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The long shadow of a fiscal expansion

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Abstract

In 2009 and 2010, China undertook a 4 trillion Yuan fiscal stimulus, roughly equivalent to 12 percent of annual GDP. The "fiscal" stimulus was largely financed by off-balance sheet companies (local financing vehicles) that borrowed and spent on behalf of local governments. The off-balance sheet financial institutions continued to grow after the stimulus program ended at the end of 2010. After the end of the stimulus program, spending by these off balance sheet companies accounted for roughly 5% of annual GDP, with an increasing share used for investment of essentially private projects. The off-balance spending by local governments is likely responsible for a 5 percentage point increase in the aggregate investment rate and part of the 7 to 8 percentage point decline in current account surplus since 2008. Finally, we argue that local governments used their new access to financial resources to facilitate access to capital to favored private firms, which potentially worsens the overall efficiency of capital allocation. The long run effect of off-balance sheet spending by local governments may be a permanent decline in the growth rate of aggregate productivity and GDP.

1. Introduction

In November 2008, in the depths of the world financial crisis, China announced to great fanfare a 4 trillion Yuan fiscal stimulus to be spent by 2010. Dominique Strauss-Kahn, then the managing director of the International Monetary Fund, said in response to the announcement of the stimulus plan that "it will have an influence not only on the world economy in supporting demand but also a lot of influence on the Chinese economy itself, and I think it is good news for correcting imbalances."[1] These funds, amounting to about 12 percent of annual Chinese GDP, were mostly to be spent on infrastructure projects in 2009 and 2010. Many people viewed the fiscal stimulus as playing an important role in preventing the world recession from getting worse. For example, Paul Krugman wrote in 2010 that China had engaged in "much more aggressive stimulus than any Western nation – and it has worked out well."[2]

The goal of this paper is two-fold. First, we analyze the institutional details on how the fiscal stimulus was financed. We show that the fiscal stimulus was implemented by local governments and mostly financed by the relaxation of financial constraints facing local governments. Specifically, local governments were legally prohibited from borrowing or running deficits. To circumvent these rules, local governments were allowed to create off-balance sheet companies known as local financial vehicles in 2009 and 2010 to fund the stimulus spending. A typical arrangement would be that local governments would transfer ownership of land to the local financing vehicle, and the land would be used as collateral to borrow from banks and shadow banks (trust products) as well as to issue bonds.

Figure 1 plots the investment rate and the budget deficit with vertical lines drawn at the beginning and end of the stimulus. As can be seen, the investment rate increased by about 4 percent of GDP in 2009 and 2010, suggesting that much of the fiscal stimulus was spent on public infrastructure projects as planned.[3] However, it can also be seen there was much smaller increase in the (official) budget deficit of the Chinese government.[4] We show that the gap between the increase in the investment rate and the budget deficit was bridged by off-balance sheet spending via the new local financing vehicles.

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[1] New York Times, November 9, 2008, "China plans $586 billion economic stimulus."
[2] http://krugman.blogs.nytimes.com/2010/07/24/keynes-in-asia/
[3] See also Chang et al. (2015) for the spike of a detrended aggregate investment in 2009-10.
[4] The figure shows the combined budget deficit of the central and local governments.

Second, we assess the long run consequences of this financing choice. We show that after the end of the fiscal stimulus, the off-balance sheet financial institutions continued to grow as local governments found themselves with powerful new tool to circumvent the financial controls on their budgets. As partial evidence for this, Figure 1 shows that the investment rate remained higher (compared to 2008) even after the end of the fiscal stimulus in 2010. By 2014, China's investment rate stood at 48 percent of GDP, which is probably the highest investment rate of any country in the world. The increase in the investment rate since 2008 reflects spending by local governments financed through the local financing vehicles, and is a direct consequence of the financing choices made in 2009 and 2010.

In short, the fiscal stimulus was really partial financial liberalization. It is partial because financial constraints were lifted only for local governments, and not for private financial institutions or for state owned banks. This might have had positive effects on welfare and growth if local governments used these resources for high social return projects previously starved of resources. However, we provide partial evidence that in addition to funding infrastructure projects, the relaxation of financial constraints made it possible for local governments to channel financial resources towards essentially private firms championed by local governments. In 2014, for example, we estimate that the off-balance sheet spending by local governments accounted for about 11% of GDP, with 4.6% of GDP spent on local infrastructure projects and 6.4% of GDP on what are essentially private commercial projects. The aggregate effect is that the overall efficiency in the allocation of capital worsened which, ceteris paribus, lowers the aggregate growth rate.

Figure 2 provides prima facie support for this story. It shows that despite the increase in the investment rate after 2008, aggregate growth rates have declined significantly after the end of the fiscal stimulus in 2010. There are clearly many other forces behind the slowdown in Chinese growth, and we do not attempt to parse these out in the paper, but the long shadow of the Chinese fiscal stimulus driven by the behavior of local governments is likely an important source of the growth slowdown.

The paper proceeds as follows. We first describe the key institutional features behind China's growth in the two decades prior to the fiscal stimulus. We then lay out the key facts about the fiscal stimulus, before describing the growth of the off-balance sheet financial institution. We then use data from a sample of these off-balance sheet financial institutions as well as firm level data from the Chinese industrial census to provide micro-economic evidence on the long run effects of the fiscal stimulus.

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2. Growth under Special Deals and Financial Constraints

To understand the long run effects of the fiscal stimulus, it is useful to take a step back to analyze the institutional foundations of China's growth. A conventional narrative of China's growth is that this growth reflects the gradual improvement of Chinese institutions. Specifically, growth took off when China removed constraints faced by farmers, opened up to the world, regularized economic and political institutions after the turmoil of the Cultural Revolution, and generally introduced pro-market institutions. While this narrative is probably an important part of the story of what happened in the 1980s, it is probably not the right explanation for what happened after 1989. Huang (2008) for example, documents that many of the pro-market policies adopted in the 1980s were reversed after 1989. Another piece of evidence is provided by the World Bank's Doing Business indicators, which is a widely used measure of the friendliness of the institutional environment faced by the private sector. According to these indictors, China ranks 151 in the world in terms of the "ease of entry" of a private firm. This is roughly on par with the Congo and significantly below Iran (rank 87) and Pakistan (rank 98).[5]

However, if institutions supporting private firms are as bad as suggested by the narrative evidence and the World Bank's Doing Business Indicators, what explains the explosive growth in the private sector in China in the last 20 years? In a companion paper (Bai, Hsieh, and Song, 2016), we argue that the key to China's growth is the development of an informal regime of "special deals" combined with strict financial constraints over local governments. We argue that a sine qua non of successful private firms in China is that they need to have the political support of a local Communist Party boss. This is because, as suggested by the World Bank's Doing Business indicators, formal institutions for private firms are very bad in China. In this environment, the only way for a private firm to succeed is that they manage to enter into a relationship with a political leader that allows them to circumvent the formal rules. This is common in countries with weak formal institutions and we argue that China is no different.

Yet the outcome, in terms of the growth of private firm and aggregate growth more generally, appears to be different in China compared to other countries with seemingly similar regimes. Why is China different? For the purposes of this paper, a key feature of the Chinese system is that local governments (at the level of counties and prefectures) have enormous

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[5] The rankings are from 2013.

power, and have largely used this power in the last 20 years to support a subset of private firms, but they did not have access to financial resources. This was important in forcing local governments to support favored private firms by improving the institutional environment facing the favored firms. Their support for private firms primarily took the form of exemption to official rules and lobbying the central government for special exemptions to the rules for their favored private firms. They could not provide financial support to favored private firms. The severe budget constraints also meant that there was little that could be directly stolen from the public budget.

There were three key institutional reforms in the 1990s that created the severe budget constraints faced by local governments. In the early 1990s, taxes were largely under the control of local governments. In 1994 for example, almost 80 percent of all tax revenues were collected and spent by local governments (see Figure 3). Under this system, known as the "fiscal contract responsibility system," local governments had to make fixed or regressive payments to the central government but could keep the remainder of local taxes.[6]

The "tax sharing reform" in 1994 removed control of local governments over the allocation of local tax revenues. As can be seen in Figure 3, the tax share of local governments fell from about 80 percent to 40 to 50 percent in 1994. The central government made fiscal transfers to local governments but tied these transfers to specific spending projects, at least for wealthier local governments. For wealthier localities, more than 80 percent of the transfers from the central government were earmarked for specific projects, particularly social security and welfare programs. Specifically, almost 80 percent of all fiscal transfers were designated for specific projects or transfers from wealthier to poorer localities.[7]

To be sure, local governments responded by looking for other sources of revenues. For example, many local governments began to impose penalties for legal violations and fees for access to "public" services. More importantly, many local governments seized land from farmers and urban residents and resold the land to private firms and developers. Land sales have become an important source of local revenue, but land is a fixed resource and revenues from land sales have mostly leveled off by 2014. Furthermore, there were controls over what revenues from land sales could be used for.

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[6] There are five contractual arrangements for the tax sharing between the central and provincial governments. Most of the contracts imply that local fiscal revenue outgrow remittance to the central government. Only three provinces remit a fixed share of local revenue to the central government. See Jiang (2008) and Jin, Qian and Weingast (2005) for more institutional details. Zhang and Zou (1998) and Ma (1997), among many others, study the growth implications of the fiscal decentralization in the 1980s and early 1990s.

[7] See Wong and Bird (2008) for a review on the tax-sharing reform.

A second important change is the 1994 budget law that made it illegal for local governments to run budget deficits. This is not to say that there wasn't some wiggle room. For example, it was possible for local governments to implicitly run deficits by establishing locally controlled state-owned companies -- the original local financing vehicles – with the explicit purpose of borrowing for public spending. Prior to 2009 these types of companies were severely restricted. Only two types of local financing vehicles were allowed. These are (i) companies specialized in road and bridge construction and (ii) investment companies specialized in urban development.[8] Nonetheless, only a small number of local governments were able to obtain access to resources via this channel. For example, there were only 17 local financing vehicles that issued bonds in 2006.[9] In addition, as we will document in detail later, the implicit local government debt was less than 6 trillion Yuan in 2008, or about 20% of China's GDP in that year.

The third change that came in the late 1990s was the reorganization of state banks implemented by Premier Zhu Rongji. Before the late 1990s, Zhou Xiaochuan, the President of People's Bank of China, described the incentives of local banking officials as follows:[10]

Loan allocation, like administrative jurisdiction, seems to be decentralized by province, prefecture, city and county. Local branches at each level may exhibit the phenomenon of 'three eyes' – i.e., they watch headquarter, local government and local PBoC with 'three eyes'.

