Zombie Firms and Political Influence on Bank Lending in China*

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January 2019

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Abstract

Zombie firms—indebted firms that are unprofitable and depend on banks or government bailouts for continued operation—are a drag on the economies in which they operate. The existence of zombie firms has been attributed to banks continuing to provide forbearance lending for their own interests. But local political officials may also contribute to keeping zombie firms alive, even in settings without the pressures of electoral cycles. Studying loans in China, I examine how bank lending is influenced by local officials and tracks their appointment cycle. I find that there is significant targeting of firms: lending to zombie firms increases in local officials' last service year and exhibits an increasing trend across the appointment cycle, while lending to non-zombie firms shrinks in the last service year and decreases across the cycle. I also find that influence is selective: local officials pressure small local banks more to lend to unprofitable firms, but their ability to affect large nationally operated banks appears to be limited.

*Eric Verhoogen, Jack Willis, and Michael Best provided exceptional guidance for this project. I thank Francesco Bripi, Gregory Cox, Francois Gerard, Jonas Hjort, Chengcheng Jia, Suresh Naidu, Cristian Kiki Pop-Eleches, Tobias Salz, Rodrigo Soares, Leo Wang, Scott Weiner, Jungsoo Yoo, Danyan Zha, Qing Zhang, and numerous seminar participants for valuable comments. All errors are mine.

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1 Introduction

Corporate credit growth in China has averaged around 20% per year between 2009 and 2015. This credit boom is related to the large increase in investment after the global financial crisis. However, investment efficiency has fallen, and there is evidence of overcapacity in several industries.[1] The financial performance of firms has deteriorated steadily, affecting asset quality in financial institutions. Loans potentially at risk account for 15.5% of total commercial bank loans to the corporate sector (IMF, 2016). In particular, a large group of "zombie firms" has been detected. Zombie firms, as the name suggests, are the "walking dead" in the economy. They are "dead" in the sense that these firms are highly indebted and financially distressed—their profitability is so low that they cannot pay back the interest or principal on their loans. On the other hand, they are "walking", as these firms continue operating in the market while depending heavily on banks or government bailouts, though they would have exited the market otherwise.

In this paper, I examine one possible reason for the prevalence of zombie firms in China: the political cycle of local party officials who have an incentive to influence bank lending in order to improve their career prospects within the party. Previous work has highlighted an electoral cycle in lending (Dinc, 2005; Cole, 2009; Carvalho, 2014; Englmaier and Stowasser, 2017), but to my knowledge, a political cycle has not been documented in a bureaucratic system such as that of China. I provide evidence that although local party officials are appointed rather than elected, bank lending is manipulated by prefecture Party Secretaries (the highest ranking official in a prefecture) and tracks their appointment cycles. Specifically, lending to zombie firms increases at the end of the cycle mainly through local banks when a new appointment is close, while lending to non-zombie firms is the greatest early in the cycle through national banks.[2]

My identification strategy is straightforward. In China, each prefecture Party Secretary has a scheduled service term of five years. At the end of the term, a higher-level Party Committee (province-level in this case) will make a (re-)appointment decision on the incumbent prefecture Party Secretary: promotion, demotion, stay, or transfer. A new prefecture Party Secretary will be assigned if the incumbent leaves. By comparing bank lending in the critical appointment year—the last service year in the term of service prior to scheduled appointment—to lending in off-appointment years, I can test for potential political manipulation of lending to serve the career

[1] See European Union Chamber of Commerce (2016) for a review of China's overcapacity problem.

[2] In this paper, banks are categorized as local banks or national banks by operating scope, not by ownership structure. A bank is defined as a national bank if it has local operating branches across the country. National banks include both state-owned banks and joint-stock banks. A bank is defined as a local bank if it operates in one prefecture or several adjacent prefectures. Local banks include urban/rural commercial banks, credit unions, and village and town banks. For details on banks in China, refer to Section 2.

advancement interests of local Party Secretaries. Using a dataset on individual loans of publicly listed firms and aggregating them to the prefecture level, I can examine whether the intensity of political influence on bank lending varies by the type of firms and banks.

Based on the dataset on individual loans from national and local banks to all publicly listed firms in China from 2000 to 2016, I find that bank lending does not respond to the last service year or appointment year of Party Secretaries on average. But this average effect masks significant heterogeneity: lending to zombie firms dramatically increases in the last service year (by 228%) and exhibits an increasing trend across the cycle, while lending to non-zombie firms shrinks in the last service year (by 87%) and decreases gradually across the cycle. In addition, the political influence on banks is selective: Party Secretaries can pressure small local banks more to lend to zombie firms, but their ability to influence large nationally operated banks is limited. I also find suggestive evidence that the effort of bailing out zombie firms does not improve firm performance later on: zombie firms show lower efficiency after a new Party Secretary is assigned, while their profitability does not change significantly. Lending to zombie firms is a short-term instrument used by Party Secretaries to boost local economic performance in the critical promotion period, and it does appear to help Party Secretaries move up the career ladder.

This paper brings together two strands of literature: the literature on political cycles in lending and the literature on zombie firms. First, this paper provides evidence of the effect of a political cycle in a bureaucratic system as opposed to an electoral system. Motivated by the idea of pre-electoral manipulation of macroeconomic and fiscal policies to enhance the probability of electoral success, numerous empirical studies on political cycles have been done in both developed and developing countries.[3] It is widely believed that opportunistic political cycles are stronger for developing countries that are new democracies, where weak institutional structures allow for greater political discretion over policy instruments (Akhmedov and Zhuravskaya, 2004; Shi and Svensson, 2006; Brender and Drazen, 2008). This paper is most closely related to the literature on political cycles in lending. There is cross-country evidence of increased lending from government-owned banks in election years relative to private banks (Dinc, 2005). Similar patterns and tactical redistribution (more loans are made in more competitive areas) are found in India for agricultural credit lent by government-owned banks (Cole, 2009), in Brazil for state-owned banks to shift employment toward politically attractive regions (Carvalho, 2014), and in Germany for savings banks that are controlled by local politicians (Englmaier and Stowasser, 2017).

This paper complements these studies by providing evidence of the effect of a political cycle

[3] Drazen (2001) provides an excellent review of the literature.

in a bureaucratic system, as opposed to an electoral system. In China, the Communist Party-government dual administrative system arranges a hierarchy by which the Party leader is in charge of determining the directions of policies as well as personnel changes, and the corresponding government leader is responsible for implementing Party policy and arranging the annual budget, as well as other everyday government matters. The Party Secretary, the highest ranking politician at any administrative region division level, is appointed by higher-level Party organizations rather than directly elected by voters. The fact that local Party officials are not subject to elections would seem to insulate them from political pressures. However, I find political manipulation of bank lending across the appointment cycle.

Another contribution of this paper is that it leverages individual loan information between each firm and bank to explore potential heterogeneity of borrowers and lenders. Previous studies on bank credit manipulation mainly use aggregate lending data (e.g., at the district level) and thus cannot track the specific origin (lending bank) and destination (borrowing firm) of the loans. This paper uses individual lending data (at the firm-bank level) and can observe characteristics of the borrowing firms and lending banks. This method allows me to distinguish between loans to zombie firms and loans to healthy firms and between loans from small local banks and loans from large national banks. Although the analysis is largely conducted at the prefecture level (the level of variation of the political cycle), the loan-level data allows me to construct prefecture-level aggregates by type of firm (zombie/non-zombie) and type of bank (local/national).

This paper is also related to the literature on zombie firms. The phenomenon of zombie firms was first recognized in Japan. It is often claimed that one factor contributing to Japan's economic weakness in the 1990s is that Japanese banks have continued to provide financial support for highly inefficient, debt-ridden zombie firms (Caballero et al., 2008; Hoshi and Kashyap, 2010; Fukuda and Nakamura, 2011). Zombie firms have also been detected in other developed economies such as the United States (Wilcox, 2008), Korea (Hoshi and Kim, 2012), England (Arrowsmith et al., 2013), Italy (Albertazzi and Marchetti, 2010), the European Union (Bruche and Llobet, 2014), and transition economies such as Russia (Papava, 2010).

The related literature on zombie firms mainly focuses on their negative impacts on aggregate outcomes from a macro perspective (Fukuda et al., 2006; Caballero et al., 2008). The prevalence of zombie firms has been proven to be costly to the economy. There is extensive macroeconomics literature showing that zombie firms depress market prices, congest markets, distort credit allocation, and crowd out healthy firms (Ahearne and Shinada, 2005; Caballero et al., 2008; Hoshi and Kim, 2012; Tan et al., 2017). The congestion created by zombies reduces the profits for healthy firms

and prevents more productive firms from gaining market share, strangling a potentially important source of productivity gains for the overall economy.

Unlike studies that take the existence of zombie firms as given and examine their impacts, in this paper, I take a step back and examine why zombie firms exist in the first place from a political cycle perspective. In the literature, the existence of zombie firms has been mainly attributed to banks continuing to provide forbearance lending for their own business interests (Peek and Rosengren, 2005; Watanabe, 2011; Ueda, 2012). When faced with an insolvent borrower, a bank usually is not willing to immediately start the liquidation process because it does not want to recognize the loss and lead its own balance sheet to deteriorate. Instead, it will reduce the interest payment, roll over the loan, or issue new loans for the firm to pay back the old loan, expecting the firm to recover soon or the government to bail it out. Moreover, by downgrading the loan, the bank will automatically reduce its capital adequacy ratio (CAR), which, if it falls below a minimum regulated level, will induce large adjustment costs.[4] Therefore, a minimum CAR constrained bank (CAR lower than 8% in China) will try to avoid downgrading the loan in order to maintain its CAR.[5] Third, the problem can be compounded by the existence of lending promises (Tanaka, 2008; Giannetti and Simonov, 2013), bank-firm affiliations (Peek and Rosengren, 2005), and government-firm connections (Khwaja and Mian, 2005).

Political manipulation of bank lending is largely omitted from the literature on zombie firms. The existing literature on the role of government in creating zombie firms is mostly descriptive and interprets the role of government as a passive, imperfect regulator. When faced with a growing budget deficit and a voting public weary of funding bank bailouts, the government may loosen supervision and allow banks to continue their forbearance lending policy in order to avoid massive firm bankruptcies and bank failures and the associated financial and political costs (Peek and Rosengren, 2005; Chernobai and Yasuda, 2013; Kawai and Morgan, 2013; Willam, 2014; Jaskowski, 2015). Nevertheless, in China and many other developing economies with immature financial systems, local Party officials may actively influence bank lending and provide targeted favors to different groups of firms during their term of office to serve their own career interests. As a result,

[4]The capital adequacy ratio (CAR) is the ratio of capital to risk-weighted (adjusted) assets. If a loan, which is an asset for the bank, is downgraded to a riskier level, i.e., its risk weight increases, CAR will be reduced. CAR reflects whether a bank has sufficient capital to buffer losses while still honoring withdrawals. A minimum capital requirement determines how much liquidity is required to be held for a certain level of assets. For example, Basel III, an international regulatory framework for banks, requires that banks maintain a minimum CAR of 8%.

[5]In 2004, China adopted the Measures for the Management of Capital Adequacy Ratios of Commercial Banks and enforced a minimum CAR of 8% on all banks. Banks with CAR below 8% will be forced to undertake corrective measures, including raising capital level and restricting the growth rate of new loans, which will lead to great costs for the banks.

at some critical moment, local officials may actively pressure banks into overlending and keeping zombie firms alive.

Local officials target zombie firms (or more generally, target different types of firms in different periods) because of career concerns. In China, the personnel control of the Chinese Communist Party (CPC) and government leaders has a highly centralized structure. Higher-level officials control the selection and (re-)appointment of lower-level officials. Economic performance is the most important indicator in personnel evaluation.[6] Under this performance-based promotion scheme, or "promotion tournaments", as they are called in Zhou (2005), local officials have strong incentives to build up the local economy to beat their peers.

To boost economic growth, local officials may pressure banks to increase lending to firms to promote local investment. The payoff to investments may be lagged. Thus, it may be more beneficial for local officials to direct more lending to healthy firms early and realize profits gradually in their term of service and to direct more lending to zombie firms late, when the loans may help to avoid a surge in unemployment and massive bankruptcies. Employment and social stability are also factors in personnel assessment. Bailing out zombies is one of the limited short-term instruments that can be used by local officials to maintain performance temporarily.

