakyear			0.0057**	0.0057**	0.006**			
			(0.0026)	(0.0027)	(0.003)			
young						-0.032*	-0.026	-0.029
						(0.017)	(0.017)	(0.018)
Young*peakyear						0.059**	0.058**	0.054**
						(0.026)	(0.026)	(0.025)
sc_output_ratio			-0.050			-0.061*		
			(0.035)			(0.035)		
sc_output_ratio*peakyear			0.115***			0.117***		
			(0.039)			(0.040)		
sc_labor_ratio				0.084			0.084	
				(0.055)			(0.057)	
sc_labor_ratio*peakyear				0.221***			0.218***	
				(0.065)			(0.068)	
sc_fai_ratio					-0.044			-0.052
					(0.063)			(0.066)
sc_fai_ratio*peakyear					0.191***			0.169**
					(0.068)			(0.066)
number of seats*peakyear	0.009***	0.184***	0.134***	0.153***	0.156***	0.150***	0.168***	0.174***
	(0.003)	(0.031)	(0.032)	(0.031)	(0.031)	(0.033)	(0.032)	(0.033)
number of seats_square*peakyear		-0.007***	-0.006***	-0.006***	-0.006***	-0.006***	-0.007***	-0.007***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Province fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.226	0.255	0.274	0.273	0.272	0.2673	0.271	0.269

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering at the province level. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table V: Stimulus Cost and the Magnitude of Cycle (Two Way Clustered Errors)

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
peakyear	0.073***	-0.043	-0.244***	-0.128*
	(0.029)	(0.026)	(0.094)	(0.070)
sc_output_ratio		-0.053		
		(0.039)		
sc_output_ratio*peakyear		0.167***		
		(0.059)		
sc_labor_ratio			0.077	
			(0.085)	
sc_labor_ratio*peakyear			0.345***	
			(0.124)	
sc_fai_ratio				-0.070*
				(0.088)
sc_fai_ratio*peakyear				0.280**
				(0.117)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.217	0.248	0.241	0.237

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering **BOTH at the province and the year level**. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table IV: Remaining Political Life and the Magnitude of Cycle (Two Way Clustered Errors)

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
Peakyear	0.059**	-0.061**	-0.281***	-0.162**
	(0.026)	(0.029)	(0.092)	(0.079)
Rpl	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
rpl*peakyear	0.005	0.006*	0.006*	0.006
	(0.004)	(0.0036)	(0.0034)	(0.004)
sc_output_ratio		-0.055		
		(0.037)		
sc_output_ratio*peakyear		0.171**		
		(0.054)		
sc_labor_ratio			0.069	
			(0.087)	
sc_labor_ratio*peakyear			0.369***	
			(0.117)	
sc_fai_ratio				-0.073
				(0.088)
sc_fai_ratio*peakyear				0.305***
				(0.123)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.226	0.260	0.253	0.250

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering **BOTH at the province and the year level**. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table IIV: Lame Duck and the Magnitude of Cycle (two way clustered errors)

Dependent Variable	Real Capital Formation Growth			
	(1)	(2)	(3)	(4)
Peakear	0.049	-0.089**	-0.307***	-0.167*
	(0.034)	(0.044)	(0.111)	(0.089)
Young	-0.020	-0.029	-0.022	-0.025
	(0.024)	(0.023)	(0.023)	(0.023)
young*peakear	0.031	0.051*	0.049*	0.040
	(0.026)	(0.029)	(0.030)	(0.028)
sc_output_ratio		-0.066**		
		(0.035)		
sc_output_ratio*peakear		0.178***		
		(0.061)		
sc_labor_ratio			0.068	
			(0.087)	
sc_labor_ratio*peakear			0.373***	
			(0.131)	
sc_fai_ratio				-0.082
				(0.092)
sc_fai_ratio*peakear				0.290**
				(0.124)
Province fixed effect	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES
R-squared	0.220	0.255	0.247	0.242

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering **BOTH at the province and the year level**. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.

Table IIIV: The Number of Central Seats and the Magnitude of Cycle (two way clustered errors)

Dependent Variable	Real Capital Formation Growth							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
peakyear	-0.028	-1.002**	-0.783**	-1.026**	-0.980**	-0.906***	-1.144***	-1.092**
	(0.037)	(0.440)	(0.349)	(0.380)	(0.390)	(0.372)	(0.413)	(0.430)
RPL			-0.002	-0.002**	-0.002			
			(0.002)	(0.001)	(0.002)			
RPL*peakyear			0.0057*	0.0057*	0.0058*			
			(0.0033)	(0.0027)	(0.0033)			
young						-0.032	-0.026	-0.029
						(0.024)	(0.024)	(0.025)
Young*peakyear						0.059*	0.058*	0.054*
						(0.030)	(0.030)	(0.031)
sc_output_ratio			-0.050			-0.061*		
			(0.037)			(0.034)		
sc_output_ratio*peakyear			0.115**			0.117*		
			(0.056)			(0.061)		
sc_labor_ratio				0.084			0.084	
				(0.080)			(0.080)	
sc_labor_ratio*peakyear				0.221			0.218*	
				(0.142)			(0.152)	
sc_fai_ratio					-0.044			-0.052
					(0.085)			(0.087)
sc_fai_ratio*peakyear					0.191***			0.169
					(0.120)			(0.120)
number of seats*peakyear	0.009***	0.184**	0.134**	0.153***	0.156**	0.150**	0.168**	0.174**
	(0.003)	(0.081)	(0.065)	(0.074)	(0.073)	(0.068)	(0.079)	(0.080)
number of seats_square*peakyear		-0.007**	-0.006**	-0.006**	-0.006**	-0.006**	-0.007***	-0.007**
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Province fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Term fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.226	0.255	0.274	0.273	0.272	0.2673	0.271	0.269

Note: in parenthesis are standard errors which are robust against heteroskedasticity and adjusted for clustering **BOTH at the province and the year level**. * indicates significance at the 10 percent level, ** significance at the 5 percent level and *** significance at the 1 percent level.