The consequence of the "three-eyed" system was that local officials exercised their political influence over the banks by allocating loans towards their pet projects. In 1997 and 1998, using the Asian financial crisis was an excuse, the central government pushed through a new "vertical management system" for the state banks. Specifically, the provincial branches of the state owned banks were dismantled and replaced with nine branches that crossed several provinces. Importantly, the power of local Communist Party officials over the appointments of local bank officers was removed and centralized by the People's Bank of China. This power was further centralized in 2003 when the China's Banking Regulatory Commission (CBRC) was established.[11]

As a result, the banking sector became more competitive (see Hachem and Song, 2016). The non-performing loan rate, which reached a record high of 30% in the late 1990s and early 2000s, declined to below 3% in 2008. The reformed banking sector managed to resist

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[8] Bai and Qian (2010) provide case studies about these companies.
[9] This information is from the WIND database, which we describe later in the paper.
[10] The quote is from Zhou (2005).
[11] See pp. 475-491, Zhu Rongji on the Record, Volume II for details.

mounting pressure from local governments that had been desperately looking for external financing since the tax-sharing reform. One example is the effort made by CBRC to prohibit local government from providing guarantees on loans except for those approved by the State Council (Document No. 27, CBRC, 2006).

3. The "Four Trillion" Fiscal Stimulus

The Chinese economy was hit hard by the 2008 crisis. GDP growth fell to 7.1% in the fourth quarter of 2008, down from 13.9% in 2007 (in the same quarter) (See Figure 2). The unemployment rate among registered urban households increases by 2 percentage points in 2008, which almost certainly understates the increase in the unemployment rate among non-registered urban households.[12] In response, the Chinese authorities rolled out a package of stimulus policies in November 2008, of which the most important was a four trillion Yuan fiscal stimulus to be spent by 2010.[13]

Table 1 (first column) summarizes projected spending under the stimulus package in seven broad categories. According to the plan, about half of the stimulus (1.87 trillion Yuan) was to be spent on public infrastructure projects and one quarter on infrastructure repairs in response to the 2008 Wenchuan earthquake. A natural question is whether the fiscal stimulus was for real, or whether the stimulus was spent on projects that would have been undertaken without the stimulus program.

To answer this question, we look at the published accounts of realized spending by the local and central governments in "roughly" the same seven categories in 2009 and 2010. We use the word "roughly" because the classification of spending in the published budgets do not line up perfectly with the spending categories in the stimulus package. For clarity Table 1 lists the spending categories in the published budget that we match to the categories in the stimulus package. We call this "on-budget" spending. In the absence of a fiscal stimulus, we assume that realized spending in the seven spending categories would have remained constant as a share of GDP. We then estimate the additional on-budget spending due to the fiscal stimulus as the difference between on-budget spending in 2009 and 2010 and the "no-stimulus" counterfactual.

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[12] These numbers are from Feng et. al.'s (2015) tabulations from the Urban Household Survey.

[13] On the monetary policy side, the required reserve ratios was adjusted downwards by three times in the fourth quarter of 2008, down from 17.5% to 16% and from 16.5% to 13.5% for large and small financial institutions, respectively. The official benchmark interest rates were cut by four times in that period. The one-year deposit and loan rates, for instance, dropped from 4.14% and 7.2% to 2.25% and 5.31%, respectively.

The second and third columns in Table 1 present the on-budget public spending due to the fiscal stimulus under this counterfactual. The second column presents the estimated spending of the consolidated government (local and central) and the third column presents spending of local governments "due" to the fiscal stimulus. From comparing the second and third columns, it can be seen that the additional spending due to the fiscal stimulus was mostly local government spending – there was very little additional spending by the central government. Furthermore, the magnitude of the on-budget spending is much smaller than the projected spending. The additional on-budget spending we attribute to the fiscal stimulus is only slightly more than one trillion Yuan, which is 3 trillion Yuan short of the projected spending under the stimulus plan. The discrepancy between the planned spending and on-budget spending is largest for "railway, roads, airports, water conservancy, and urban power grids" (1.5 trillion vs. 0.27 trillion) and "post-disaster reconstruction" (the Wenchuan earthquake).

Another way to see the discrepancy between the planned spending and the actual "on-budget" spending that took place is to look at the budget deficit. Figure 1 shows that the combined budget deficit (local and central governments) increased from an average of 1.4% of GDP in 2000-2008 to an average 2% of GDP in 2009-10. If we assume that the budget deficit would have remained at 1.4% of GDP in the absence of the fiscal stimulus, then the on-budget spending due to the stimulus increased the budget deficit by 0.6% of GDP in 2009 and 2010. We remind the reader the plan was for stimulus spending equivalent to roughly 6% of GDP in 2009 and 2010.

While this evidence may suggest that the fiscal stimulus may not have been fully implemented, the evidence on aggregate investment from the national accounts indicates otherwise. The justification for looking at aggregate investment is that about 72 percent of the projected stimulus spending in Table 1 should have been classified as investment in the national accounts.[14] Figure 1, which plots aggregate investment as a share of GDP, shows that the aggregate investment rate increased by roughly 5 percentage points in 2009 and 2010. Note that a 5 percentage point increase in the investment rate in 2009 and 2010 is about 80 percent of 4 trillion Yuan. This evidence is not conclusive of course because we do not know what the investment rate would have been in the absence of the stimulus package.

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[14] The 72% number assumes that spending on "rural livelihood and infrastructure" (0.37 trillion), "railway, road, airport, water conservancy and urban power grids" (1.5 trillion), and "post-disaster reconstruction" are investment, whereas the other spending categories in Table 1 are not. The sum of planned spending in the three "investment" categories is 2.87 trillion, which is roughly 72% of 4 trillion.

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Figure 4, which plots aggregate investment in infrastructure and non-residential structures ("non-residential structures"), housing, and other (mostly machinery and equipment) as a share of GDP, provides another piece of evidence.[15] Note that the investment rate in "non-residential structures" includes public investment in infrastructure and private investment in non-residential structures. (The Chinese national account does not separately provide numbers on public infrastructure spending and private spending on non-residential structures.) Figure 4 shows that the investment rate in "non-residential structures" increased from 16% of GDP in 2008 to 18% of GDP in 2009 and 20% of GDP in 2010. There is no change in the investment rate in "other" (mostly machinery and equipment) and a small increase in the investment rate in housing structures in 2009 and 2010.   Remember that the stimulus plan called for infrastructure spending equivalent to about 8% of GDP (72 percent of 4 trillion Yuan) in 2009 and 2010. Assuming that the increase in the investment rate in "non-residential structures" in 2009 and 2010 is only driven by infrastructure investment, this suggests that about three-quarters of the planned infrastructure spending in the stimulus program was finished by 2010.

In summary, we do not know for sure whether the stimulus plan was fully implemented. The increase in the aggregate investment rate by 5 percentage points of GDP in 2009 and 2010, as well as the increase in the investment rate in "non-residential structures" in the same two years, suggests that it mostly was. Even so, only a quarter of the stimulus spending shows up on the government's balance sheet, and three quarters of the spending was conducted by entities that were off the balance sheet of local governments. What exactly these off-balance entities are, and how much they matter is what we turn to next.

4. Financial Deregulation

In the previous section, we showed that the 4 billion Yuan stimulus only generated a 1 billion Yuan increase in spending that appeared ***on the balance sheet*** of the public sector in 2009 and 2010. Yet the evidence from the national accounts suggests that much more than 1 trillion Yuan was spent. Since only a quarter of the spending was on the balance sheet of local governments, the remaining three-quarter of the stimulus must have been undertaken by entities that were off the balance sheet of local governments. In this section, we document the institutional changes that facilitated the growth of the off-balance sheet institutions. In

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[15] We measure investment in Figures 1 and 4 by the annual "gross fixed capital formation" series provided by China's National Bureau of Statistics (NBS).

addition, we discuss the limited data available on the quantitative importance of this off-balance sheet spending.

As we described earlier, local governments were prohibited from running budget deficits. However, the decision in November 2008 was that local governments would be in charge of the stimulus spending. How could this be done if the 1995 budget law and numerous regulations made it illegal for local governments to borrow? One possibility was for the central government to borrow on behalf of local governments and transfer the necessary funds to local governments, but this would obviously increase the central government's debt. Furthermore, any spending plan of the central government had to be approved by the National People's Congress. Instead, the decision was to circumvent the 1995 budget law by allowing local governments to use off-balance sheet companies known as local financing vehicles. In this way, the debt would not show up on the balance sheet of the central government, and there would be no technical violation of the 1995 budget law.

In March 2009, the CBRC made this decision public (although the rules had already been informally relaxed before the public announcement):

> *"Encourage local governments to attract and to incentivize banking and financial institutions to increase their lending to the investment projects set up by the central government. This can be done by a variety of ways including increasing local fiscal subsidy to interest payment, improving rewarding mechanism for loans and establishing government investment and financing platforms compliant with regulations."*

Document No. 92, CBRC, March 18, 2009.

Another important regulatory support, orchestrated by the central government, came from the Ministry of Finance. Despite the existing regulations on the use of local government revenue and the budget law that prohibits local government borrowing, the Ministry of Finance issued a regulation that allowed local government to finance investment projects using all sources of funds, including budgetary revenue, land revenue and fund borrowed by local financing vehicles.

> *"Allowing local government to finance the investment projects by essentially all sources of funds, including budgetary revenue, land revenue and fund borrowed by local financing vehicles."*

Document 631, Department of Construction, Ministry of Finance, October 12, 2009.

The last regulatory change worth emphasizing is that local government were encouraged to borrow from financial institutions, which was not allowed by the Budget Law and many regulations issued before 2008. Although the new regulation says explicitly that external financing should only be used for investment projects set up by central government, the loophole is that the new regulation does not apply to local financing vehicles. By using these off balance sheet institutions, local government can raise funds without violating the Budget Law.

There are two sources of publicly available information on the activities of these off balance sheet companies. First, local financing vehicles that issue bonds have to provide annual financial statements. LFVs that do not issue bonds do not have to provide such information. These financial statements are compiled by a company called WIND.[16] In addition to the identity of each LFV, the key data we use from the financial statements is the net debt of each LFV. There is, however, no information on the composition of the liabilities or assets of the LFVs.

A second source of information is from audits of *all* LFVs, including those that do not issue bonds, by China's National Audit Office in 2011 and 2013. The reports of this audit publish the total **stock** of debt of all LFV in each year from 2006 to 2013. The reports also provide limited information on the composition of the liabilities and assets of the LFVs. The reports only present aggregated information: no individual data or decomposition into different types of LFVs is available.

There are two important differences between the data provided by WIND and the Audit Office. First, the data in the Audit Office covers *all* local financing vehicles, whereas the WIND database only includes local financing vehicles that issue bonds. Second, the data on the Audit Office only covers "official" debt of the LGVs, which the Audit Office defines as "the debt that government has responsibility to repay or debt the government would fulfill the responsibility of guarantee or for bailout when the debtor encounters difficulty in repayment." However, "official" debt is only a subset of LGF debt. This is because although LGVs were originally set up to finance local infrastructure projects, many of them have since ventured into commercial projects. The debt in the WIND database covers *all* LGV debt, including the debt used to finance the LGV's commercial projects.

It perhaps useful to describe the activities of two LFVs we are familiar with to illustrate the difference between the two measures of debt. One such LFV is the Beijing Capital Group

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[16] WIND defines a local financing vehicle as a company whose business covers "infrastructure and utilities" and whose major shareholder is a local government or a subsidiary of a local government.