The third contribution of this paper is to add to the literature on zombie firms by providing new evidence on the causes of zombie firms from the political cycle perspective as described above. Local officials, instead of simply taking a regulator's stand and turning a blind eye to banks' forbearance lending behavior, may actually have strong incentives to tactically manipulate bank credit and pressure banks into overlending to specific interest groups in critical (re-)appointment years for promotional success. It suggests that the current corrective measures that emphasize reinforcing regulation on banks to eliminate zombie firms may not truly work, unless political influence and banks' independent lending decisions can be separated.

This paper proceeds as follows. In the next section, I introduce the institutional background of politics and banks in China, including how local officials influence banks. Section 3 develops the empirical strategy. In Section 4, I summarize the data used in the paper and describe how to identify zombie firms and solve potential endogeneity concerns. Section 5 presents the main results regarding political influence. Section 6 discusses the impacts of targeted favors on the performance of zombie firms and on the probability of promotion for local officials. Section 7 concludes.

[6]At any administrative level, each official's performance is individually distinguishable and comparable to peers, which allows for a sensible link between performance and turnover (Li and Zhou, 2007).

2 Institutional Background

2.1 Politics in China

2.1.1 Executive Levels of Local Officials

In China, the administrative divisions are structured in a hierarchy on six different levels. From the highest to the lowest, they are provinces (*sheng*), prefectures (*di*), counties (*xian*), townships (*xiang*), and villages (*cun*). Each level in the hierarchy is responsible for overseeing the work carried out by lower levels. At each level, corresponding to the Communist Party and government's dual administrative system, there are two officials or leaders (termed cadres in the Communist lexicon) who are the most important.

The first key official that represents the Communist Party of China (CPC), commonly called the Party Secretary, is the leader of the CPC organization in the administrative region. Party Secretary is the de facto highest-ranking political official in his or her area of jurisdiction. As the policy maker, Party Secretary is responsible for policy formulation and personnel management. Party Secretaries are selected and appointed by their superiors at higher levels. The second key official is the head of the local government, usually called the governor (at the province level), mayor (at the prefecture level), or magistrate (at the county level). This figure is the second-highest-ranking official, who usually serves concurrently as the "Deputy Party Secretary" in the local CPC organization. The head of the local government is in charge of the day-to-day execution of policies made by the Party Secretary. Theoretically, mayors are "elected" by the local People's Congress under the indirect hierarchical electoral system. However, candidates are nominated by the Party, and the People's Congress is supposed to implement the recommendation. Since the Party Secretary is always in precedence above the head of the local government at each administrative level, I focus on the Party Secretary as my main unit of analysis.

A fundamental principle of the Chinese leader (cadre) system is that the Communist Party is in firm control of the leader system, especially with regard to the leaders' appointment and promotion. A multilayer stratified leader management system has been adopted. The system delegates powers of leader management to Party committees at each level and sets up a one-level-down leader management formula (i.e., a Party Committee and its Organization Department are in charge of leader management for the next lower level). Specifically, the central Party authority is responsible for supervising leaders at the provincial level; provincial Party Committees manage leaders at the pre-

fectural level; prefectural Party Committees take care of leader management affairs at the county level; and county Party Committees are in charge of overseeing leaders at township level.

2.1.2 Term of Office

According to the *Interim Provisions on the Term of Office for the Leaders of the Party and Government (2006)*, the term of office of all Party and government leaders shall be five years (Provision 3). In addition, leaders should remain stable during their term of office and stay for a full term of five years, except for the following special cases: (1) reaching the retirement age of 65; (2) under bad health conditions; (3) being unequal to the position and requiring adjustment; (4) voluntarily resigning or being forced to resign; (5) being punished and dismissed; and (6) special work needs (e.g., being rotated to a new region at the same administrative level) (Provision 4). Leaders shall stay in the same position for at most two terms (Provision 6).

In practice, new appointments frequently occur before they are scheduled. From 2000 to 2016, the average term of office for 1,443 Party Secretaries from 334 prefectures was 4.5 years. As there is evidence that Party Secretaries who serve for more than one term may have different incentives in the second five-year period (Zhang and Gao, 2007), I restrict my sample to Party Secretaries who have a term of office less than or equal to five years (namely who serve for one term only) to make the analysis cleaner.

2.1.3 Selection and Appointment of Party Secretaries

To examine the potential manipulation of bank lending by Party Secretaries in their last service year, a natural concern is whether to keep the first five service years of Party Secretaries who serve for two terms. The key to this question is, in the fifth year of service (the critical promotion year), do Party Secretaries know in advance whether they are likely to be promoted or to stay in the same place for a second term? If the chances can be at least vaguely known prior to the (re-)appointment decision, then Party Secretaries who have slim chance (and finally stay for a second term) will not have strong incentives to boost performance and particularly help zombie firms in their fifth year. Thus, including the first five years of their service will tend to attenuate the last year manipulation effect on bank lending. The answer is yes.

The selection and appointment of Party Secretaries follows the *Regulations on the Work of Selecting and Appointing Leading Party and Government Cadres* and is presided over by the Or-

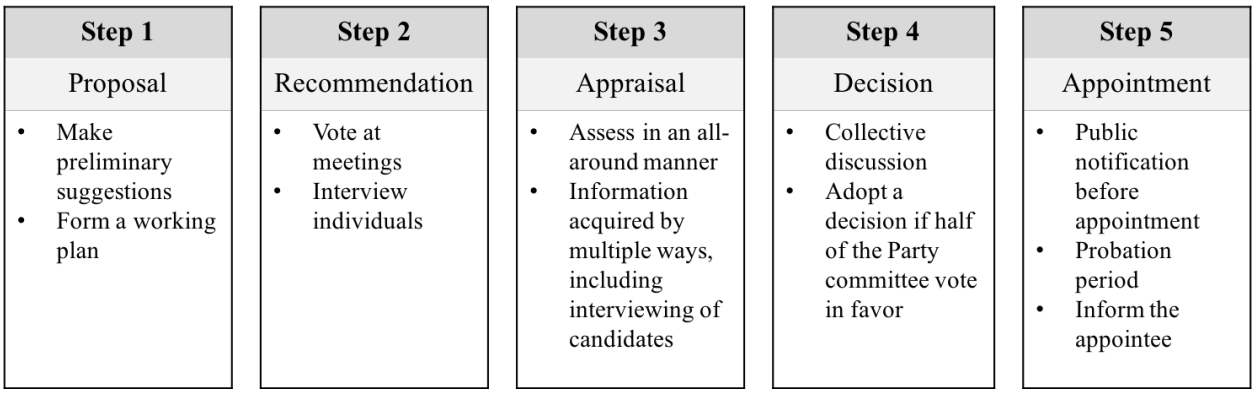

Figure 1: Selection and Appointment of Party and Government Leaders

ganization Department of the Party Committee at the higher level. It takes a five-step procedure: Proposal, Democratic Recommendation, Appraisal, Discussion and Decision, and Appointment. Leaders of the Party Committee and the government shall, as a rule, be selected from backup candidates.

First, the Party Committee and its Organizational Department (at the higher level) make preliminary suggestions and form a plan for appointing and selecting new leaders. Second, it determines the candidates for appraisal through a democratic process of recommendation. The methods for recommending candidates include voting at meetings and interviewing individuals. The results of recommendations shall be valid for one year. Third, determined candidates will be assessed in an all-around manner, including integrity, ability, diligence, performance, and honesty, with the emphasis on their actual achievement. Information is acquired by interviews of individuals, the issuance of questionnaires, democratic opinion polls, on-the-spot investigations, perusal of relevant files, investigation of specialized items, and interviews of candidates. Fourth, the Party Committee discusses and decides on the appointment or removal of leaders. A vote shall be cast, and the decision shall be adopted if half of the Party Committee members who are entitled to attend the meeting vote in favor. Fifth, public notification before the appointment of a Party or government leader is implemented. There will be a probationary period of one year. When the appointment of a leader is decided upon, the Party Committee shall designate a person to inform the appointee.

The whole procedure can take a few months to a year. Party Secretaries know whether they are in the pool of candidates to be promoted at least from Step 3, when they are interviewed as a part of appraisal and assessment. In practice, they may obtain access to the information even earlier. Feng (2010) conducted field work in Zhong County (a county in Beishan Prefecture, Henan Province), investigated the changes and promotion of local leaders since 1978, and provided a panorama of Zhong County leaders and their complete political careers. Feng's study provided evidence on

leaders knowing the recommendation voting results (Step 2), campaigning for votes, and lobbying the higher-level leaders to support them in further steps. Campaigning often includes providing entertainment and bribes to higher-level leaders.

> *"Bribe usually takes place before voting: 1000 yuan for Section-Head level (Party Secretaries of Townships) leaders; 2000 yuan for Deputy-Division-Head level (Deputy Party Secretary of Counties) leaders; more for higher level leaders. There are 260 leaders at the Section-Head level in Zhong County. You have to bribe most, if not all, leaders. ... Entertainment is a way to cultivate affection. Many Party Secretaries know that bribe is not enough. Frequent social interactions are necessary to cultivate mutual respect and understanding, so that they will vote for you."*

As Party Secretaries know their status in the pool of candidates in the early stages of the appointment procedure, those who are in the pool and rank high will have different motivation from those who rank low or are not even in the pool. The latter group tends to be less motivated to put great effort in the last service year and become Party Secretaries who stay for more than one term. In summary, in the last service year, Party Secretaries are likely to know in advance their chances of being promoted. Those who are not in the promotion pool will stay in the same position for the second term. They may not have incentives to boost performance in the fifth year. Thus, including the first five years may underestimate the effect of the last year on lending.

2.2 Banks in China

China has a bank-centered financial system and an underdeveloped capital market, which makes it difficult for firms to raise external financing from the bond or equity market (Allen et al., 2005). According to the National Bureau of Statistics of China, the bank credit to GDP ratio in China was approximately 112% in 2013, and banks provided about half of the total financing for Chinese firms.

I divide all the banks into two broad categories: national banks and local banks. Here, "national" does not indicate that the bank is controlled by the state. Instead, a bank is defined as a national bank if it operates nationally and has local branches across the country. In this group, there are three policy banks[7], four state-owned commercial banks (the "Big Four")[8], and twelve

[7]The three policy banks include the Agricultural Development Bank of China (ADBC), China Development Bank (CDB), and the Export-Import Bank of China (Chexim). They were established in 1994 to take over the government-directed spending functions of the four state-owned commercial banks. These banks are responsible for financing economic and trade development and state-invested projects.

[8]The four state-owned banks include the Bank of China (BOC), the China Construction Bank (CCB), the Agri-

joint-stock commercial banks (JSCBs)[9]. They have local branches across the country in almost all provinces, prefectures, and counties. Although there may be (central) state shares in their ownership structure, the local branches of these national banks are not affiliates of the local government. Thus, local officials have relatively limited control over these banks.

A bank is defined as a local bank if it operates only in one prefecture or several adjacent prefectures. This group includes hundreds of urban/rural commercial banks, credit unions, and village and town banks. Many of them were founded on the bases of urban/rural credit cooperatives. Most urban commercial banks have strong ties to their local government, and the majority of shares are owned by the local state. Since 2005, some urban commercial banks started to diversify their shareholders by inviting Chinese and foreign private companies to take minority shares, merging, and cross-shareholding. Some of the banks have even listed their shares. The urban commercial banks' market orientation is toward supporting the regional economy and financing local infrastructure and other government projects. As the local government is the largest shareholder (typically 30%) of urban commercial banks, local officials usually have actual control over the activities of these banks. They can appoint bank managers or organize meetings to ask for support for local projects from these banks.

Local officials are able to channel money through banks to targeted firms because they have varying degrees of control over different types of banks in their jurisdiction, as described above. However, this is not the only way local officials mobilize credit resources. On the other hand, as local governments are prevented from borrowing directly from financial markets, they may turn to borrow indirectly from banks via local government financing platforms (LGFPs) [10] and award unprofitable firms large-scale projects to increase their productive capacity (Tan et al., 2016).

cultural Bank of China (ABC), and the Industrial and Commercial Bank of China (ICBC). Each bank specializes in providing financing to different sectors.