Company ("Capital Group") owned by the local government of Beijing. The Capital Group owns the Beijing subway, two toll highways (from Beijing to Tianjin and from Beijing to Tongzhou), and a company that specializes in building urban roads and rain and sewage infrastructure.[17] Only the debt used for these public infrastructure projects will be classified as official local government debt by the Audit Office. However, the Capital Group also has three subsidiaries that are essentially real-estate developers and another four financial service companies.[18] Finally, the most recently established companies of the Capital Group are in the green technology and waste disposal businesses. For example, the Capital Group created the Beijing Capital Waste Management NZ (in 2014) and ECO Industrial Environment Engineering (in 2015) in solid-waste disposal industry in New Zealand and Singapore, respectively.[19]

Another LFV is the Beijing State-Owned Assets Management Company ("BSAM"). BSAM is the owner of the main facilities built for the 2008 Beijing Olympics, including the National Stadium ("Bird's Nest") and the National Aquatics Center ("Water Cube"). BSAM also has subsidiaries in the financial industry, real-estate development, and manufacturing. For example, BSAM is the owner of the Bank of Beijing and the Beijing Motor Corporation. The latter company is the primary investor in several car manufacturers, including the joint venture with Hyundai (Beijing-Hyundai). Only the debt used to build the sports facilities in Beijing should be counted as "official debt" while the debt in the WIND data includes the debt incurred by all BSAM's subsidiaries.

Figure 5 plots the number of bond-issuing LFVs in the WIND database. As can be seen, there were only a small number of bond-issuing LFVs prior to fiscal stimulus. After the controls over local financing vehicles were lifted in early 2009, the number of these off-balance sheet companies doubled by 2010. The number of bond-issuing LFV continued to increase after the end of the stimulus program, increasing from 1200 in 2010 to 1800 by 2013. We remind the reader that the data in Figure 5 only includes LFVs that issue bonds. According to the audit conducted by the National Audit Office, there were a total of 9,000 LFVs as of

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[17] Beijing Virescence Area Infrastructure Development and Construction Company is the subsidiary that specializes in urban roads and sewage. The Capital Group operates the Beijing subway and two highways through the Beijing MTR Corporation (the Beijing subway), the Tianjin Beijing-Tianjin Expressway Corporation, and the Beijing-Tongzhou Freeway.

[18] The real estate companies are Bejing Capital Land, Capital Jingzhong (Tianjin) Investment, and Beijing Capital Investment and Development. The financial services companies are Capital Securities, Beijing Capital Investment and Guarantee, Beijing Agricultural Investment Company, Beijing Agricultural Guarantee Company, and Beijing Capital Investment Company (a venture capital fund).

[19] The other recently established subsidiaries (Qinghuangdao Capital Star Light Technology and Beijing Capital Boom-Sound Science and Technology) manufacture pollution control equipment.

June 2013. There were about 1800 bond-issuing LFVs in 2013 (see Figure 5) so there were a total of 6,200 LFVs in 2013 that are not in the WIND database.

Figure 6 presents aggregate debt accumulation of bond-issuing LFVs in the WIND data as well as accumulation of "official" debt for all LFVs in the Audit Office reports. We impute the annual change in "official" debt from 2007 to 2013 from the change in the stock of the net debt of all LFVs provided by the Audit Office.[20] There is limited data on official debt accumulation of all LFVs after 2013. In a press conference on May 26, 2016, Finance Minister Lou Jiwei said that the stock of local government debt stood at 16 trillion Yuan by the end of 2015. Since the total amount of off-balance sheet debt already stood at 17.9 trillion Yuan by June 2013 (according to the Audit Office), we believe the 16 trillion number cited by Lou Jiwei only refers to the debt that local governments are legally obliged to repay (this is called "direct debt" in China).[21] According to the Audit Office, the stock of "direct debt" was 10.9 trillion Yuan in June 2013. If we assume that the ratio of all "official" debt to direct "official" debt at the end of 2015 is the same as in June 2013, this implies that the total stock of "official" debt at the end of 2015 is 26.3 trillion Yuan. Assuming a constant increase in debt from June 2013 to end of June 2015, this number implies that net debt increased by 3.36 trillion Yuan in 2014 and 2015. This is the number we plot in Figure 6 for "official" debt accumulation of all LFVs in 2014 and 2015.

Remember that the debt in the NAO report refers to "official" debt while the debt in the WIND data is all LFV debt. Furthermore, remember that the LFVs in the WIND data is subset of the LFVs reported in the Audit Office reports. The net increase in debt as reported by the WIND data understates total debt accumulation because the smaller LFVs (more than 6000 LFVs in 2013) are not in the WIND data. The increase in debt as imputed from the Audit Office reports also understates debt accumulation for another reason, because it only counts "official" debt and omits the debt of the commercial ventures of the LFVs. One way to see this last point is to note that although the Audit Office reports data from all LFVs, total debt accumulation is almost always *smaller* than debt accumulation from the much smaller sample of bond-issuing LFVs in the WIND data (see Figure 6).

Figure 7, which presents the *stock* of debt reported in the two datasets, makes the same point. Here, the total stock of debt in the WIND sample is always larger than the stock of debt

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[20] The report of the Audit Office only reports the stock of net debt at end of June 2013. We impute debt accumulation in 2013 by doubling the change in net stock from the end of 2012 to the end of June 2013.
[21] The report of the IMF's 2016 Article IV consultation cites a figure that indicates that government's debt as a share of GDP increased from an average of 15% to 16% of GDP in 2011 through 2013 to 38.5% of GDP in 2014. This number is the "direct" debt and is the same as the number cited by Lou Jiwei.

reported by the Audit Office. The gap in 2015 is particularly large. The total stock of debt of LFVs in the WIND data is about 37 to 38 trillion Yuan while the total stock of "official" debt is 23 trillion Yuan. Again, this is because the Audit Office numbers do not report LFV debt that are not official obligations of local governments.

The data provided by the Audit Office answers the question "how much LGV debt was used for local infrastructure projects?" While that is an important question, we want to know how the fiscal stimulus changed the local government's control over the allocation of resources. To answer this question, we need to know debt accumulation by LFVs used for infrastructure and for the commercial projects of the LFVs. We have no data on the latter, but we can use the firm level records of LFV data in the WIND data to impute the total amount of LFV debt (official and commercial debt). Specifically, we assume that the true distribution of total LFV debt (across different LFVs) follows a power law distribution and that the WIND data is a truncated sample of the true distribution. We then estimate the truncated power law distribution from the firm level records in the WIND data and use the estimated parameters of the "true" power law distribution to back out the stock of debt missed by the WIND dataset in each year.[22]

The "true" stock of LFV debt imputed via this method is shown in Figure 7. We interpret the gap between this number and the "official" debt reported by the Audit Office (the dotted line) as the stock of debt of the commercial subsidiaries of the LFVs. The difference in 2015 is significant. The official debt stood at 23 trillion Yuan in 2015 while our estimate of the true debt of LFVs is about 48 trillion Yuan. In turn, the gap between the "true" stock of LFV debt and the debt in the WIND data is simply due to the fact that the WIND data does not have data on the large number of small LFVs.

We can also the data on official borrowing to check the funding of the fiscal stimulus in 2009 and 2010. Official borrowing of LFVs increase from 1 trillion Yuan in 2008 to an average of 2.5 trillion Yuan in 2009 and 2010. If we assume that the stock of off-balance sheet debt would have remained constant as a share of GDP in the absence of the stimulus package, then local governments borrowed an additional 3.6 trillion Yuan in 2009 and 2010 through off-balance sheet entities. When we add 3.6 trillion Yuan in off-balance sheet spending to the 1 trillion Yuan in on-balance spending calculated earlier, we get that the fiscal stimulus have resulted in an additional 4.6 trillion Yuan in spending, which is larger than the official spending target of 4 trillion Yuan.

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[22] We provide the details of the imputation (as well as evidence that a truncated Pareto distribution is good fit of the data) in the appendix.

Figures 6 and 7 also clearly show that off-balance sheet spending by local governments did not return to pre-stimulus levels after the stimulus program ended in 2010. This is true whether one looks at accumulation of "official" debt or the total accumulation of debt we impute. While debt accumulation for infrastructure projects may have decreased after 2013, it was more than offset by "unofficial" debt accumulation by LFVs. Our estimates are that debt of LFVs increased by about 7.5 trillion Yuan in 2014 and 2015 (or a total of about 15 trillion Yuan in the two years). Put differently total spending by LFV in 2014 and 2015 are almost four times larger than the amount spent on the fiscal stimulus in 2009 and 2010.

We have limited information on the composition of the liabilities of the LFVs. The earliest information is from a speech in 2009 by the President of CBRC who said that banks loaned 3.05 trillion Yuan to LFVs in 2009. We assume this number refers to bank loans for official LFV debt, although we are not sure. According to the data from the National Audit Office plotted in Figure 6, LFV debt increased by about 3.4 trillion Yuan in 2009. Putting these two numbers together, we get that 90% of the off-balance sheet spending of local governments in 2009 was funded by bank loans. The National Audit Office provides a more complete breakdown of the funding sources of the outstanding debt of official local financing vehicle debt as of June 2013. This data indicates that 56.6% of the liabilities of official LFV debt consisted of bank loans, 10.3% were bonds, and 11.6% were loans from trust companies. This information suggests that the liabilities of the LFVs were predominantly bank loans during the fiscal stimulus but have shifted away from bank loans since then.

Turning to the composition of the assets of the LFVs, the Audit Office also provides information on what official debt has been used for. This is presented in Table 2. One should interpret these numbers with caution, as it is not clear how carefully this information was audited. With this caveat in mind, the numbers in the audit report indicate that about 60% of the off-balance sheet expenditures of local governments were spent on infrastructure (municipal construction and transportation infrastructure).

This information also allows us to provide one more check on whether the 4 trillion stimulus package was carried out. We do not know what the official debt raised in 2009 and 2010 was spent on, but we know the total amount of additional "official" off-balance sheet debt in these two years totaled 3.6 trillion Yuan. If we assume that share of the debt raised in 2009 and 2010 spent on each item is the same as given in Table 2, then we can estimate the "official" off-balance sheet expenditures of local governments during the fiscal stimulus in 2009 and 2010. This information is summarized in the fourth column in Table 1. The comparison of spending categories in the National Audit office report and in the project documents of the

fiscal stimulus is not perfect. For example, it is not clear how exactly expenditures for "post-disaster reconstruction" is classified by the Audit office. Nonetheless, when we add the on-balance and off-balance sheet expenditures, we get the consistent story that about 60% of the stimulus was spent on infrastructure projects (broadly defined).

Table 3 provides more evidence that local governments use LFVs after 2010 to circumvent budget constraints. We exploit the cross-sectional variation across localities in the tightness of the official budget constraint and examine whether localities with tighter official budget constraints make more use of LFVs. In the pre-stimulus period when LFVs were heavily regulated, we expect to see no correlation between LFV's borrowing and local fiscal gap. In contrast, the relaxation of the constraints over off-balance sheet borrowing would lead to a positive correlation after 2009. Column 1 reports the benchmark fixed-effect regression between log total debt from LFVs in a locality and the local fiscal gap (measured as the official budget deficit as share of local GDP). In Column 2, we add an interaction term between the fiscal gap and a post-2009 dummy that equals one for years after 2009 and zero otherwise. The interaction term is positive and highly significant. In other words, a faster debt growth of a LFV is associated with a widening of local fiscal gap only in the post-stimulus period. In Columns (3) and (4), we add a set of controls including log GDP, log population and GDP growth, with little change in the results.