[9]The twelve Joint-Stock Commercial Banks include China Merchants Bank (Merchants), CITIC Industrial Bank (CITIC), Shanghai Pudong Development Bank (Pudong), China Minsheng Banking Corporation (Minsheng), Fujian Industrial Bank (Industrial), China Everbright Bank (Everbright), Guangdong Development Bank (GDB), Huaxia Bank (Huaxia), Hengfeng Bank (Hengfeng), Shenzhen Development Bank (SDB), Huishang Bank (Huishang) and Bohai Bank (Bohai). Their capital is partly held by the state, mainly either directly through the Ministry of Finance or Central Huijin Investment Company Limited or indirectly through SOEs. Some also have been invested in by foreign entities.

[10]Local government financing platforms (LGFPs) are corporate vehicles for local governments to engage in local public welfare projects, such as affordable housing construction, infrastructure, social services, and ecological and environmental protection (Lu and Sun, 2013). LGFPs are set up, fully owned and operated by local governments to borrow money from the banking and financial system to promote local infrastructure development.

3 Empirical Strategy

3.1 Instruments for Last Service Year and Appointment Cycle

The most straightforward approach to test for temporal political manipulation in the last service year is to compare the amount of bank lending in (re-)appointment years (the last service years) to the amount of bank lending in non-appointment years. Specifically, the first step is to define the indicator for a new Party Secretary coming into force, New_t. In reality, (re-)appointment of a new Party Secretary can occur at any time in year. Around 50% of the (re-)appointments occur before June, while the remaining occur after June. I define an indicator for a new Party Secretary coming into force: New_t. Similar to Zhang and Gao (2007), in a given year, (1) if there is a new Party Secretary being appointed, and the appointment occurs before June 30, then $New_t = 1$ for the current year; (2) if a new Party Secretary is appointed but the appointment occurs after June 30, then $New_t = 1$ for the next year, and $New_t = 0$ for the current year; (3) if there is no appointment, then $New_t = 0$ for the current year. Therefore, New_t represents the first year of a new Party Secretary coming into power in the prefecture.

The next step is to define the indicator for the de facto last service year of the incumbent Party Secretary $Last_t$. For each prefecture, $Last_t$ = New_{t+1}. Suppose a new appointment occurs on March 1, 1998, in a prefecture, then $New_{1998} = 1$, $Last_{1997} = 1$, and $Last_{1998} = 0$. Suppose another new appointment occurs on September 1, 2001, then $New_{2002} = 1$, $New_{2001} = 0$, and $Last_{2001} = 1$. Table 1 provides an example to show how New_t and $Last_t$ are defined.

In reality, the timing of new (re-)appointment is not fixed and subject to some changes, and thus, the actual "last service year" is uncertain and can be endogenous. A typical cause of an early (re-)appointment is a new vacancy in the Party Committee at the higher level (in this case, the province level). On the one hand, if the incumbent Party Secretary is promoted unexpectedly in the middle of the scheduled term of office before he/she could direct more loans to zombie firms, the last year effect on bank lending to zombie firms will be underestimated. On the other hand, if early (re-)appointments only occur when the local economic performance is particularly good, a spurious correlation between bank lending and appointment years may be observed and the last year effect will be overestimated. Similar to Khemani (2004) and Cole (2009), I use a dummy as an instrument for the actual last service year, S^{-0}, for whether five years have passed since the previous "last service year" (thus, 0 year left until the next scheduled appointment). This "scheduled last service year" is a predictor of the "actual last service year". To avoid having the instrument only assign scheduled last service years ($= 1$) to years $t, t + 5, t + 10,$ and $t + 15$, I reset the instrument after an early (re-)appointment. Table 1 also illustrates how to define S^{-0}.

Table 1: Definition of Last Service Year Indicator

city_id	year	secretary_id	New	Last	Term	S^{-0}
1	1997	A	0	1	1	0
1	1998	B	1	0	5	0
1	1999	B	0	0	5	0
1	2000	B	0	0	5	0
1	2001	B	0	0	5	0
1	2002	B	0	1	5	1
1	2003	C	1	0	4	0
1	2004	C	0	0	4	0
1	2005	C	0	0	4	0
1	2006	C	0	1	4	0
1	2007	D	1	0	4	0
1	2008	D	0	0	4	0
1	2009	D	0	0	4	0
1	2010	D	0	1	4	0
1	2011	E	1	0	2	0
1	2012	E	0	1	2	0
1	2013	F	1	0	2	0
1	2014	F	0	1	2	0
1	2015	G	1	0	3	0
1	2016	G	0	0	3	0
1	2017	G	0	—	3	0

If the instrument is not reset after an early appointment, the weak instrument problem becomes a concern. This can be shown by tabulating the term of office for the next Party Secretary following the current Party Secretary. As shown in Table 2, the rows represent the term of current Party Secretary, ranging from 1 year to 5 years, and the columns represent the term of next Party Secretary following the current one. Following the current Party Secretaries who serve for 1 year or 2 years, the majority of the next Party Secretaries have a term of 3 years (29% and 28%, respectively). Following the current Party Secretaries who serve for 3 years, the majority of the next Party Secretaries have a term of 2 years (30%). Following the current Party Secretaries who serve for 4 years or 5 years, the majority of the next Party Secretaries have a term of 5 years or 4 years (27% and 29%, respectively). This finding suggests that a full term of five years is rarely reached following an early appointment. Thus, if the instrument simply assigns the scheduled last service year ($= 1$) to years t, t+5, t+10, and t+15 and is not reset after an early appointment, its explanatory power in the first stage tends to be very weak.

Table 2: Frequency of Early Appointment

		Term of Next Party Secretary (%)				
		1	2	3	4	5
Term of Current Party Secretary	1	8	20	29	24	19
	2	14	25	28	22	11
	3	13	30	21	21	15
	4	12	23	19	19	27
	5	13	18	21	29	18

Analogously, to examine how bank lending tracks the actual appointment cycles, which are potentially endogenous, I define an instrument appointment cycle, which follows a 5-year cycle that begins anew after every early appointment (Khemani, 2004; Cole, 2009). Specifically, I define five indicators: S^{-k} ($k = 0, 1, 2, 3, 4$), reflecting the $(5 - k)$th year of service. Thus, the current Party Secretary expects k years left until the scheduled last year of the term. For example, $S^{-4} = 1$ indicates the first year of service; thus, the Party Secretary expects 4 years left until the scheduled last service year of the term. Similarly, I reset the instrument after an early appointment to avoid the weak instrument problem.

3.2 Targeting of Firms and Banks

To test for which types of firms and banks are being targeted by local officials, I use individual loan information (at firm-bank level) between each firm and bank to explore the potential heterogeneity of borrowers and lenders. With information on the characteristics of borrowing firms and lending banks, I can separate loans into different bins according to the type of borrower and lender and make distinctions between loans to zombie firms and loans to healthy firms, loans from small local banks and loans from large national banks, as well as their interactions. Specifically, I first divide all loans into two bins: loans to zombie firms and loans to non-zombie firms. Then, I aggregate the loans in each bin separately to the prefecture level to examine which firms are provided with targeted favors. I also divide all loans into another two bins: loans from local banks and loans from national banks. Similarly, I aggregate the loans in each bin separately to the prefecture level to examine which banks are being pressured to increase lending more across the appointment cycle. Finally, I interact the two sets of bins to show a complete picture of bank lending manipulation in the last service year and the appointment cycle of local officials.

4 Data and Estimation

4.1 Data Description

My analysis makes use of five datasets.

4.1.1 Loans

The data on loans from all commercial and policy banks to publicly listed firms come from China Listed Firm's Bank Loans Research Database, established by GTA Information Technology Company (CSMAR). [11] As far as I know, this is the only database that provides detailed information on individual loans for each publicly listed firm obtained from banks and nonbank financial institutions in China. My sample contains 59,961 loans from 772 banks to 2,591 firms from 2000 to 2016. On average, there are 3,331 loans per year. The advantage of the database is that, for each firm, it not only documents which bank the loan comes from but also the local branch of the bank (at the prefecture and finer levels). This allows me to aggregate loans to the prefecture level and distinguish between loans from national banks and loans from local banks.

One issue with the database is that the local bank branch information is not reported exactly at the prefecture level. There are 30% of observations with ambiguous locations that are reported at finer levels (e.g., township, village, and street levels), which may not correspond to a unique prefecture. For these observations, I identify the prefecture by mapping these towns, villages, and streets to the prefectures to which they belong. When the prefecture is not unique, I try to identify the prefecture by tracking the borrowing history of the firm and choose the most likely prefecture in which the local branch lies. There are also 15% of observations without local branch information. For these observations, I impute the missing location with a simple algorithm, which is described in more detail in Appendix I. Following this algorithm, I extrapolate local branch information for 4,002 observations, which increases my sample size by 8%.

However, when individual loans are aggregated to the prefecture-year level, there are still cases where missing loans are detected in a random number of years in a prefecture-cycle. Here, a

[11] Publicly listed firms represent a relatively limited sample of firms in China. Lending to small and medium non-publicly listed firms is not included, as these firms are not required by the regulators to report individual borrowing information. An approximation of loans to non-publicly listed firms can be achieved by extracting the short-term debt and long-term debt information from the balance sheet of each individual firm, which is accessible from databases such as Chinese Industrial Enterprise Database (CIED). Thus, the last year effect on lending to zombie firms among nonpublicly listed firms can be estimated and compared to the results in this paper. However, it is impossible to distinguish between loans from local banks and loans from national banks, as firms do not report their creditors in their financial statements.

prefecture-cycle indicates an appointment cycle of a Party Secretary in a prefecture. The missing loan problem is particularly serious for the subsample of loans from local banks to zombie firms, as loans from local banks account for 14% of all loans, and loans to zombie firms only account for 12% of all loans.

For example, the publicly listed firm *China Southern Glass* was a zombie firm in 2009 and received 42 loans in that year. In the original dataset, none of these 42 loans have records of bank local branch information and thus are supposed to be dropped from the analysis because of missing prefectures. Using the algorithm described above, 19 of the loans are recognized as zombie loans and assigned to a prefecture. The remaining 23 loans are not recognized as zombie loans and dropped from the sample. In comparison, in 2008, this firm borrowed from all prefectures recognized in 2009 and an additional prefecture: Yichang. It is possible that the missing prefectures in 2009 include this additional prefecture. For each zombie firm, the seriousness of missing prefectures varies.

In order to fill in the loan gaps (at the prefecture-year level), I follow Verhoogen (2008) and impute the missing loans by regressing aggregate loan values (in logs) on the following variables: one-year lead and one-year lag of the same variable, the current value, and one-to-four-year lags of local GDP growth, unemployment rate, fiscal surplus ratio (the ratio of fiscal surplus to GDP), fixed asset investments (in logs), year fixed effects, and prefecture-cycle fixed effects. The predicted values from the regression are imputed for the missing loans. If a lead and/or lag of any independent variable is missing, I impute the missing loans with the predicted values from an analogous regression without the lead and/or lag.

4.1.2 Firms

The data on firms come from the Chinese Stock Market & Accounting Research Database, also established by GTA Information Technology Company (CSMAR). This database contains basic information (e.g., name, registered address, ownership structure, and initial number of employees) and financial statement information (asset, liability, capital, sales revenue, costs, financial expenses, and gross and net profit) of all publicly listed companies in China. There are 31,925 observations in my sample, which includes 3,231 firms, from 2000 to 2016. On average, there are 1,774 firms per year. As many of observations have missing information on interest expense, I supplement the CSMAR database with the RESSET Financial Research Database, which is provided by Beijing Gildata Resset Data Tech Co., Ltd. Interest expense is extracted from the income statement footnote of each publicly listed firm.

4.1.3 Local Officials

The data on local government officials come from two sources: GTA Information Technology Co., Ltd., and Fudan University Social Science Lab. The database on prefectural Party Secretaries is a balanced city-year panel, containing 1,443 Party Secretaries from 334 prefectures, from 2000 to 2016. Personal information such as name, birth year and place, education, undergraduate major, working experience, and party membership for each government official is documented in the database. As shown in Figure 2, in the whole sample, the average term of service for all Party Secretaries is 4.5 years. In the subsample of Party Secretaries who serve for one term only, the average term of service is 3.6 years. I use the one-term subsample in the analysis to avoid changing incentives in the second term.

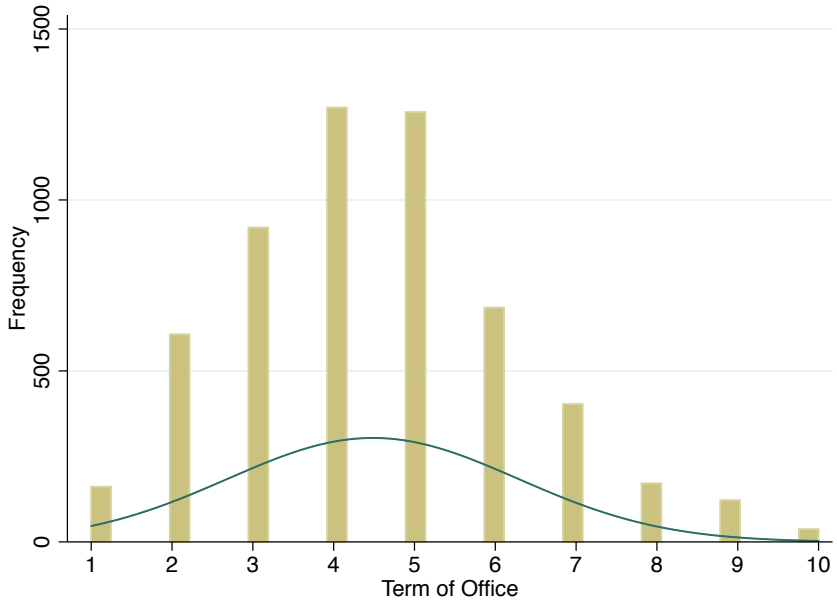

Figure 2: Prefecture Party Secretary Term of Office

4.1.4 Banks

The data on banks come from Orbis Bank Focus (previously known as BankScope), established by Bureau van Dijk Electronic Publishing. BankScope is a database of banks worldwide. It contains financial information, asset quality and capital adequacy information at the individual bank level. It includes 302 banks in China, from 2010 to 2016. Since it only keeps 6 years of history for

listed banks and 4 years of history for unlisted banks, I supplement this database with another two databases on banks: the Chinese Banks Financial Research Database (a sub-database of CSMAR) and the Wind Economic Database.

4.1.5 Prefecture Characteristics

The data on prefecture-level characteristics come from the CEIC China Premium Database. In this database, fixed asset investment, urban population, GDP, fiscal revenue and expenditure, and unemployment can be observed at the individual prefecture level from 2000 to 2016.

4.2 Identifying Zombie Firms

As in most of the literature on zombie firms, the definition of zombie firms in this paper focuses on two key aspects. First, zombie firms are close to or already in insolvency, i.e., their profit is too low to cover interest payments on loans. Second, zombie firms receive extremely subsidized loans from their lending banks, i.e., they obtain very favorable interest rates on their loans.

Following Caballero, Hoshi, and Kashyap (2008), I start with identifying zombie firms as firms that receive extremely subsidized lending from banks (the second aspect). To put it differently, firms are identified as zombie firms if they are actually paying an interest (R_t) that is lower than the minimum required interest payment (R_t^*) in the market. The first step is to calculate the minimum required interest payment (R_t^*). I select interest rates that are extremely advantageous for the firm (the lowest interest rates possible in a normal market); thus, R_t^* is in fact less than what most firms would pay in the absence of bank subsidization. R_t^* is defined as:

$$R_t^* = rs_{t-1}BS_{t-1} + (\frac{1}{5}\sum_{j=1}^{5} rl_{t-j})BL_{t-1}$$

where rs and rl are the short-term ($<$ 1 year) and long-term (1-3, 3-5, and $\geq$ 5 years) prime rate for loans suggested by the People's Bank of China (the central bank). The actual interest rate of a firm loan is usually the prime rate plus a positive risk premium; thus, it is higher than the suggested prime rate. BS and BL are the short-term and long-term bank loans of a firm, respectively. Calculated using the prime rates, R_t^* represents the lower bound a firm would pay for its loan under normal conditions.

The next step is to calculate the gap between actual interest payment (R_t) and the minimum required interest payment (R_t^*). The interest gap is defined as:

$$gap_t = R_t - R_t^*$$

The third step is to generate the zombie indicator. A firm is identified as a zombie firm if the interest gap is below zero:

$$z_t = \mathbf{1}\{gap_t < 0\}$$

A major concern of this method is that it may misidentify healthy firms as zombie firms. Specifically, profitable firms with good reputations and low default risk may obtain very favorable loans from banks, but they are misclassified as zombies by the above method. To correct for this measurement error, I follow Fukuda and Nakamura (2011) by applying a profitability criterion (filter) when identifying zombie firms. That is, I re-identify a zombie firm (with negative interest gap) as non-zombie if the firm has a net profit that is sufficiently large to cover the minimum required interest payment. Thus, only firms that are truly "underwater" are classified as zombies (the first aspect). I use this method (referred to as the "CHK-FN" method) as the main method of zombie identification.

Another concern is that some firms are identified as zombie in just one year during the whole sample period because of some temporary negative shock. To correct for this, I follow Nie et al. (2016) and identify a firm as zombie in year t if it is identified as a zombie in both year t and year $t-1$. This method allows me to eliminate one-shot zombie firms in the sample. I use this method (referred to as the "eliminating one-shot zombie" method) for robustness checks.

Figure 3 depicts the percentage of zombie firms in China from 2000 to 2016. The blue dashed line represents the percentage of zombie firms in all publicly listed firms using the main CHK-FN method, while the red dotted line represents the percentage of zombie firms in all publicly listed firms after eliminating all one-shot zombies in the sample. On average, the percentage of zombie firms among all firms is 12% across the years. The percentage of zombies increases significantly after 2008, when there was a credit boom related to the large increase in investment after the Global Financial Crisis. This finding is consistent with the stylized fact that in the same time period, investment efficiency has fallen and the financial performance of firms has deteriorated.

Figure 4 shows the percentage of zombie assets in the economy from 2000 to 2016. Compared

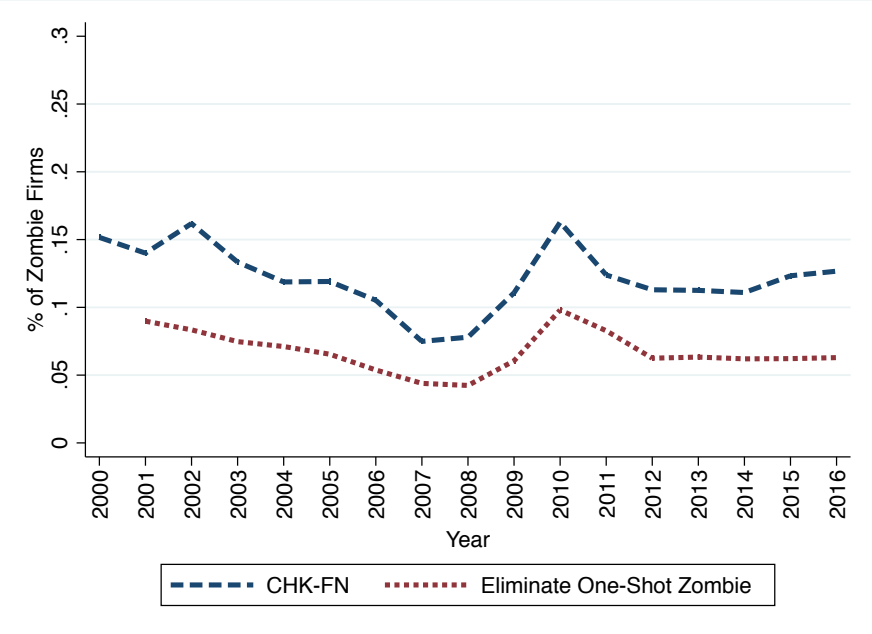

Figure 3: Percentage of zombie firms

to Figure 3, although the relative proportion of zombie firms in the economy remains stable (except for year 2009 to 2011), the percentage of zombie assets has been decreasing over time. This finding suggests that the zombie group has consisted of smaller firms in recent years.

Table 3 shows the summary statistics of zombie firms and non-zombie firms. Compared to non-zombie firms, zombie firms on average have larger size (asset and liability), lower profitability (total profit and net profit), more short-term loans and long-term loans, but similar interest expense. Zombie firms and non-zombie firms have similar state share in their ownership structure. There are both state-owned and private enterprises in zombie firms. The relative proportion of state-owned enterprises (SOEs) for both central SOEs and local SOEs is higher in zombie firms.

4.3 Endogeneity of Zombie Firms

The above definition of zombie firms allows for variation in zombie status across years for a firm, which will result in changes in the set of firms that are zombies. One concern regarding this definition is the potential endogeneity of zombie firms. Specifically, obtaining more loans may cause firms to become zombies. Then, a lending boom to zombies late in the service term may not be interpreted as the result of temporary manipulation of lending by local officials.

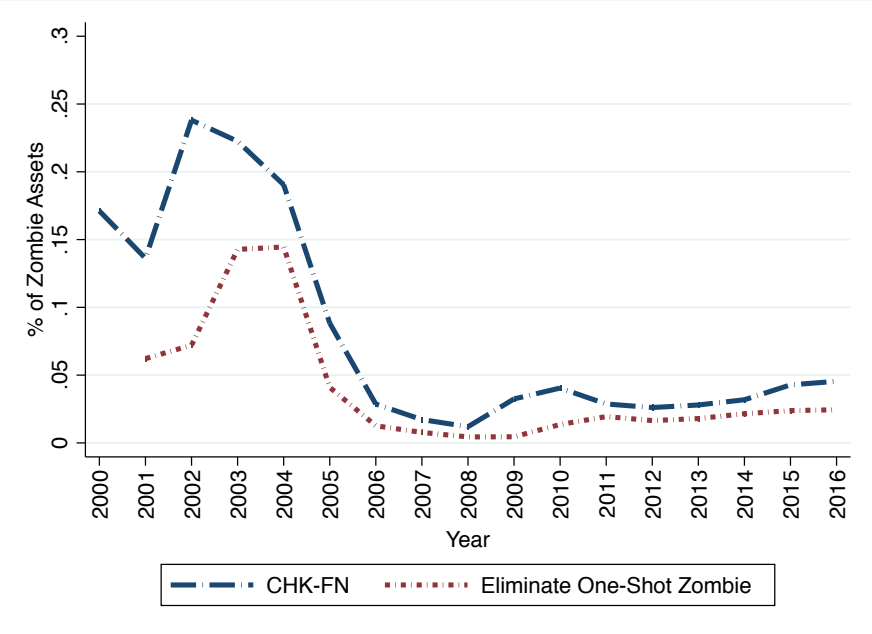

Figure 4: Percentage of zombie assets

To rule out the possibility of loan-induced zombie firms, a preliminary Granger causality analysis at the firm level is carried out in order to test the relationship between getting loans and being a zombie. The results, presented in Table A in the Appendix, suggest that for a firm, loans in the previous year do not affect its zombie status in the current year. This finding may reduce the concern regarding endogenous zombies to some degree.

Another related concern is that there may be other political cycle effects that confound zombie lending effect. Assume the total amount of lending to firms is constant over time. If weak firms obtain favorable treatment in other forms (e.g., direct subsidy or tax rebate) from local officials early in their service term, then when that favorable treatment is removed in the end, they may be recognized as zombies in the later years. Then, it will appear that lending to zombies increases late in the service term, when in fact lending has not changed.

A cleaner solution to the potential endogeneity problem is to use a predetermined definition of zombie firms; thus, the pool of zombie firms is fixed in each prefecture-cycle, and churns in the pool will disappear. Thus, in this paper, I identify a firm as a zombie in every year of the current prefecture-cycle if it has ever been a zombie firm for more than 2 years in the previous 5 years before the start of the current prefecture-cycle. By using a fixed group of predetermined zombie firms, endogenous selection into the zombie group will be ruled out.