Since the end of the stimulus program, the central government made numerous attempts to roll back these off-balance sheet financial institutions, with little success so far. The first attempt came in November 2009, when the Ministry of Finance issued a document that prohibits local governments from providing loan guarantees and warned local governments from undertaking more spending on infrastructure spending than stipulated by the stimulus package. The first formal regulation seeking to restrict off-balance sheet spending by local governments came from the State Council in June 2010. This regulation issued new rules that required local governments to seek approval of new investment projects. According to the rules, banks also had to strictly enforce the minimum share of capital that local governments had to invest in projects funded via the LFVs.

In response, local governments found new ways to raise funds for their off-balance sheet spending. After the State Council issued new rules in June 2010, the most common method used by local governments to skirt the minimum capital requirements was to transfer ownership of land to the LFVs. The off-balance companies can then use the land as collateral to borrow from banks and in this manner circumvent the need to meet the capital requirements stipulated by the new rules. Another method was to borrow from non-regulated trusts. As

discussed earlier, loans from trusts accounted for 8% of all LFV debt by June 2013. Another common method was to use build-transfer arrangements where a private company would get a concession from a local government in exchange for a share of the revenues from the project.

The central government attempted to limit the ability of local governments to obtain new funds via their LFVs through these alternative channels of funding. For example, four different agencies of the central government (the Ministry of Finance, the National Development and Reform Commission, the Central Bank, and the CBRC) jointly issued a decree in December 2012 to limit borrowing by LFVs. The most recent attempt by the central government to stop off-budget borrowing by local governments came in August 2014, when the 1995 budget law was amended to allow provincial level governments to issue bonds subject to quotas set by the State Council.[23] At the same time, the new budget law used strong language to order local governments to stop their "illegal" borrowing via their off-balance sheet companies. The goal, which Chinese policy makers labeled a "dredging and blocking" strategy, was to entirely eliminate LFVs by replacing the debt of the LFVs with local government bonds within three years.

Our limited evidence suggests that debt accumulation that is backed up by the local government declined in 2014 and 2015 (see Figure 6 and7). However, as we've discussed, debt accumulation by LFV for their commercial ventures increased in 2014 and 2015. Published reports of the government's debt show that public debt as a share of GDP increased from an average of 15% to 16% of GDP in 2011 through 2013 to 38.5% of GDP in 2014. While this may suggest that LFV debt equivalent to approximately 22%   This increase in public debt reflects the recognition of "direct" debt incurred by off-balance sheet companies on behalf of local governments. However, the amount of "direct" LFV debt swapped (as of the writing of this paper) for local government bonds is only 3 trillion Yuan, which is much smaller than the approximately 22% of GDP suggested by the public debt numbers.

Less than a year after the new rules were issued, the central government showed signs of backing off the crackdown on LFVs. Perhaps in response to the small decline in the investment rate in 2014 and more generally the slowdown in aggregate growth (see Figures 1 and 2), the State Council issued a new decree in May 2015 that reversed its attempts to crack down on LFV borrowing. In particular, the May 2015 decree urged financial institutions to continue to lend to LFVs.

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[23] Guangdong, Shanghai, and Zhejiang have been allowed to issue local government bond since 2011.

We do not have yet had data on investment spending after 2014, but the NBS provides a monthly series on "fixed asset investment" that provides more recent information. Furthermore, in 2015, the NBS released for the first time monthly data on "fixed asset investment" in infrastructure. The "fixed asset investment" series has two problems. First, it includes purchases of land and pre-existing structures, as well as expenditures on previously used machinery.   Second, it is based on a survey of large investment projects, which may not be representative of all investment spending.   The gross fixed capital formation series we use in Figures 1 and 4 fixes these two problems, but is only available at an annual frequency (and is only available until 2014 at the time of the writing of this paper). With this caveat in mind, infrastructure investment measured by "fixed asset investment" grew at an annual rate of 17.2% in 2015, which is higher than the rate of aggregate investment of 10%. In the first seven months in 2016, "fixed asset investment" in infrastructure grew at an annual rate of 19.6%, 2.4 times as high as the growth rate of aggregate "fixed asset investment".

In sum, although the central government made several attempts to curb the LFVs over the last five years, the most recent evidence suggests that the central government is once again resorting to the same methods they used in 2009 and 2010. We do not what will happen in the future, but the next section turns to an assessment of the aggregate effects of the off-balance spending undertaken by local governments from the end of the fiscal stimulus in 2010 to 2016.

5. Aggregate Effects of Partial Financial Liberalization

We now turn to an assessment of the aggregate effects of the partial financial liberalization. A common argument is that the main effect of the off-balance sheet spending by local governments, primarily on infrastructure investment, is to crowd out investment by private firms. Huang, Pagano, and Panizza (2016), for example, provide empirical evidence that the investment rate private industrial firms in localities with large increases in off-balance sheet spending is lower than the investment rate of similar firms in localities that accumulated less debt.

This could be true, but there are several pieces of evidence that challenges this view. First, note that aggregate investment rate, which includes investment by private firms and spending by LFVs, increased by 5 percentage points after 2008. For spending by LFVs to crowd out private investment, it would have to be the case that spending by LFVs that are classified as investment account for more than 5 percent of GDP. We know that LFVs raised 5

trillion Yuan in 2009-10. Even if all the revenues from the debt were invested in the two years, they would still account for only 3.3 percent of GDP.

How can the investment rate increase by so much? Figure 8 shows that there was no corresponding increase in the savings rate. If anything, there has been a small decline in the savings rate. The adjustment instead has been entirely on the external balance. China's current account shifted from a surplus of about 10% of GDP in 2008 to 2 to 3% of GDP by 2013 and 2014.

Another way to see this is to look at the asset composition of China's banking system (primarily formal banks and trusts). Ideally, we could directly measure the share of loans to private firms and loans to LFVs in the total assets of the banking system. The published balance sheets of the Chinese banking system do not provide this information, but we can use our estimate of total loans from banks and trust to the LFVs to impute this number. Panel A of Figure 9 presents the share of loans from the banking system to LFVs as a share of total assets of the banking system, where total assets consist of reserve assets, government and central government bonds, and loans to non-financial institutions. (We provide more detail on how we back out the numbers in Figure 9 in the appendix). The "official government debt" series measures loans from the banking system to LFVs used for infrastructure projects ("official debt") while "debt of all LFVs" is our imputation of all loans of the banking system to the LFV (not just for the LFV's official debt). This number uses our estimate of bank and trust loans to LFVs along with published data on total assets of the banking system (again, banks and trusts. Not surprisingly, official LFV debt as a share of total assets increases after 2008. Furthermore, as one would expect from Figure 7, total banking system loans to LFVs increased by even more, reflecting loans of the banking system to fund the LFVs' commercial activities.

Despite the increase in lending to LFVs, Panel B shows that debt of non-financial institutions (excluding LFVs) as share of total assets of financial institutions increased by 4 percentage points between 2008 and 2014. How can the banking system lend more (as a share of total assets) to LFVs and at the same time also lend more to non-financial institutions? Panel C provides the answer. It shows that the banking system's holdings of central bank bonds *fell* by about 7 percentage points (as a share of total banking system assets) over the same time period. This is about 2 percentage points more than the increase in LFV debt as a share of total assets. This fact suggests that increasing share of LFV debt on the balance sheet of the banking system was more than offset by the declining share of central bank bonds. Moreover, the share of reserves and central government bonds drop by 4.5 percentage points. As a result, loans to firms, as a share of total assets of the banking system, have increased and

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the investment that is crowded out by LFV spending are the Central Bank's purchases of US Treasury bills. Viewed from the lenses of the external adjustment seen in Figure 7, the other side of the decline in central bank bond holdings in the banking system is that the rate at which the central bank has been sterilizing the effect of the banking system's purchases of central bank bonds on the money supply has declined since 2008.[24]

Finally, we can also directly measure the investment rate of private firms vs. state owned firms. We do not have this information for the aggregate economy, but we can measure this using the firm-level data from the Chinese industrial surveys. We plot this in Figure 9. Not surprisingly, the investment rate of state-owned firms exceeds that of private firms in the industrial sector, reflecting the well documented preferential access of state owned firms to credit. Here, the investment rate of private industrial firms declines from an average of 15% in 2006-2007 to an average of 12-13% in 2011-2012. However, it is less clear whether this small decline reflects the crowding out effect of LGV spending, as the investment rate of state owned industrial firms fell by even more over this period.

So if aggregate private domestic investment has not suffered from the growth of the LFV, what are the main effects of the off-balance spending by local governments? Here, it is useful to sketch a toy model. The model makes two points. First, partial financial liberalization (which is what happened in China) may worsen the allocation of resources. Second, the model also helps us understand why the boost in aggregate investment driven by financial liberalization will necessarily reduce trade surplus.

The economy consists of a financial intermediary and two types of firms: "connected" and "unconnected" firms. There is no heterogeneity within each type. All firms produce a homogenous good with following production technology: $Y_i = A_i K_i^\alpha$, where Y_i is output, $i \in \{c, u\}$, with c and u representing the connected and unconnected firms. Here, we consider K_i the capital a firm needs to borrow from the financial intermediary.

The representative connected firm can borrow from the financial intermediary at a regulated interest rate, denoted by $\bar{r}$, subject to a borrowing limit $\bar{K}$. In Song et al. (2011), $\bar{K} = \infty$. For simplicity, we assume $\bar{K}$ to be a policy parameter that is exogenous to the connected firm. There is also a market interest rate, denoted by r, at which both connected and unconnected firms can borrow. We will maintain the following assumption throughout: $\bar{r} < \alpha A_c \bar{K}^{\alpha-1} < r$. The first inequality guarantees that the connected firm will always borrow up to the limit $\bar{K}$ at the regulated interest rate. The second inequality, on the other hand, rules

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[24] See Song et al. (2014) for more institutional details and Chang et al. (2015) for theoretical analysis of China's sterilization.

out the possibility that the connected firm will borrow from the market. The representative unconnected firm can only borrow at the market interest rate, r equal to the marginal product of capital: $r = \alpha A_u K_u^{\alpha-1}$.

The financial intermediary can borrow from and lend to the world market at an exogenous interest rate of r^*. The financial intermediary also takes domestic savings at a regulated deposit rate. For simplicity, we let the regulated deposit rate equal r^*. Aggregate domestic deposits, denoted by D, are assumed to be exogenous. The economy has trade surplus if the aggregate fund demand, denoted by K, is smaller than the aggregate domestic savings:

$$Surplus = D - K = D - (K_c + K_u).$$

Trade surplus shows up as foreign assets on the balance sheet of the financial intermediary. So, the above equation can be rewritten as the balance-sheet constraint:

$$D = \overline{K} + K_u + F,$$

where F denotes foreign assets.

Finally, we introduce a quadratic lending cost for the financial intermediary. Profits of the intermediary are:

$$\pi = r\overline{K} + rK_u + r^*F - r^*D - \frac{\gamma}{2}(\overline{K} + K_u)^2,$$

where γ is a parameter affecting the marginal lending cost. The first and second items in the profit function are profits of lending to the connected and unconnected firms, respectively. Maximizing the profits, subject to the balance-sheet constraint, gives the following first-order condition:

$$\alpha A_u K_u^{\alpha-1} = r^* + \gamma(\overline{K} + K_u),$$

where we substitute the first-order condition for the unconnected firm for r.