Table 3: Summary Statistics: Zombie Firms vs. Non-zombie Firms

	Zombie	Non-zombie	Diff.	Std. Error
asset	13652.82	9913.54	-3739.28*	1953.50
liability	9608.55	5845.06	-3763.50***	1130.38
profit	68.11	477.02	408.91***	130.77
netprofit	21.66	372.20	350.54***	102.04
BS	1189.19	980.36	-208.83	136.54
BL	3567.77	998.98	-2568.79***	240.11
intexp	163.27	128.69	-34.58	22.75
stateshare	0.14	0.14	-0.00	0.01
stateshare50	0.11	0.12	0.02	0.01
SOE	0.56	0.45	-0.11***	0.02
CSOE	0.21	0.14	-0.07***	0.01
LSOE	0.35	0.31	-0.04***	0.02

4.4 Estimation

4.4.1 Last Service Year Effect

To test for potential political manipulation in the last service year, I compare the amount of bank lending issued in the last service years, i.e., the (re-)appointment years, to the amount issued in nonappointment years. I include year fixed effects to control for aggregate macro shocks that are common to all prefectures. I also include prefecture-cycle fixed effects (a group identifier of each prefecture-Party Secretary group) to control for time-invariant characteristics in a particular prefecture in the service term of a particular Party Secretary. Finally, I include one-year lag of local GDP growth, unemployment rate, fiscal surplus ratio, fixed asset investment (in logs) and the share of urban population in each prefecture. Formally, I regress

$$Loan_{ct} = \alpha + \beta Last_{ct} + X'_{ct-1}\eta + \mu_{cj} + \theta_t + \varepsilon_{ct}$$

where $Loan_{ct}$ is aggregated loan in prefecture c in year t. $Last_{ct}$ indicates the appointment year (last service year) of the prefecture Party Secretary, and X'_{ct-1} is the list of lagged prefecture characteristics. μ_{cj} represents prefecture-cycle fixed effects, where subscript j indicates Party Secretary j. θ_t represents year fixed effects. Standard errors are clustered at the prefecture level.

The timing of new (re-)appointment is subject to some random changes; thus, the "last service year" is uncertain and can be endogenous to some degree. Following Khemani (2004) and Cole (2009), I use a dummy as an instrument for the actual last service year, S^{-0}, and for whether five

years have passed since the previous"last service year" (thus, 0 year left until the next scheduled appointment). This scheduled "last service year" is a predictor of real "last service year". To avoid the case where the instrument only assigns last service year to years t, $t+5$, $t+10$, and $t+15$, I reset the instrument after an early (re-)appointment to avoid the weak instrument problem.

4.4.2 Appointment Cycle Effect

To test how bank lending varies across the whole appointment cycle, I regress the amount of lending on the instrument indicators of each service year in the cycle:

$$Loan_{ct} = \alpha + \beta_1 S_{ct}^{-3} + \beta_2 S_{ct}^{-2} + \beta_3 S_{ct}^{-1} + \beta_4 S_{ct}^{-0} + X'_{ct-1}\eta + \mu_{cj} + \theta_t + \varepsilon_{ct}$$

where S^{-k} ($k = 0, 1, 2, 3, 4$) represents the $(5-k)$ year of service. Thus, the Party Secretary expects k years left until the scheduled last year of the term. City-cycle fixed effects, year fixed effects, and prefecture level controls are included in the regression. Since the five indicators are supposed to add up to 1 in any given year, I use S^{-4} as the reference group and omit it in the regression.

4.4.3 Aggregate Separately by Bin

To test for which firms and banks are being targeted in the political manipulation, I aggregate the individual loan data to the prefecture level separately by different bins and redo the exercise:

$$Loan_{ct}^{Bin} = \alpha + \beta_1 S_{ct}^{-3} + \beta_2 S_{ct}^{-2} + \beta_3 S_{ct}^{-1} + \beta_4 S_{ct}^{-0} + X'_{ct-1}\eta + \mu_{cj} + \theta_t + \varepsilon_{ct}$$

where Bins include lending to zombies, lending to non-zombies, lending from local banks, lending from national banks, and their interactions: zombie-local, zombie-national, non-zombie-local, and non-zombie-national.

5 Results

In this section, I present three sets of findings. First, on average, bank lending does not respond significantly to the last service year relative to other years in the term of Party Secretaries. Second, there is significant targeting of firms: lending to zombie firms increases in the last year by 228%

and exhibits a significant increasing trend across the cycle; in contrast, lending to non-zombie firms decreases in the last year by 87% and shows a significant decreasing trend across the cycle. Third, Party Secretaries are more capable of pressuring local banks to lend to zombie firms.

5.1 Does the appointment year affect bank lending?

Does the appointment year (last service year) affect bank lending to firms in general? Table 4 Panel A presents the results of the last year effect on bank lending using the whole sample where all loans (from all banks to all firms) are aggregated to the prefecture level. Column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3) instrumental variable regression, and column (4) the first stage of IV regression. The results from OLS, reduced form, and IV regression show that there is no significant increase in bank lending in the last service year of the Party Secretary. Thus, there is no evidence of political manipulation of bank lending to firms on average. The IV and OLS estimates vary in magnitude, although neither is significant, suggesting that the endogeneity of appointment years is indeed a concern. The first-stage results show that the scheduled last service year S^{-0} (IV) is a relatively strong predictor of the last service year, with a coefficient of 0.47, R^2 of 0.72, and F statistic of 86.7.

Does the appointment year (last service year) affect bank lending to zombie firms? Table 4 Panel B presents the results of last year effect on bank lending using the subsample where only loans to zombie firms (from all banks) are aggregated to the prefecture level. Column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3) instrument variable regression, and column (4) the first stage of IV regression. The IV results show that in the last service year of a Party Secretary, lending to the predetermined group of zombie firms in each prefecture-cycle increases dramatically by 228%. There is clear evidence of strong temporary political influence on bank lending to zombie firms. The IV and OLS estimates have different signs and vary significantly in magnitude, which suggests that the appointment year is endogenous. The first-stage results show that the scheduled last service year S^{-0} (IV) is a relatively strong predictor of the last service year, with a coefficient of 0.47, R^2 of 0.68, and F statistic of 42.7.

Does the appointment year (last service year) affect bank lending to non-zombie firms? Table 5 Panel C presents the results of last year effect on bank lending using the subsample where only loans to non-zombie firms (from all banks) are aggregated to the prefecture level. Column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3) instrument variable regression, and column (4) the first stage of IV regression. The IV results show that in the

Table 4: The Effect of Last Service Year on Bank Lending

	(1) OLS	(2) Reduced Form	(3) IV	(4) First Stage
Panel A: All firms				
Last	-0.0389		-0.589	
	-0.141		-0.468	
S^{-0}		-0.154		0.468***
		-0.243		-0.0503
Observations	1,294	1,438	1,294	1,294
R-squared	0.872	0.874	0.867	0.724
First Stage F-stat			86.69	
Panel B: Zombie firms				
Last	-0.291		2.284***	
	-0.341		-0.695	
S^{-0}		0.972***		0.467***
		-0.36		-0.0715
Observations	562	588	562	562
R-squared	0.712	0.715	0.592	0.681
First Stage F-stat			42.67	
Panel C: Non-zombie firms				
Last	-0.0243		-0.865*	
	-0.161		-0.495	
S^{-0}		-0.351		0.480***
		-0.253		-0.0478
Observations	1,164	1,280	1,164	1,164
R-squared	0.824	0.819	0.812	0.713
First Stage F-stat			101	
City Characteristics	Yes	Yes	Yes	Yes
City_Cycle FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a regression. The dependent variable is total bank loans in log values to all firms (panel A), zombie firms (panel B), and non-zombie firms (panel C). In each panel, the coefficient reported is a dummy for actual last service year in column (1), scheduled last service year in column (2), and actual last service year instrumented with scheduled last service year in column (3). In addition to the indicated dependent variable of interest, all regressions include year and prefecture-cycle fixed effects, and prefecture-level controls of GDP growth rate, unemployment rate, fiscal surplus ratio, fixed asset investment (in logs) and share of urban population, lagged by one year. The unit of observation is the prefecture-year. Robust standard errors are in parentheses. Standard errors are clustered at prefecture level. The first stage of the IV regression in column (4) is $Last_{ct} = \alpha + \beta S_{ct}^{-0} + X'_{ct-1}\eta + \mu_{cj} + \theta_t + \varepsilon_{ct}$.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

last service year of a Party Secretary, lending to non-zombie firms shrinks significantly by 86.5%. The IV and OLS estimates vary in magnitude and significance, suggesting serious endogeneity of appointment years. The first stage results show that the scheduled last service year S^{-0} (IV) is a relatively strong predictor of the last service year, with a coefficient of 0.48, R^2 of 0.71, and F statistic of 101.

Combining the above results shows that there is a significant substitution of lending to zombie firms for lending to non-zombie firms. In their last service year, which is a critical promotion period, Party Secretaries tend to direct more loans to zombie firms at the cost of fewer loans to non-zombie firms. In general, total lending to all firms does not change significantly in the last year. They bail out zombie firms in this critical year in order to improve performance and avoid a surge in the unemployment rate that could possibly harm the probability of being promoted.

5.2 How Does Bank Lending Vary across the Appointment Cycle?

Figure 5 expands on the above results by tracing out how bank lending varies across the whole appointment cycle. Each plot in Figure 5 represents a separate regression of aggregate loans on dummies for the number of years until the next scheduled appointment year, i.e., the last service year. The x-axis represents dummies for scheduled service year. It ranges from $t = -3$, which indicates the scheduled second year of service (three years left until the scheduled last service year under a five-year appointment schedule) to $t = 0$, which indicates the scheduled last year of service (zero years left until the scheduled last service year). I use the scheduled first year of service ($t = -4$) as the reference group in the regression.

The top plot shows how total loans to all firms vary across the appointment cycle. The middle plot reflects total loans to zombie firms, and the bottom plot represents total loans to non-zombie firms. For zombie firms, the trend of bank lending generally increases at the end of the cycle, which clearly indicates that lending to zombies is higher in the critical promotion period (year 5 of the term) relative to earlier off-appointment years (year 1-4 of the term). For non-zombie firms, a reverse trend is detected, i.e., the trend of bank lending decreases over the appointment cycle. Lending to non-zombies is the highest in the first year of the term and gradually reduces in the following four years. On average, lending to all firms tends to decrease over time, which is mainly driven by the group of non-zombie firms. Taken together, the trends suggest that during the term of service, a Party Secretary tends to put more effort and direct more lending to healthy firms because the payoff of investment may have a several-year lag, and it takes time to generate profitable

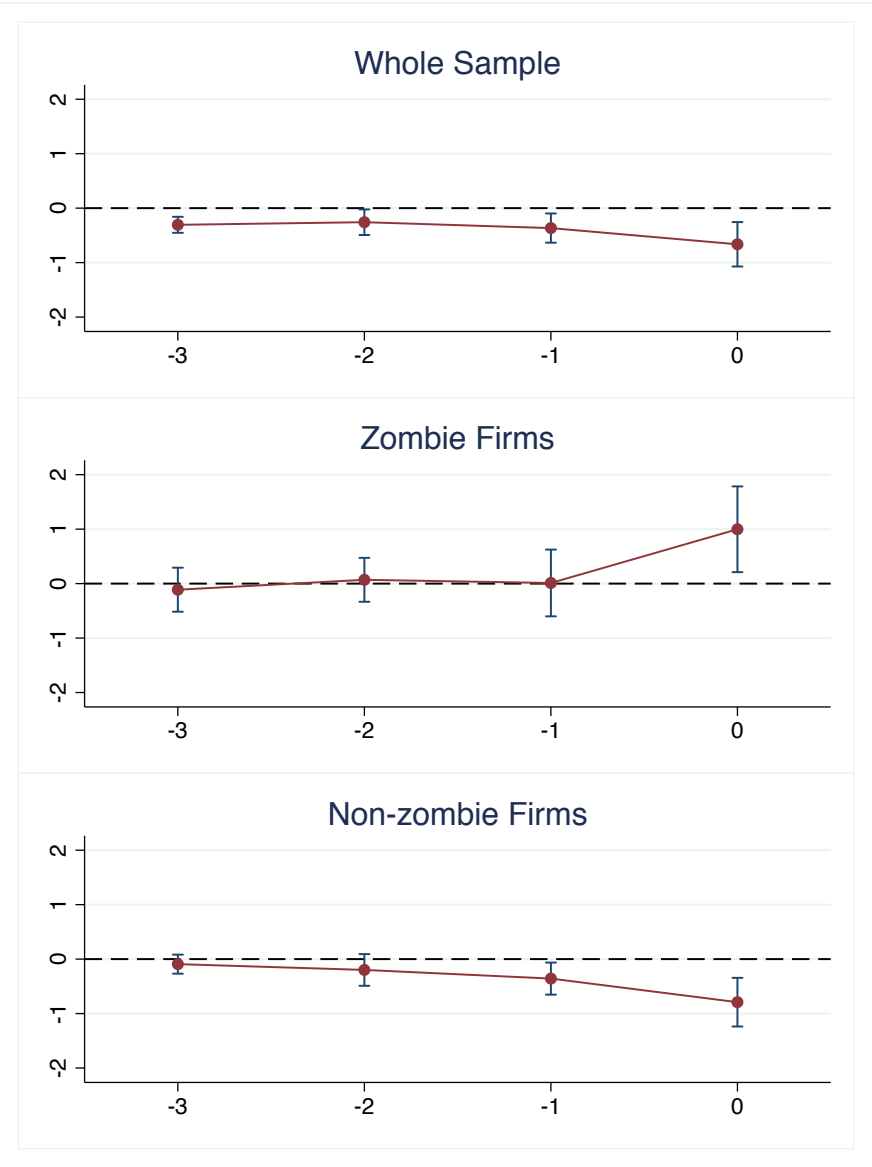

Figure 5: The Effect of Appointment Cycle on Bank Lending

Notes: Each plot represents a regression. The coefficients plotted are dummies for the number of years until the next scheduled appointment (last service year). The dependent variable is total loan in log values to all firms at the top, to zombie firms in the middle, and to non-zombie firms at the bottom. All regressions include year and prefecture-cycle fixed effects, as well as prefecture controls. Standard errors are clustered at the city level. Line segments around the dots gives the 90% confidence interval.

results. In contrast, lending to zombie firms occurs the most at the end of the term because the money is not used for restructuring these distressed firms, but rather to avoid massive bankruptcies and potential increases in the unemployment rate. At the end of the term, a Party Secretary has limited short-term instruments to boost (or at least maintain) performance. Bailing out zombie firms is one of them.

5.3 Which Banks are Being Pressured the Most?

National banks are banks that are relatively large in size and have local branches in most of the prefectures in China, while local banks are smaller in size and only operate in a particular prefecture or adjacent prefectures. By ownership structure, local banks have stronger ties to their local government and tend to be affected more by the local government officials.

Table 5 reports the results of last year effect on bank lending by bank type. Panel A uses the subsample where only loans from local banks are aggregated to the prefecture level. Similar to the analysis in Section 6.1, Column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3) instrument variable regression, and column (4) the first stage of IV regression. The IV results show that in the last service year of a Party Secretary, lending from local banks increases by 24.8% , although it is not significant. Again, the IV and OLS estimates vary in magnitude and significance, suggesting serious endogeneity of appointment years. The first-stage results show that the scheduled last service year S^{-0} (IV) is a relatively strong predictor. Analogously, Panel B reports the results of aggregate loans from national banks. The IV results show that in the last service year of a Party Secretary, lending from national banks decreases by 40.5%, although it is not significant.

Taken together, the results suggest that the last-year effect of bank lending from local or national banks to all firms is not significant. However, local banks tend to have more pressure to increase lending and respond more strongly to the last service year.

Figure 6 expands on the above results by tracing out how bank lending from local banks and national banks varies across the whole appointment cycle. The top plot shows the trend of total loans from local banks, and the bottom plot shows the trend of total loans from national banks. Loans from local banks, which account for 20% of all loans, do not exhibit any trend, with differences in lending in later years of the term and earlier years of the term not significant. Loans from national banks, which account for 80% of all loans, show a decreasing trend over the cycle.

Table 5: The Effect of Last Service Year on Bank Lending by Bank Type

	(1) OLS	(2) Reduced Form	(3) IV	(4) First Stage
Panel A: Local Banks				
Last	0.0125		0.248	
	-0.134		-0.372	
S^{-0}		0.1		0.470***
		-0.224		-0.0468
Observations	1,096	1,183	1,096	1,096
R-squared	0.735	0.72	0.733	0.664
First Stage F-stat			101	
Panel B: National Banks				
Last	-0.0258		-0.505	
	-0.138		-0.386	
S^{-0}		-0.079		0.446***
		-0.198		-0.0394
Observations	1,643	1,781	1,643	1,643
R-squared	0.753	0.75	0.747	0.671
First Stage F-stat			128.1	
City Characteristics	Yes	Yes	Yes	Yes
City_Cycle FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a regression. The dependent variable is total loans from local banks in log values (panel A), total loans from national banks in log values (panel B). In each panel, the coefficient reported is a dummy for the actual last service year in column (1), the scheduled last service year in column (2), and the actual last service year instrumented with the scheduled last service year in column (3). In addition to the indicated dependent variable of interest, all regression include year and prefecture-cycle fixed effects, and prefecture-level controls of GDP growth rate, unemployment rate, fiscal surplus ratio, fixed asset investment (in log values) and the share of urban population, lagged by one year. The unit of observation is prefecture-year. Robust standard errors are in parentheses. Standard errors are clustered at the prefecture level. The first stage of the IV regression in column (4) is $Last_{ct} = \alpha + \beta S_{ct}^{-0} + X'_{ct}\eta + \mu_{cj} + \theta_t + \varepsilon_{ct}$.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

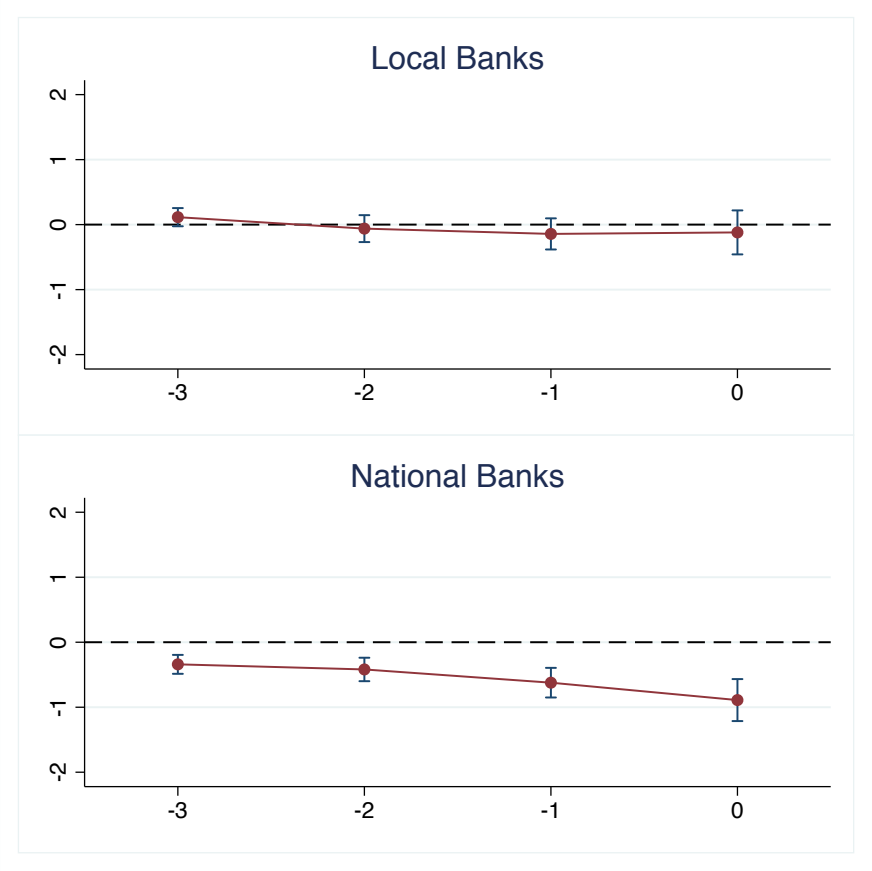

Figure 6: The Effect of Appointment Cycle on Bank Lending by Bank Type

*Notes:*Each plot represents a regression. The coefficients plotted are dummies for the number of years until the next scheduled appointment (last service year). The dependent variable is total loan in log value from local banks at the top, from national banks at the bottom. All regressions include year and city-cycle fixed effects, as well as prefecture controls. Standard errors are clustered at city level. Line segments around the dots give the 90% confidence interval.

5.4 Interactions

I further interact with the destination and source of loans and generate four different bins: (1) loans from local banks to zombie firms, (2) loans from national banks to zombie firms, (3) loans from local banks to non-zombie firms, and (4) loans from national banks to non-zombie firms.

Table 6 reports the results of the last-year effect on bank lending using each bin, where only loans in that bin are aggregated to the prefecture level. Similar to previous analysis, in each panel, column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3)

instrument variable regression, and column (4) the first stage of IV regression.

In Table 6 Panel A and Panel B, the IV results show that local banks increase lending to zombie firms massively in the last service year of a Party Secretary. The lending boom is larger than putting all loans to zombie firms together. There is also suggestive evidence that national banks increase lending to zombie firms in the last service year, though the effect is not significant. The effect of local banks is much stronger than that of national banks, which is consistent with the fact that local banks are more closely controlled by local government officials by nature. In Panel C and Panel D, for non-zombie firms, lending from local banks is not significant and small in magnitude in the last year, while lending from national banks decreases. The magnitude is larger than when putting all loans to non-zombie firms together.

Figure 7 expands the analysis by tracing out how bank lending in each bin varies across the appointment cycle. Each plot in Figure 7 represents a separate regression of total loans on dummies for the number of years until the next scheduled appointment year, i.e., the last service year. Comparing the first plot (loans from local banks to zombie firms) and the second plot (loans from national banks to zombie firms), it can be seen that both local banks and national banks increase lending to zombie firms across the appointment cycle over time. Local banks are more responsive in every year, indicating that these smaller local banks are better manipulated by local government officials. Comparing the third plot (loans from local banks to non-zombie firms) and the fourth plot (loans from national banks to non-zombie firms), it can be seen that lending from local banks to non-zombie firms is less responsive than lending from national banks to non-zombie firms. The proportion of zombie firms in all firms and the proportion of local banks in all banks are relatively small. It can be inferred that local government officials mainly use loans from large national banks as long-term tools to support the growth of healthy firms. Loans from small local banks are taken as short-term tools to help zombie firms.

Table 6: The Effect of Last Service Year on Bank Lending by Firm Type and Bank Type

	(1) OLS	(2) Reduced Form	(3) IV	(4) First Stage
Panel A: Zombie-Local				
Last	0.852		3.779**	
	-0.837		-1.898	
S^{-0}		1.755		0.506***
		-1.104		-0.072
Observations	381	397	381	381
R-squared	0.852	0.851	0.836	0.693
First Stage F-stat			49.34	
Panel B: Zombie-National				
Last	-0.24		1.269	
	-0.419		-1.25	
S^{-0}		0.649		0.432***
		-0.626		-0.0601
Observations	885	915	885	885
R-squared	0.634	0.623	0.62	0.672
First Stage F-stat			51.62	
Panel C: Non-zombie-Local				
Last	-0.0127		0.108	
	-0.141		-0.337	
S^{-0}		0.0127		0.481***
		-0.207		-0.0458
Observations	1,069	1,151	1,069	1,069
R-squared	0.728	0.714	0.727	0.667
First Stage F-stat			110	
Panel D: Non-zombie-National				
Last	-0.11		-1.063*	
	-0.177		-0.579	
S^{-0}		-0.177		0.469***
		-0.28		-0.0606
Observations	1,031	1,165	1,031	1,031
R-squared	0.875	0.875	0.862	0.728
First Stage F-stat			59.8	
City Characteristics	Yes	Yes	Yes	Yes
City_Cycle FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a regression. The dependent variable is total loans from local banks to zombie firms (panel A), from national banks to zombie firms (panel B), from local banks to non-zombie firms (panel C), and from national banks to non-zombie firms (panel D), all in logs.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