Two results are immediate. First, a financial liberalization for the connected firm that increases its borrowing limit $\overline{K}$ will crowd out fund allocated to the unconnected firm by increasing the marginal lending cost ($\gamma > 0$). Such financial liberation will lower the marginal

product of capital among connected firms and raise the marginal product of capital among unconnected firms. Second, differentiating the above equation with respect to $\bar{K}$ shows that $|dK_u/d\bar{K}| < 1$. That is to say, the financial liberalization will always increase the aggregate fund demand and, hence, reduce fund inflow or trade surplus.

With this model in mind, we now turn to the patterns in the data. We first examine the allocation of capital between listed industrial firms and all industrial firms. As we discuss in Bai, Hsieh, and Song (2016), the favored firms are almost always the largest firms in a locality. The data on all firms is from the micro-data of the Chinese Industrial Survey conducted by China's National Bureau of Statistics.[25] The solid line in Panel A of Figure 11 plots the debt revenue ratio of all the listed firms. The ratio exhibits a downward trend before 2009, falling from 0.90 in 1998 to 0.67 in 2008, indicating that listed firms were becoming less dependent of debt financing. 2009 stands out as a turning point. The debt revenue ratio jumps to 0.82, with revenue roughly unchanged and debt up by 33.9% or 2.3 trillion Yuan. In sharp contrast, NBS firms show a smaller increase in their debt revenue ratio, up from 0.50 in 2008 to 0.53 in 2009 (see the dashed line in Panel A). In other words, we find a highly asymmetric expansion of debt between listed firms and NBS firms. The stimulus package, including the monetary expansionary policies, the four trillion Yuan investment plan and the associated financial deregulation, seems to favor listed firms in terms of debt financing.

The more interesting finding is that after scaling back a bit their debt revenue ratio in 2010-11, listed firms continued to expand their debt at a much faster rate relative to their revenue. In 2015, the debt revenue ratio reaches 1, more than doubling the ratio of NBS firms in 2014. The divergence of the debt revenue ratio between listed and NBS firms after 2011 is hard to explain by discrimination embedded in the stimulus package. Rather, we view it as evidence supporting our story that the financial deregulation opens up a new channel through which financial resources can be directed towards the connected firms.

We next conduct the following robustness checks. Listed firms cover all industries, while NBS firms are all from the industrial sector. To control for the industry heterogeneity, Panel B uses manufacturing firms only. The results are essentially the same. Panel C and D distinguish state-owned and private firms. As expected, the jump of the debt revenue ratio for state-owned listed firms in 2009 is more dramatic than their private counterparts. The divergence of the debt revenue ratio is more pronounced between private listed firms and

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[25] The sample consists of all state-owned industrial firms and private industrial firms with revenue above 5 million Yuan before 2007 and 20 million Yuan after 2010.

private NBS firms. Using firm-level data (dotted lines) yields almost the same results as those from aggregate data in China's Statistical Yearbook.

Another way to examine the efficiency of capital allocation is to directly measure the dispersion of the marginal product of capital across firms. We do not directly measure the marginal product, but with some assumptions, we can proxy the marginal product of capital by the average product of capital. With this assumption, the overall dispersion in the marginal product of capital can be measured by the dispersion in the average product of capital. Figure 12 plots the variance in the log average product of capital (value-added relative to the capital stock) across privately owned industrial firms from 1998 to 2012 (we do not have firm level data from 2008 to 2010). We normalize the average product of capital of each firm by the median average product in each four digit industry, and also trim the 1% outliers in each industry-year.

As can be seen, the dispersion in the average product of capital falls slightly from 1998 to 2007, but shows a sharp increase in 2011 and 2012. Remember that this is exactly when off-balance sheet spending by local governments took off and when we start to see a larger amount of LFV debt used to fund commercial activities. To be clear, the dispersion in the average product of capital can reflect forces other than differences in access to capital across firms. For example, adjustment costs or differences in markups across firms will also show up as differences across firms in the average product of capital. However, there is no reason why these forces should change over time. Growing misallocation of capital would lower aggregate TFP and output growth, and as Figure 2 shows, the growth rate of aggregate GDP did fall after 2008.

The forces behind the growth slowdown in China are clearly complex. The slowdown can be due to the effect of the anti-corruption campaign that began in 2013 or the effect of property and equity market bubbles that may have also had the effect of misallocating financial resources. With more work, it would be very interesting parse out how much of the growth slowdown is driven by these forces, including the effect of spending by off-balance sheet companies by local governments, but this is not a task we undertake in this paper.

The model also rationalizes why the external adjustment in China since 2008 would necessarily be associated with an increase in the investment rate (as opposed to a decrease in the savings rate). As discussed earlier, the current account surplus (as a share of GDP) starts to decline after 2007. A widely held explanation for the reversal of the current account surplus is that the appreciation of the Yuan discourages savings. However, there is only a small decline in the savings rate, and the decline in the current account is entirely driven (in a proximate

sense) by the increase in the investment rate. Song et al. (2011) explain China's rapid growing trade surplus prior to 2009 as the result of domestic financial frictions that suppress investment. Our argument here is that a similar mechanism is a play, but in reverse. The four trillion Yuan plan and the financial deregulation generates an investment boom, which leads to the rebalancing of China's current account.

Finally, the toy model also predicts a rising market interest rate, which is in line with what has been happening in the post-2009 period. The market-based deposit rates (i.e., returns to wealth management products), interbank repo rates and returns to trust products are all increasing (see, e.g., Hachem and Song, 2016). This is also consistent with the finding of increasing capital productivity for non-favored firms that have little access to credit at regulated interest rates.

In sum, the long run effect of the temporary fiscal stimulus appears to have been an increase in the investment rate, a decline in the current account surplus, and a decline in productivity driven by the increased misallocation of resources. Again, we remind the reader that, at least at the time we are writing this paper, GDP growth appears to have slowed permanently compared to the 1990s and 2000.

6. Conclusion

The central facts about China's economy since 2008 are the slowdown in aggregate growth, the increase in the investment rate, the decline in the external surplus, and the rise in off-balance sheet debt by local governments. We argue that all four facts can be understood as outcomes of the institutions created by the decision to finance the fiscal stimulus in 2009 and 2010 by off-balance sheet spending. The fiscal stimulus in China was largely financed by the creation of off balance sheet companies that allowed local governments to circumvent financial controls. About three quarters of the stimulus spending was done by these off balance sheet companies, on behalf of local governments, with only a small increase in the official budget deficit. After the stimulus spending ended, local governments continued to use their newfound power to obtain access to financial resources. The result is an increase in off-balance sheet local government debt and an increase in investment spending. Local governments, who have long faced high powered incentives to support favored local businesses, used this new found power to channel financial resources towards favored private firms. The effect on the

efficiency of capital allocation may have had important effects on aggregate productivity growth in recent years.

Many observers have commented on the rise in local government debt as well as the decline in the current account surplus. As an example, in a June 2016 speech widely covered by the media, David Lipton (the deputy Managing Director of the IMF) praised the reversal of China's account surplus but raised concerns about the rise in debt, including local government debt.[26] This paper argues that the rise in local government and the external adjustment are two outcomes of exactly the same institutional changes. If this is the case, it is difficult to see how one can praise the external adjustment but condemn the rise in debt. For us, what is more concerning is that the off-balance sheet institutions may have changed the way the "special deals" regime operates. Furthermore, the powerful political forces behind off-balance sheet lending combined with the fear of the short run consequences of shutting down this lending may make it very difficult to undo the local financing vehicles in the future, with potentially significant adverse consequences for China's future growth.

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[26] See https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp061016 for the text of David Lipton's address.

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Appendix: Composition of Assets of Banking System in 2008 and 2014

This appendix provides details on the composition of the assets of the Chinese banking system, which we define as banks and trusts. We provide these numbers for 2008 and 2014, but Figure 8 plots a subset of these numbers for all years between 2008 and 2014.

Table A1:   Decomposition of Total Assets of China's Banking Sector (trillion Yuan)

|	2008	2014	Source
Total Assets	58.2	160.8	
Reserve Assets	9.4	23.3	Balance sheet of other depository corporations
Central Bank Bonds	5.3	9.6	Balance sheet of other depository corporations
Domestic Government Bonds	4.3	0.7	China Statistical Yearbook
Lending to the Non-Financial Sector	39.2	127.2	China's National Bureau of Statistics
Lending to Households	5.7	22.9	Balance sheet of other depository corporations
Total Lending to LFVs	9.6	47.7	WIND
"Official" Lending to LFVs	5.7	22.9	National Audit Office and Ministry of Finance
Lending to Firms (excluding LFVs)	23.8	56.6	Residual of lending to households and LFVs

Total assets consist of reserve assets (row 1), central bank bonds (row 2), domestic government bonds (row 3), and lending to the non-financial sector (including loans to local financing vehicles) (row 4).   Data on reserve assets and central bank bonds are provided by the central bank's data on balance sheet of "other depository institutions". We assume that only "other depository institutions" hold reserve assets and central bank bills. The numbers on government bonds are from China Statistical Yearbook.

Total lending to non-financial institutions (including local financing vehicles) are imputed from "social financing" released by China's National Bureau of Statistics. "Social financing" is a flow number, available since 2002, about the amount of total fund that the real economy gets from the financial sector. In includes bank loans, bonds, trust and entrusted loans, undiscounted bank's acceptance and equity financing. We use the stock of bank loans in 2001 and the ratio of new bank loans to social financing in 2002 (about 90%) to infer the stock of total lending to

non-financial institutions in 2001. We exclude equity financing, which is less than 3% of social financing.

We further decompose total lending to non-financial institutions into lending to households, LFVs, and corporations. Lending to households is from the central bank's data on balance sheet of "other depository institutions". We assume that only "other depository institutions" lend to households. Total Lending to LFVs is imputed from the WIND micro-data. Official Lending (which is a subset of total lending to LFVs) is measured by the data from National Audit Office and the Ministry of Finance (see the text for details).