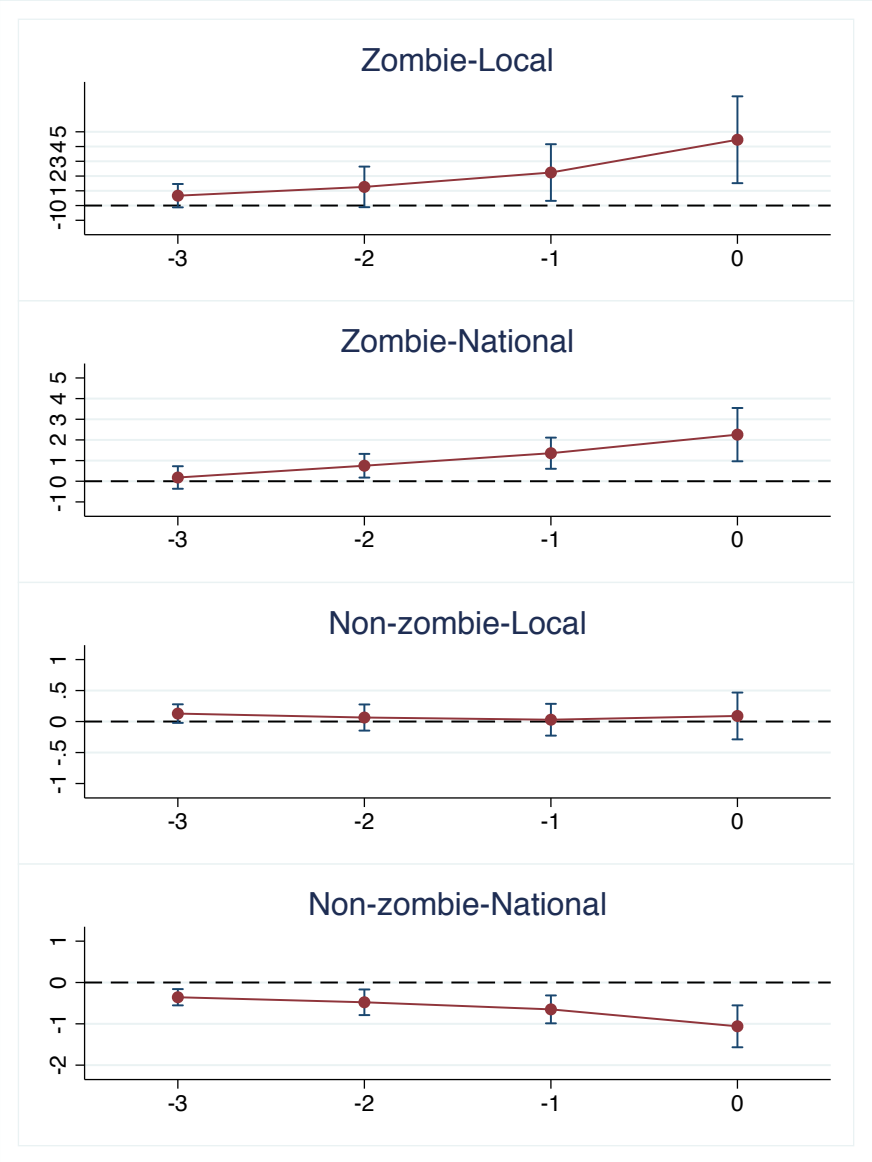

Figure 7: The Effect of Appointment Cycle on Bank Lending by Firm Type and Bank Type

Notes: Each plot represents a regression. The dependent variable is total loans from local banks to zombie firms (first plot), from national banks to zombie firms (second plot), from local banks to non-zombie firms (third plot), and from national banks to non-zombie firms (fourth plot), all in log values. All regressions include year and city-cycle fixed effects, as well as prefecture controls. Standard errors are clustered at the prefecture level. Line segments around the dots give the 90 % confidence interval.

6 Discussion

6.1 Zombie Performance after the Assignment of A New Party Secretary

As Party Secretaries increase lending to zombie firms in their last service year as a short-term tool to boost performance in the critical promotion period, a natural question follows: do zombie firms do much worse in the year after an official is re-assigned?

I measure performance with three indicators: asset turnover, net profit margin, and return on assets. Asset turnover is the ratio of net sales revenue to average total assets. It measures the efficiency with which a firm uses its assets to generate sales revenue. The larger the asset turnover is, the higher the operational efficiency. Net profit margin is the ratio of net profit to sales revenue and is an indicator of profitability, representing how much profit each dollar of sales generates. Return on assets is the ratio of net profit to average total assets and indicates how profitable a company is relative to its total assets.

To test the performance of zombie firms after the new Party Secretary arrives, I specify the following regression:

$$Performance_{ct}^{zombie} = \alpha + \beta New_{ct} + X'_{ct-1}\eta + \mu_c + \theta_t + \varepsilon_{ct}$$

where $Performance_{ct}^{zombie}$ is a measure of average performance of zombie firms in prefecture c in year t, including asset turnover, net profit margin, and return on assets. $Newct$ indicates the first service year of a new prefecture Party Secretary, and X'_{ct-1} is the list of lagged prefecture controls. μ_c represents city-cycle fixed effects, and θ_t represents year fixed effects. Standard errors are clustered at the prefecture level.

Similarly, as the timing of (re-)appointment is subject to some random changes, I use a dummy as an instrument for the actual first service year, $NewIV$, for whether five years have passed since the previous "first service year". This scheduled "first service year" is a predictor of the real "last service year". To avoid the case where the instrument only assigns the last service year to years t, $t+5$, $t+10$, and $t+15$, I reset the instrument after an early (re-)appointment.

Does zombie performance deteriorates after a new Party Secretary comes? Table 7 shows the results of first-year effect on zombie performance indicators. In each panel, column (1) reports the result of OLS regression, column (2) reduced-form regression, column (3) instrument variable regression, and column (4) the first stage of IV regression. There is no significant effect of the first

service year on any performance measure.

I then expand on the results by tracing out how zombie performance changes across two cycles: five years in the current cycle and the first three years in the next cycle. Figure 8 shows the results. The x-axis represents dummies for the scheduled service year. It ranges from $t = -3$, which indicates the scheduled second year of service for the current cycle, to $t = 3$, which indicates the scheduled third year of service for the next cycle. I use the scheduled first year of service for the current cycle ($t = -4$) as the reference group in the regression.

The top plot shows how the average asset turnover of zombie firms varies across two appointment cycles. The middle plot reflects the average net profit margin, and the bottom plot represents the return on assets. For zombie firms, the efficiency to use assets to generate sales revenue improves across the current cycle and dips when the current Party Secretary leaves and a new Party Secretary comes into power. Return on asset tends to decrease over the current cycle, and the trend extends further to the next cycle. Net profit margin does not exhibit a significant trend across two cycles. Taken together, the evidence suggests that zombie firms show lower efficiency in the year after an official is reassigned, but their average profitability does not change significantly.

6.2 Does Lending to Zombies Help Promotion?

Finally, I provide some suggestive evidence on how Party Secretaries' subsequent assignments respond to zombie lending. Although it is stated in the *Regulations on the Work of Selecting and Appointing Leading Party and Government Cadres* that candidates for promotion will be evaluated in an all-around manner, emphasis is placed on their actual achievement. Measures for achievement include local GDP growth, unemployment, social stability, and other indicators. Bailing zombie firms out in the last service year is not one of the indicators, but it may help maintain investment growth and avoid a surge in unemployment and social unrest. The questions is as follows: Do Party Secretaries who pressure banks to partake in zombie lending end up with better assignments (conditional on performance indicators such as local GDP growth, unemployment rate)?

To test whether lending to zombies helps promotion, I specify the following cross-sectional

Table 7: The Effect of New Appointment Year on Zombie Firm Performance

	(1) OLS	(2) Reduced Form	(3) IV	(4) First Stage
Panel A: Asset turnover				
New	0.0395		0.0973	
	(0.0450)		(0.0780)	
NewIV		0.0641		0.658***
		(0.0750)		(0.0761)
R-squared	0.773	0.773	0.770	0.741
First Stage F-stat			74.77	
Panel B: Net profit margin				
New	-0.0201		0.145	
	(0.179)		(0.181)	
NewIV		0.0956		0.658***
		(0.176)		(0.0761)
R-squared	0.747	0.747	0.746	0.741
First Stage F-stat			58.15	
Panel C: Return on assets				
New	-0.00273		0.00351	
	(0.00845)		(0.00941)	
NewIV		0.00231		0.658***
		(0.00913)		(0.0761)
R-squared	0.962	0.962	0.962	0.741
First Stage F-stat			81.54	
Observations	637	635	635	635
City_Cycle FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a regression. Each column in each panel represents a regression for zombie firms. The dependent variable is average asset turnover (panel A), average net profit margin (panel B), and return on asset (panel C). The coefficient reported is a dummy for actual first service year in column (1), scheduled first service year in column (2), and actual first service year instrumented with scheduled first service year in column (3). The first-stage result of the IV regression is reported in column (4). All regressions include year and city-cycle fixed effects. Standard errors are clustered at the prefecture level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

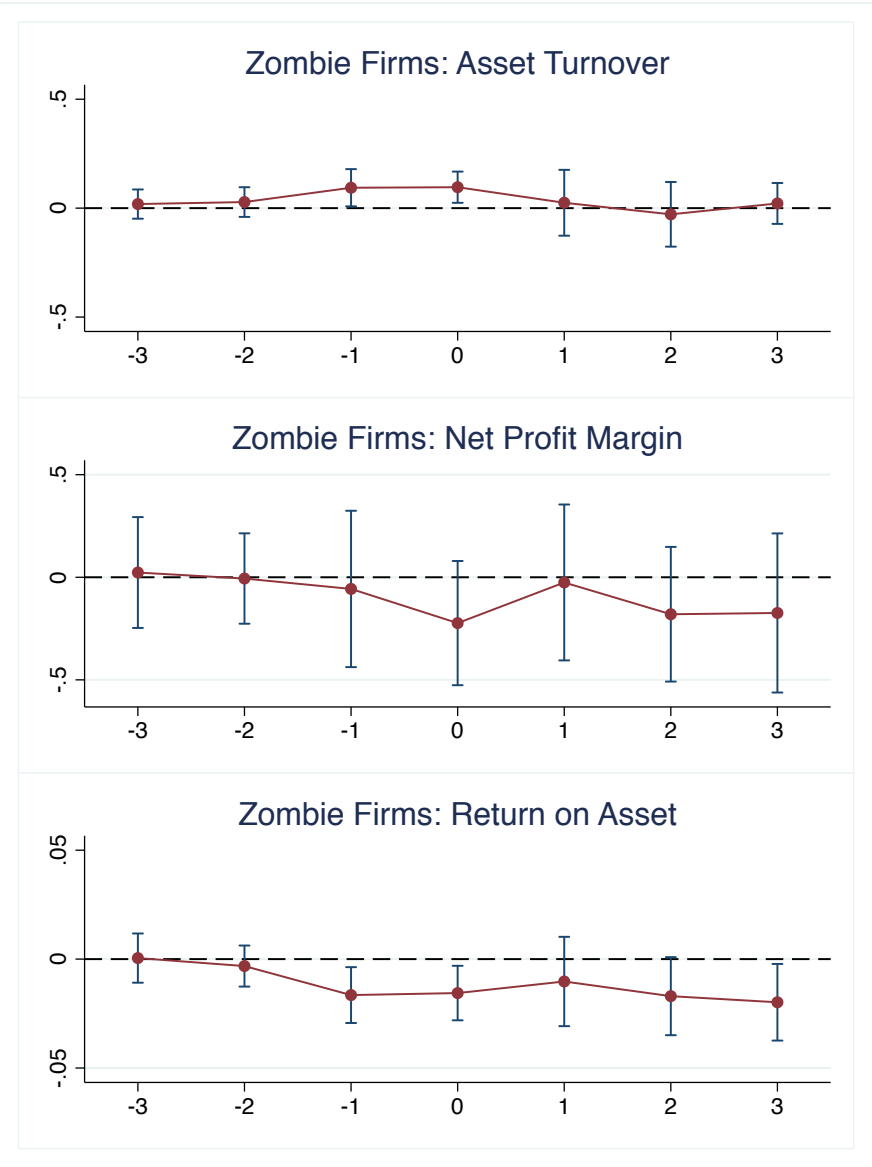

Figure 8: The Effect of Appointment Cycle on Zombie Firm Performance
Notes: Each plot represents a regression. The coefficients plotted are dummies for service years for the current and next appointment cycle. The dependent variable is average asset turnover in the top left corner, net profit margin in top right corner, and average return on assets in the bottom left corner. All regressions include year and city-cycle fixed effects, as well as prefecture controls. Standard errors are clustered at the prefecture level. Line segments around the dots give the 90 % confidence interval.

regression:

$$Promotion_{cj} = \alpha + \sum_{m=1}^{5} \beta_m Loan_{cjm}^{zombie} + \sum_{m=1}^{5} \gamma_m Loan_{cjm}^{non-zombie} + \sum_{m=1}^{5} \eta_m \Delta GDP_{cjm} + \sum_{m=1}^{5} \rho_m UMP_{cjm} + \sum_{m=1}^{5} \lambda_m FSR_{cjm} + X_j' + \varepsilon_{cj}$$

where $Promotion_{cj}$ is an indicator of whether the incumbent Party Secretary j in prefecture c gets promoted at the end of the service term. $Loan_{cjm}^{zombie}$ represents lending to zombie firms in each service year m ($m = 1, 2, 3, 4, 5$) of Party Secretary j in prefecture c, and $Loan_{cjm}^{non-zombie}$ represents lending to non-zombie firms in in each service year m analogously. ΔGDP_{cjm}, UMP_{cjm}, and FSR_{mcjm} reflects GDP growth, unemployment rate, and fiscal surplus ratio in each service year m respectively. X_j' is a series of Party Secretary individual characteristics, including length of service term, current term starting age, gender, and years of education.