Figure 1: Investment Rate and Budget Deficit
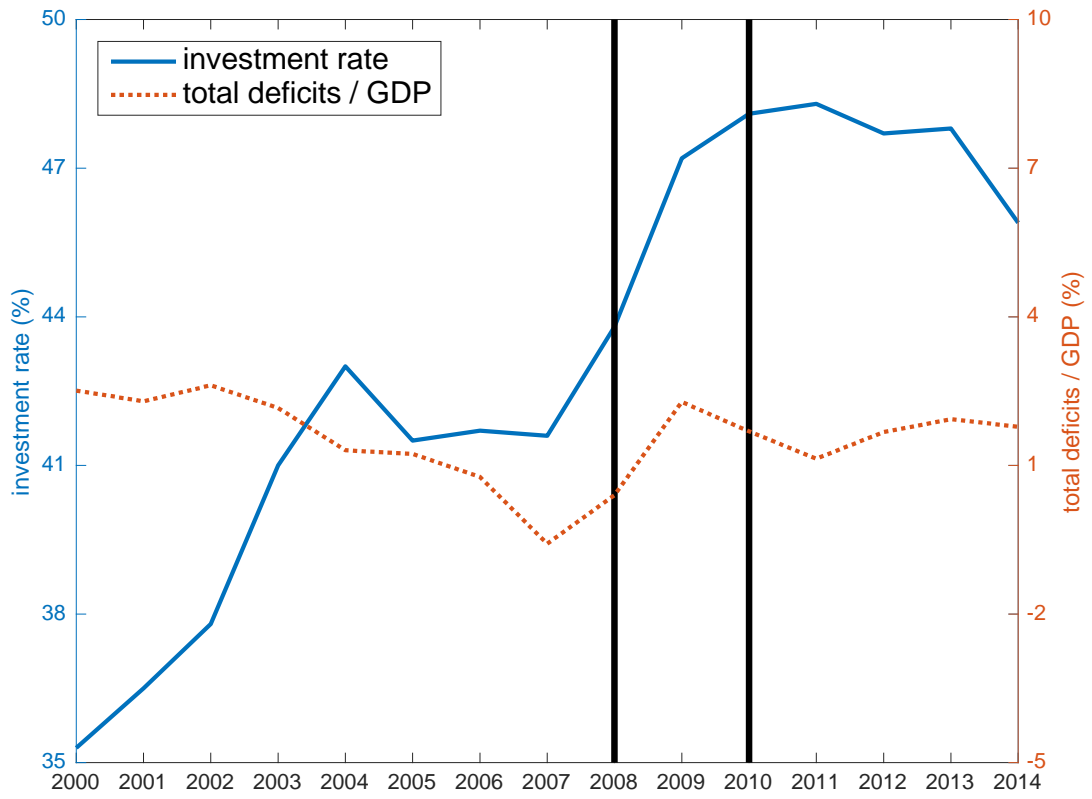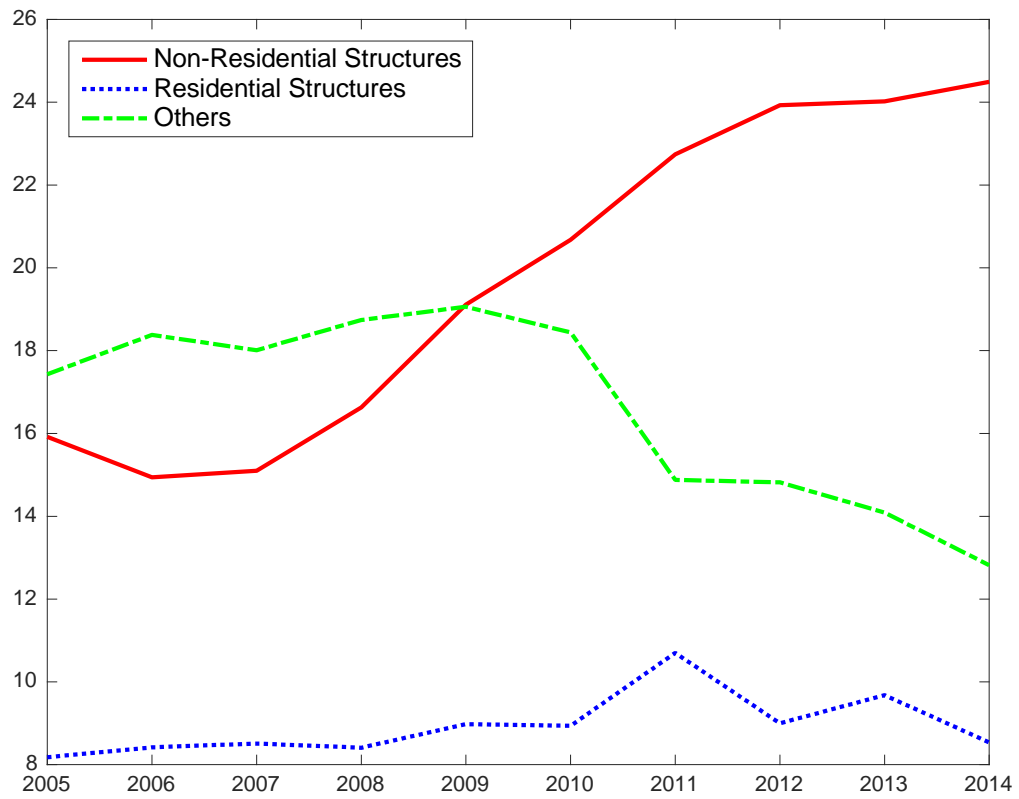
Figure 2: GDP Growth Rate
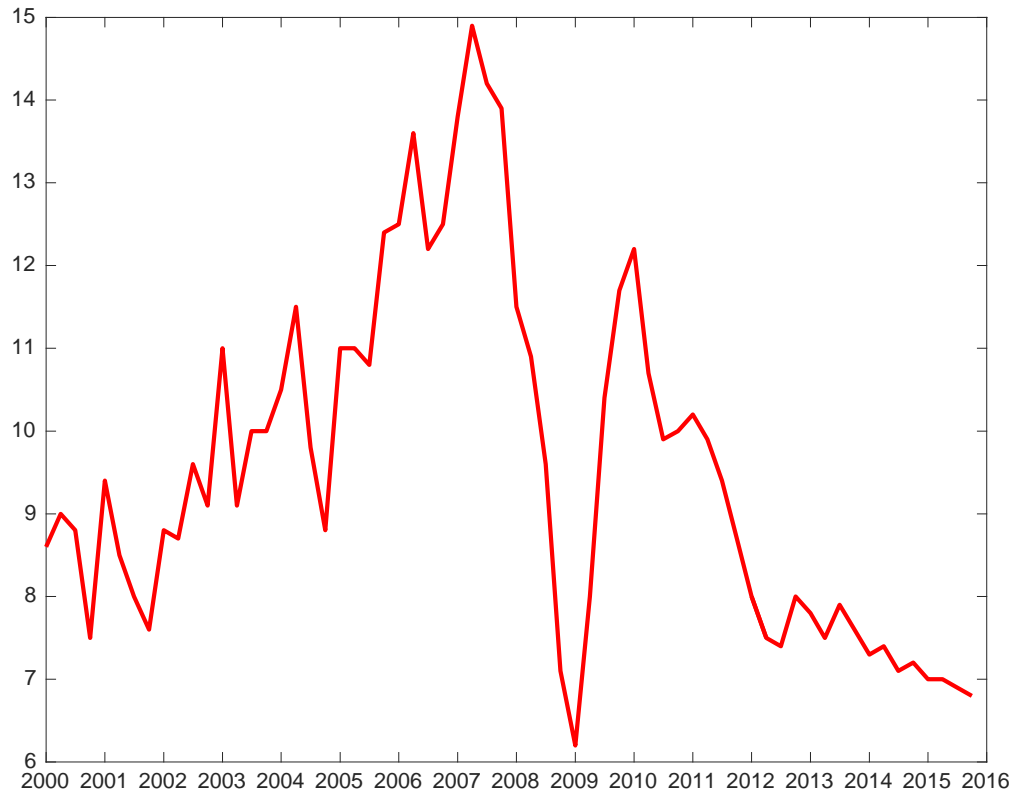
**Figure 3: Share of Local Governments in Total Tax Revenues**
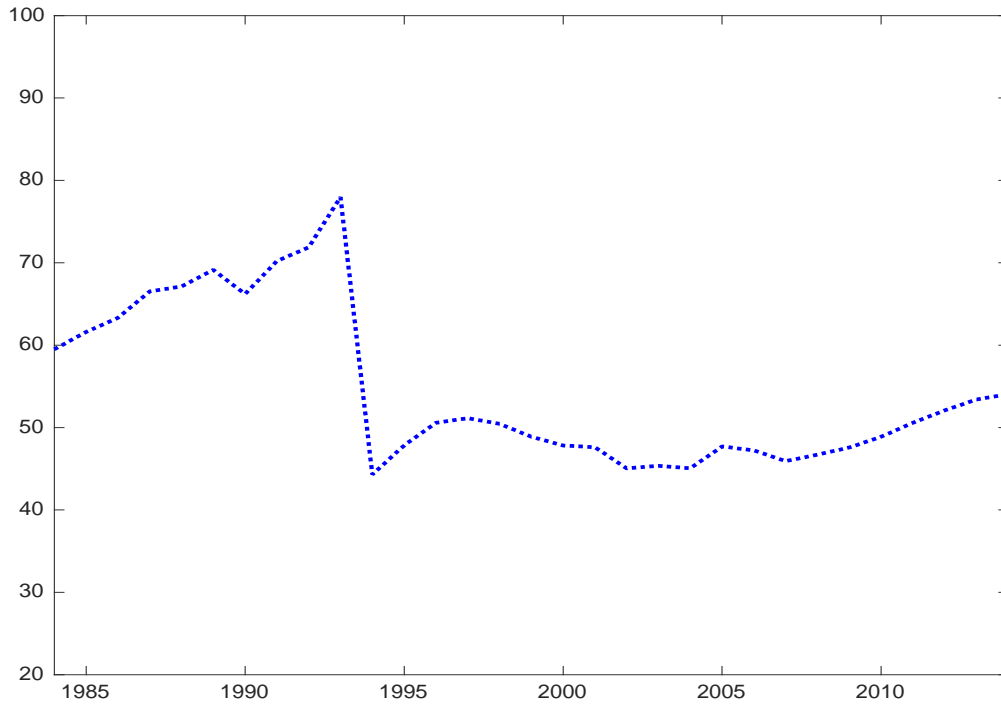
Note: Data from China Statistical Yearbook.

Figure 4: Components of Aggregate Investment Rate (% of GDP)

Note: "Non-residential structures" include infrastructure and business structures. We measure investment as the "gross fixed capital formation" series in the China Statistical Yearbook.

**Figure 5: Number of Bond-Issuing Local Financing Vehicles**
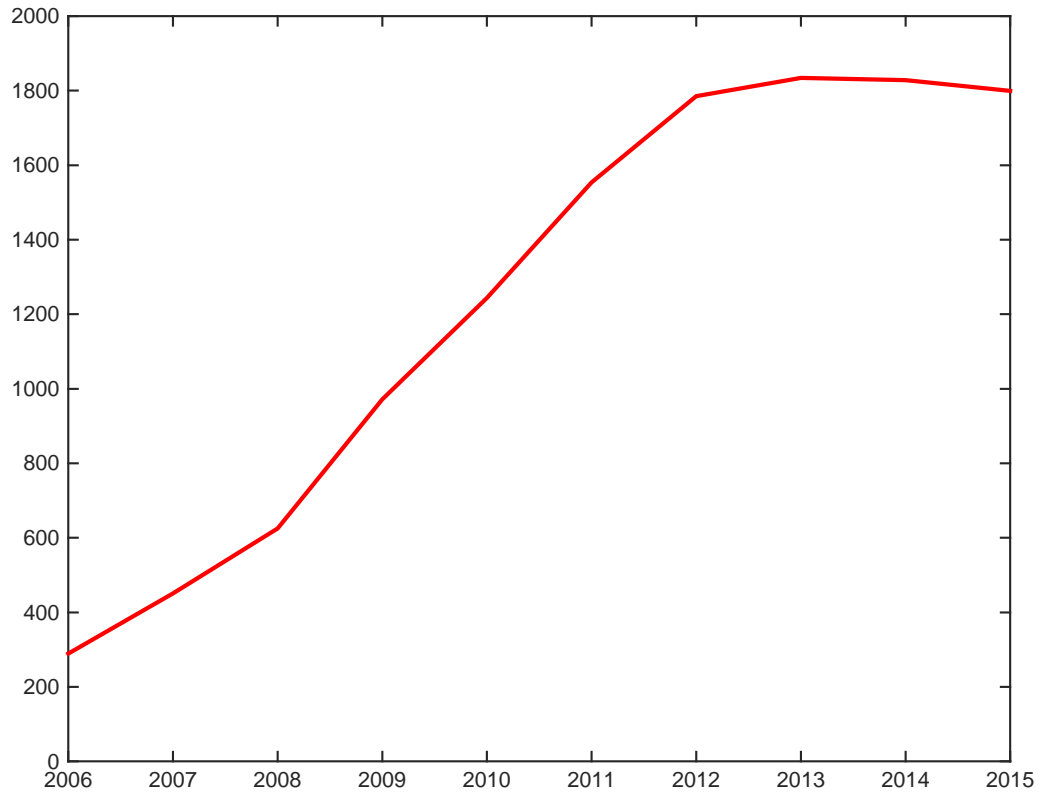
**Figure 6: Debt Accumulation by Local Financing Vehicles (trillion Yuan)**
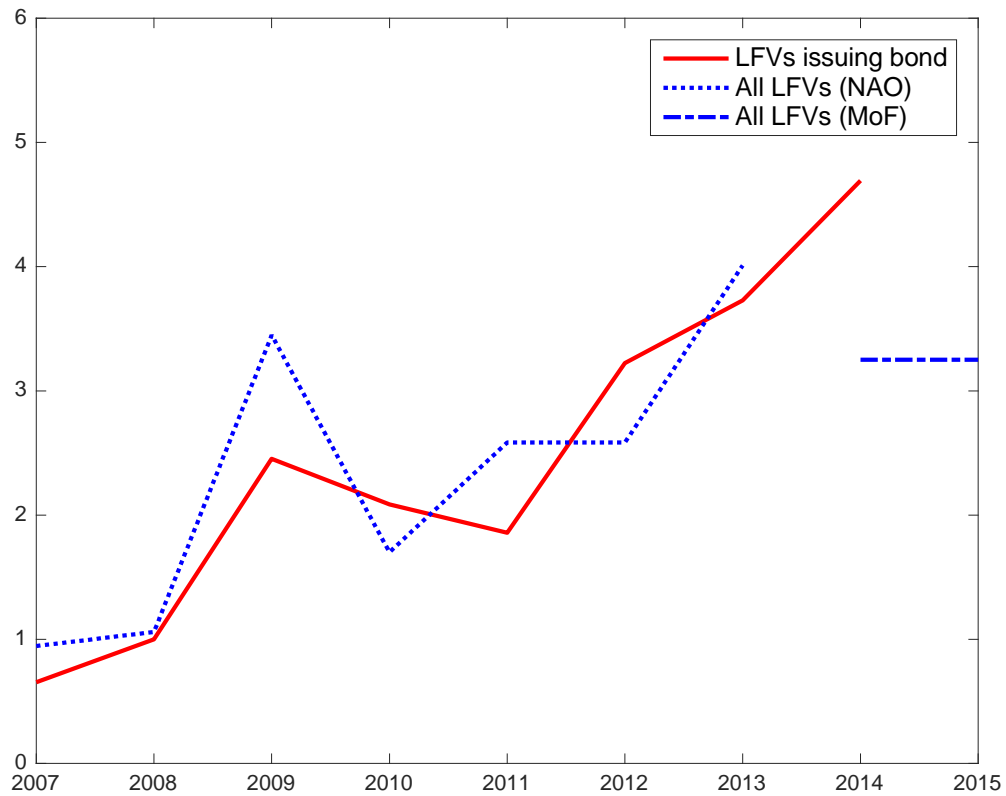
Note: Debt accumulation defined as change in net debt in the calendar year. Data of bond-issuing LFVs are from WIND database. Data of all LFVs from 2007 to 2013 are from China's National Audit Office Reports (2011 and 2013). Net borrowing of all LFVs in 2014 and 2015 is estimated from public statements in 2016 by Lou Jiwei (the Minister of Finance). See text for details.

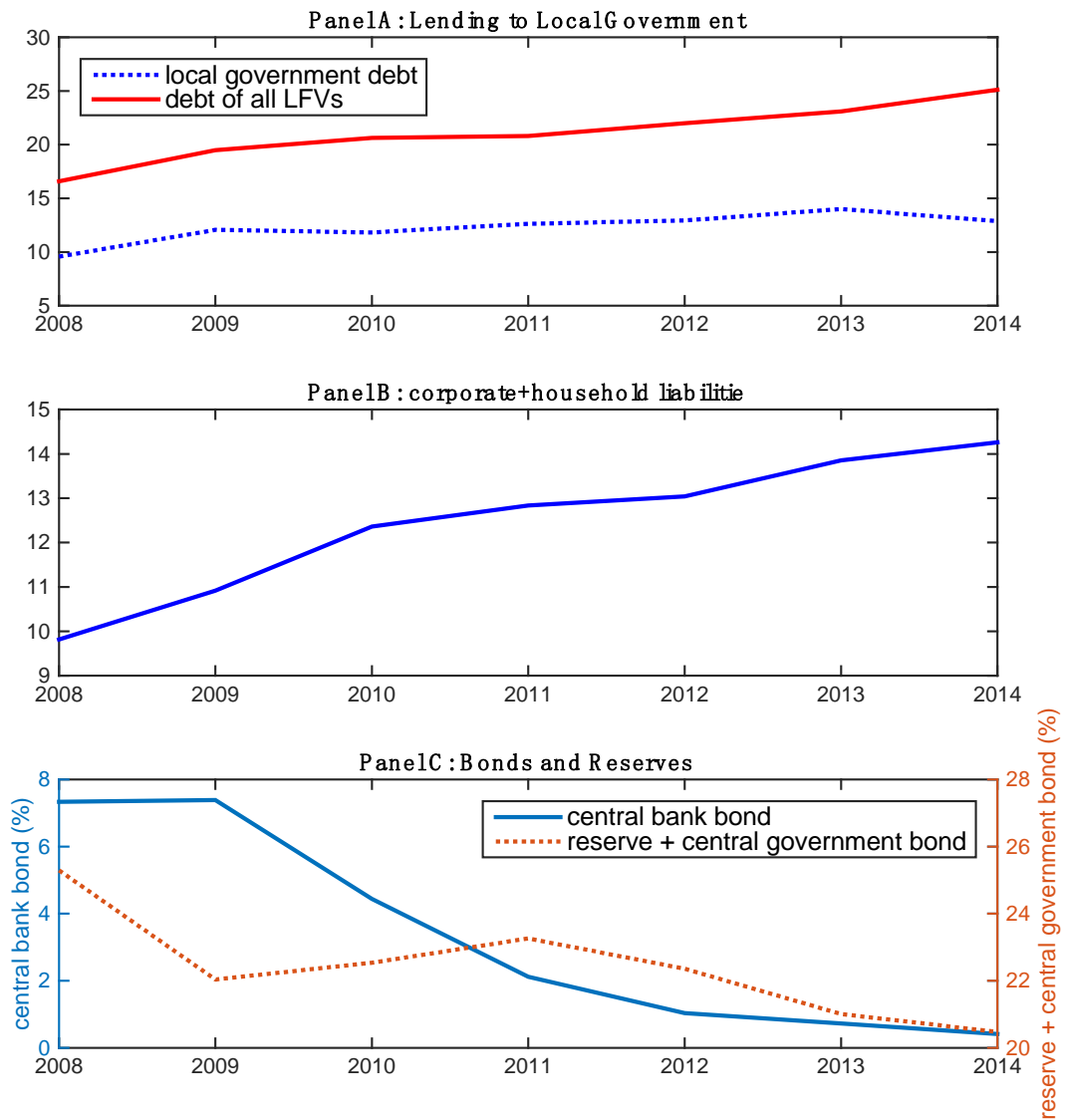# Figure 7: Total Stock of Debt of Local Financing Vehicles
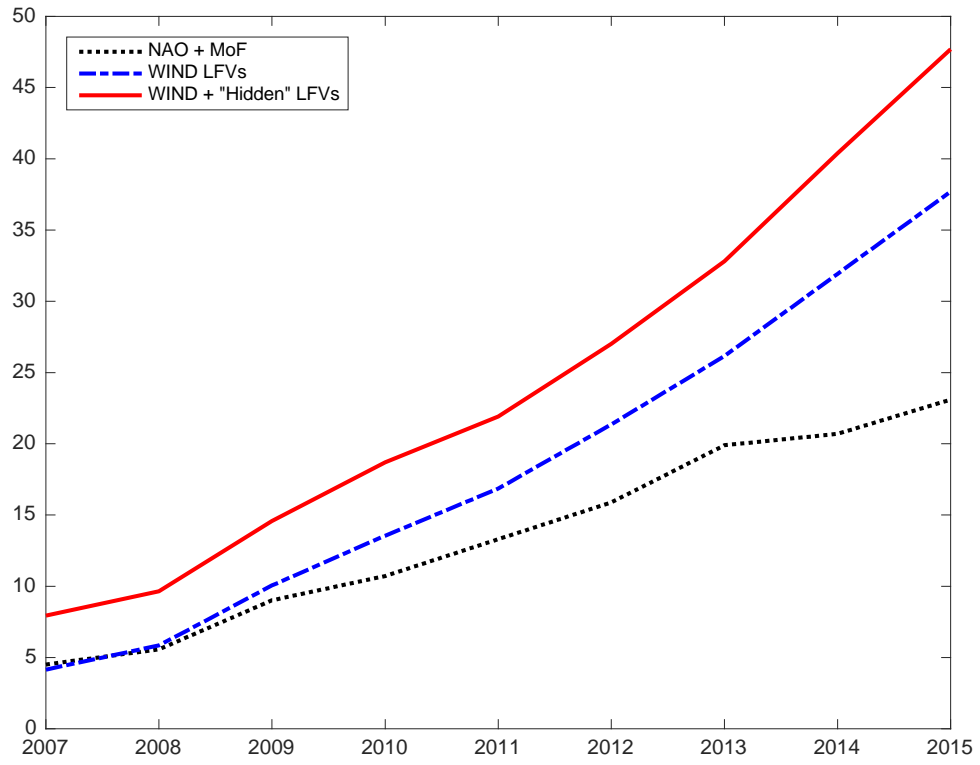
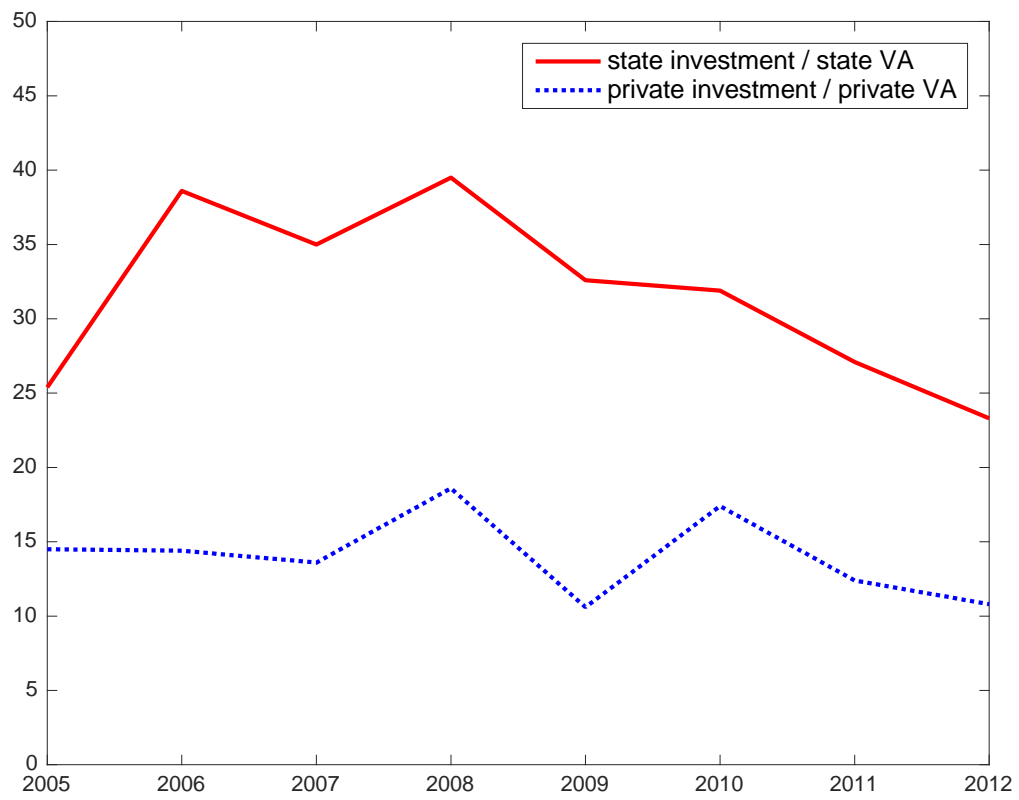# Figure 8: Aggregate Investment, Savings and Current Account Surpluses
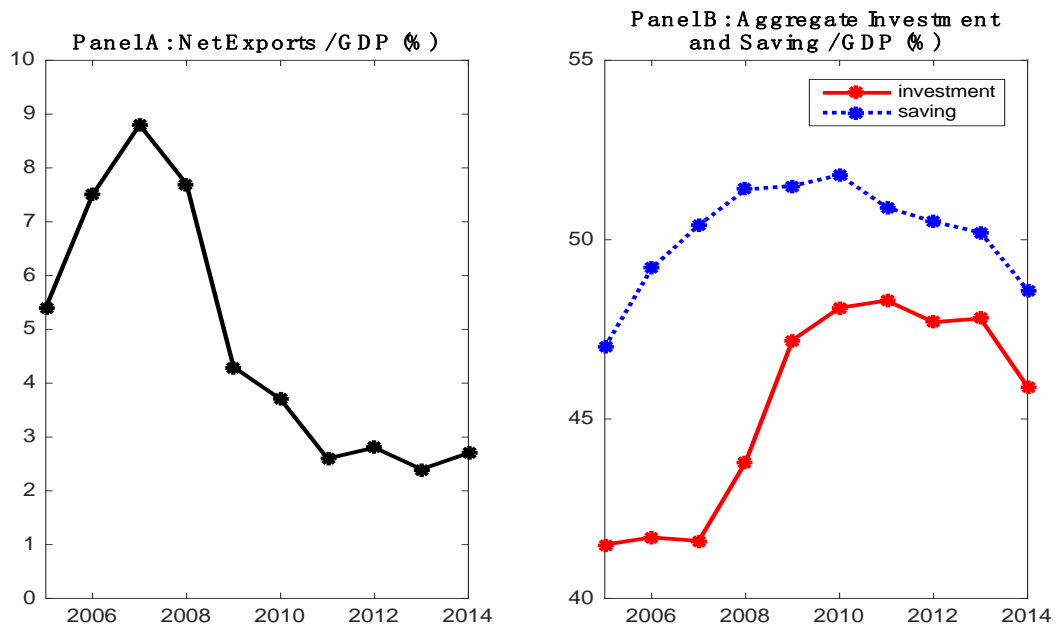
Source: China Statistical Yearbook.