Table 9 shows the results of logit regressions. Lending to zombie firms in the critical appointment year (last service year) significantly increases the probability of being promoted, while lending to zombie firms in earlier years (especially in the fourth year) has a negative impact on promotional success. In contrast, lending to non-zombie firms has a negative impact on the promotion probability in the last service year and mostly positive impacts in earlier years, although the effects are insignificant. In an alternative specification, I use the percentage of total lending to zombie firms in each year as the main independent variables, all else the same. The results show that a higher percentage of lending to zombies in the last service year increases the promotion probability significantly, while higher percentage in earlier years reduces the promotion probability, although it is insignificant. Among the achievement indicators, GDP growth in the second to the last year seems to be the most important determining factor of promotion. Admittedly, there are other factors such as relationship (*guanxi*) with higher level officials that can affect the chance of promotion, and these factors are omitted in the regression. Thus, it only provides suggestive evidence that lending to zombies at the end of the political cycle in general helps promotion.

Table 8: Probability of Promotion: Lending to Zombie Firms

	(1)	(2)
VARIABLES	Value to Zombie	Percentage to Zombie
Lending to zombie firms		

in year 5	0.291*	
	(0.163)	
in year 4	-0.448*	
	(0.247)	
in year 3	-0.113	
	(0.151)	
in year 2	-0.218	
	(0.182)	
in year 1	-0.0523	
	(0.150)	
Lending to non-zombie firms		
in year 5	-0.255	
	(0.174)	
in year 4	0.256	
	(0.194)	
in year 3	0.0836	
	(0.132)	
in year 2	0.147	
	(0.148)	
in year 1	-0.00790	
	(0.151)	
Percentage to zombie firms		
in year 5		3.317*
		(1.980)
in year 4		-2.548
		(1.560)
in year 3		-0.128
		(1.053)
in year 2		-1.345
		(0.957)
in year 1		-0.598
		(1.051)
GDP growth		
in year 5	-0.0628	-0.0252
	(0.233)	(0.124)
in year 4	0.295**	0.220**

	(0.136)	(0.110)
in year 3	0.0142	0.0734
	(0.124)	(0.0838)
in year 2	0.0733	0.107
	(0.124)	(0.0851)
in year 1	0.0961	0.112
	(0.0906)	(0.0719)
Fiscal surplus ratio		
in year 5	0.0858**	0.0965**
	(0.0409)	(0.0416)
in year 4	-0.275**	-0.297**
	(0.131)	(0.147)
in year 3	-0.206**	-0.180*
	(0.100)	(0.102)
in year 2	-0.000115	-0.00596
	(0.0676)	(0.0673)
in year 1	0.0854	0.0809
	(0.0551)	(0.0522)
Unemployment rate		
in year 5	0.0520	0.0566
	(0.278)	(0.262)
in year 4	-0.322*	-0.420**
	(0.167)	(0.182)
in year 3	-0.186	-0.158
	(0.136)	(0.138)
in year 2	0.0238	0.0322
	(0.109)	(0.114)
in year 1	0.0716	0.0835
	(0.0951)	(0.106)
s_term	0.153	0.161
	(0.137)	(0.134)
s_startage	-0.0455	-0.0578
	(0.0507)	(0.0497)
s_male	-0.100	-0.0981
	(0.649)	(0.702)
s_education	0.0199	0.00377

	(0.0998)	(0.0948)
Constant	3.279	2.978
	(3.951)	(3.645)
Observations	332	332

7 Conclusions

The existence of zombie firms has been proven to be costly. Banks continuing to provide forbearance lending are attributed to be the main contributing factor to zombie firms in most of the relevant literature. In this paper, I explain the causes of zombie-firm lending from a political cycle perspective and examine how local political officials, even if they are appointed under a bureaucratic system rather than elected, may manipulate bank lending and contribute to keeping zombie firms alive. Specifically, I aggregate individual loan data to the prefecture level, explore how bank lending responds to the appointment cycles of local political officials to serve their promotion interests, and explore how it contributes to the existence of zombie firms.

On average, bank lending does not respond to the last service year or appointment cycle of Party Secretaries. However, there is significant targeting of firms: lending to zombie firms increases in the last year by 228% and exhibits a significant increasing trend across the cycle, and lending to non-zombie firms shrinks by 87% and shows a significant decreasing trend across the cycle. Party Secretaries tend to direct more credit to non-zombies in the early years of service because it may take a few years for non-zombie firms to transform credit resources to profitable projects and the payoff of investment tend to be lagged; thus, early lending support will be more beneficial. In the later years of service, Party Secretaries will substitute lending to zombie firms for lending to non-zombie firms, as helping zombie firms is one of the limited short-term instruments that can be used to avoid a surge in unemployment and maintain performance at the end of a cycle. In addition, Party Secretaries are more capable of pressuring small local banks to support unprofitable, distressed local zombie firms. Their ability to manipulate large nationally operated banks and influence their lending decisions is relatively limited.

For zombie firms, there is suggestive evidence that their performance does not change significantly after a new Party Secretary is assigned. The efficiency to use assets to generate sales revenue

improves across the current cycle and dips when the current Party Secretary leaves and a new Party Secretary comes into force. The two profitability measures do not exhibit a significant trend across the two appointment cycles. Lending to zombie firms is a short-term tool used by Party Secretaries to maintain or boost achievement temporarily in the critical promotion period, and it does seem to help Party Secretaries move up the career ladder.

Considering the damage caused by zombie firms, various policies have been proposed to eliminate zombie firms, including increasing regulation on banks. These measures may not be truly effective if the role of local government officials is omitted, especially in the context of developing countries where financial markets are immature and largely affected by the government. As suggested in this paper, local governments may not have the incentives to increase regulation and protect the independent operation of banks. They may instead actively influence banks and manipulate credit resources to serve their own political interests at the cost of social welfare. Thus, reduced intervention or even separation between local government officials and banks, particularly local banks, may be needed to correct the problem of zombie firms.

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Appendix I: Data Imputation

One issue with the loan database is that the bank local branch information is not reported exactly at the prefecture level. There are 30% of observations with ambiguous locations that are reported at finer levels (e.g., township, village, and street levels) that may not correspond to a unique prefecture. For these observations, I identify the prefecture by mapping these towns, villages, and streets to the prefectures to which they belong. When the prefecture is not unique, I try to identify the prefecture by tracking the borrowing history of the firm and choose the most likely prefecture in which the local branch. There are also 15% of observations without local branch information. For these missing values, I try to impute the missing location with the following algorithm:

> *Step 1*: If firm F only borrows in one prefecture C across all years (possibly from multiple banks, including bank B), then I identify the missing local branch as being in prefecture C. If firm F borrows from multiple prefectures across all years, then I do not identify the local branch and go to Step 2.
>
> *Step 2*: If firm F borrows in several prefectures but only from fixed bank-city pairs (i.e., whenever firm F borrows from a particular bank B, it only borrows from a particular local branch in prefecture C of this bank B), then I identify the missing local branch as being in prefecture C. If it is not true, I go to Step 3.
>
> *Step 3*: If firm F borrows in several cities but only from fixed bank-year-city pairs (i.e., whenever firm F borrows from a particular bank B in a particular year T, it only borrows from a particular local branch in prefecture C of this bank B), then I identify the missing local branch as being in prefecture C. If it is not true, I do not identify the local branch. Note that there could be several loans between one firm and one bank in a year.

Following this algorithm, I extrapolate local branch information for 4,002 observations, which increases my sample size by 8%.

Appendix II: Granger Causality Analysis of Zombie Firms

The original definition of a zombie firm allows for variation in zombie status across years for a firm, which may lead to potential endogenous selection into the zombie group due to loans taken in previous years. To rule out the possibility of loan-induced zombies, a preliminary Granger causality analysis is carried out in order to test the relationship between obtaining loans and being a zombie.

I use the loan dataset and aggregate it to firm level. Notice that each publicly listed firm may have subsidiaries in multiple prefectures and thus borrow in multiple prefectures in a year. I treat each firm-prefecture pair as a unique business unit of this firm. If the firm is a zombie, then all of its business units are also zombies. The Granger causality tests at the firm level are:

$$Loan_{ict} = \sum_{k=1}^{2} \alpha_k Loan_{ict-k} + \sum_{k=1}^{2} \beta_k Zombie_{ick} + \mu_{cj} + \theta_t + \gamma_i + \varepsilon_{ict}$$

$$Zombie_{ict} = \sum_{k=1}^{2} \alpha_k Loan_{ict-k} + \sum_{k=1}^{2} \beta_k Zombie_{ick} + \mu_{cj} + \theta_t + \gamma_i + \varepsilon_{ict}$$

where $Loan_{ict}$ is total loan for firm i in prefecture c (or business unit ic) in year t. $Zombie_{ict}$ indicates the business unit ic being a zombie in year t. μ_{cj} represents prefecture-cycle fixed effects where the subscript j indicates Party Secretary j. θ_t represents year fixed effects. γ_i represents firm fixed effects. Standard errors are clustered at the firm level.

Table A shows the results of Granger causality tests at the firm level. Columns (1) and (3) report the results of regressing current loans on one- and two-year lags of loans and zombie status. The only significant predictor of current loans is loans one year ago, when service year fixed effects are included in the regression as shown in column (3). Zombie status in the previous two years does not affect current loans. Columns (2) and (4) report the results of regressing current zombie status on the same set of lagged variables. It can be seen that loans in the previous two years are not predictors of current zombie status, which may reduce the concern of loan-induced zombies to some degree. However, zombie status one year ago negatively affects zombie status in the current year when service year fixed effects are included, as shown in column (3), indicating that a firm being a zombie in the last year tends to become non-zombie in the current year, which resonates

with the churning pattern of zombie firms in a prefecture-cycle.

Table A: Granger Causality Test of Loans and Zombie Status

	(1)	(2)	(3)	(4)
VARIABLES	Loan	Zombie	Loan	Zombie
Loan 1-year lag	0.0144	0.00243	0.0148*	0.00285
	(0.00912)	(0.00205)	(0.00855)	(0.00202)
Loan 2-year lag	0.0108	-0.00106	0.0117	-0.00102
	(0.00994)	(0.00185)	(0.00943)	(0.00193)
Zombie 1-year lag	0.0696	-0.263**	0.0807	-0.261**
	(0.379)	(0.110)	(0.383)	(0.110)
Zombie 2-year lag	-0.319	-0.0720	-0.314	-0.0583
	(0.253)	(0.117)	(0.249)	(0.117)
Constant	20.59***	0.463	19.88***	1.649***
	(0.905)	(0.393)	(1.344)	(0.551)
Observations	1,344	1,325	1,325	1,325
R-squared	0.828	0.807	0.828	0.812
Prefecture_Cycle FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Service_Year FE	No	No	Yes	Yes

Notes: Each column represents a regression. The coefficients reported are lagged loan and lagged zombie status. The dependent variable is the total loan to a firm in a city in a year for column (1) and (3). The dependent variable is zombie status for a firm in a year in a prefecture for column (2) and (4). All regressions include year and prefecture-cycle fixed effects. Regressions in column (3) and (4) include service year fixed effects as well. Standard errors are clustered at the firm level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.