Figure 9: Composition of Assets of China's Banking Sector

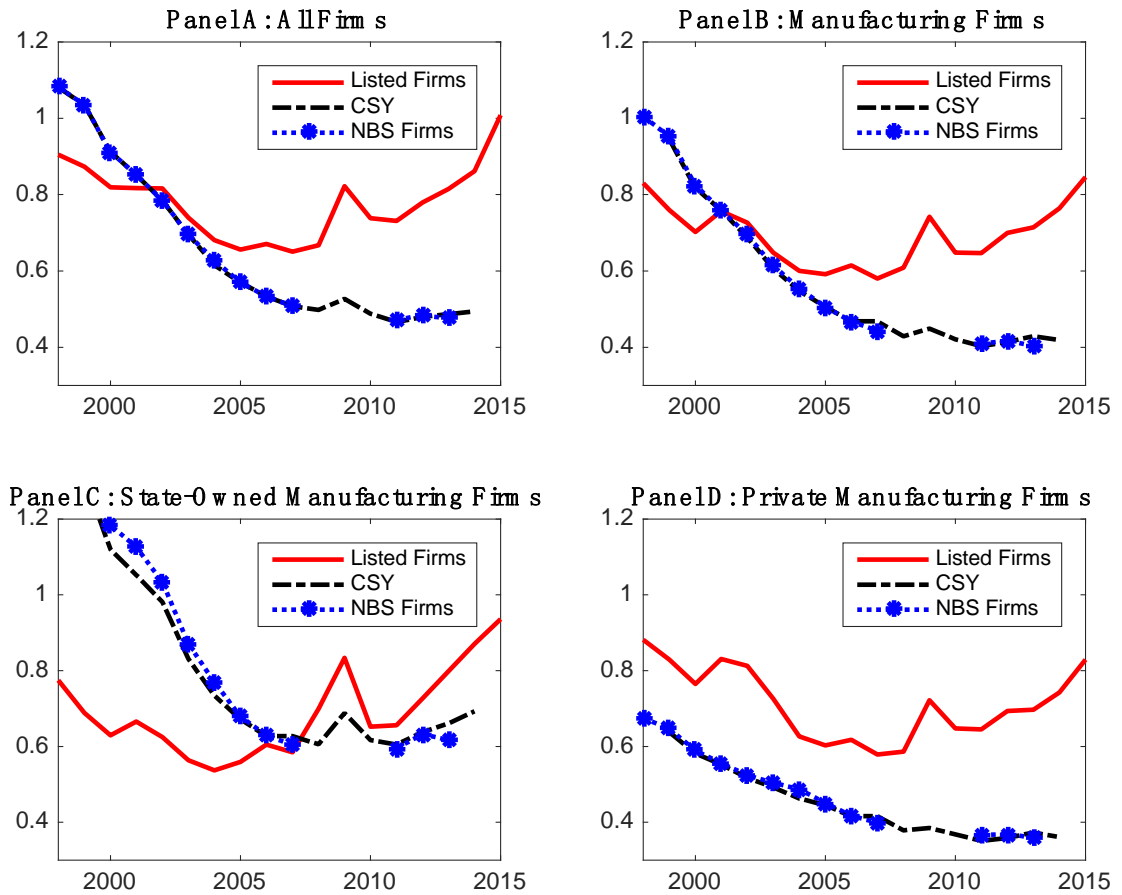Note: The banking sector includes formal and shadow banking. See text and appendix for details.

Figure 10: Investment Rate by Ownership in the Industrial Sector (%)

Source: Tabulations from China's Statistical Yearbook.

Figure 11: Firm Debt Revenue Ratios

Note: The solid line in Panel A plots the debt revenue ratio of listed firms. Data source: The CSMAR database. The dashed line is the ratio of all state-owned and private industrial firms above scale. Data source: China's Statistical Yearbook. Panel B plots the debt revenue ratio of manufacturing firms in the listed-firm sample (solid line) and in the NBS sample (dotted line). Panels C and D plot results for state-owned and private manufacturing firms, respectively. As a robustness check, the dashed lines in all panels use the data from the Annual Survey of Industrial Firms conducted by China's National Bureau of Statistics (NBS sample henceforth), with years missing between 2008-10.

Figure 12: Dispersion in Average Product of Capital

Note: Figure plots the variance of log Y/K among private firms in the balanced-panel of industrial firms from 1998 to 2013. The Y-K ratio is divided by the median value in each four digit industry. Top and bottom one percentiles are dropped.

Table 1: Components of the Fiscal Expansion (trillion Yuan)

	Planned Investment		On-Balance Sheet Spending		Off-Balance Sheet Spending
			Central + Local	Local	
Housing Security	0.40	Housing Security	0.20	0.12	0.14
Rural Livelihood and Infrastructure	0.37	Urban and Rural Community Affairs + Agriculture, Forestry and Water Conservancy	0.20	0.20	0.04
Railway, Road, Airport, Water Conservancy and Urban Power Grids	1.50	Transportation	0.27	0.31	2.53
Health, Education and Culture	0.15	Health, Education and Culture	0.11	0.11	0.05
Environment Protection	0.21	Environment Protection	0.05	0.05	0.05
Self-Independent Innovation and Structural Adjustment	0.37		N.A.	N.A.	
Post-Disaster Reconstruction	1.00	Post-Disaster Reconstruction	0.23	0.21	
Total	**4**		**1.05**	**1.00**	**2.81**

Table 2: Cumulative Off-Balance Sheet Expenditures of Local Governments
(as of June 2013)

% of total expenditures

Municipal Construction	34.6
Transportation Infrastructure	24.4
Land Storage	11.2
Housing Security	6.5
Health, Education, and Culture	5.8
Agriculture, Forestry, and Water Conservation	3.2
Environmental Protection	2.7
Industry and Energy	1.4

Table 3: Fixed-Effect Regressions on LFVs' Debt Growth

(Dependent variable: log debt)

	(1)	(2)	(3)	(4)
Log debt of LFVs	0.458	0.457	0.446	0.446
	(0.001)	(0.076)	(0.010)	(0.010)
Fiscal Gap	0.610	-0.462	0.866	0.094
	(0.223)	(0.331)	(0.275)	(0.401)
Fiscal Gap x post_09		0.940		0.735
		(0.215)		(0.278)
Year Dummies	yes	yes	yes	yes
Other Controls	no	no	yes	yes
Observations	8,454	8,454	5,837	5,837
R-squared	0.756	0.757	0.749	0.749
Number of Issuers	1,704	1,704	1,285	1,285

Note: Fiscal gap is (local fiscal expenditure – local fiscal revenue) / local GDP. Other controls include log GDP, log population and GDP growth. Standard errors are in parentheses.