# The Financing of Local Government in China: Stimulus Loan Wanes and Shadow Banking Waxes*

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**Abstract**

This paper documents that China's four-trillion-yuan stimulus package fueled by bank loans in 2009 (as a response to the 2007/08 global financial crisis) led to the rapid growth of shadow banking activities in China several years later. The local governments in China financed the stimulus plan mainly through bank loans in 2009, and resorted to non-bank debt financing after 2012 facing mounting rollover pressure from bank debt coming due. Coss-sectionally, the provinces with abnormally greater bank loan growth in 2009 experienced more Municipal Corporate Bonds issuance during the periods of 2012-2015, and we link the stimulus loan rollovers of local governments to shadow banking activities, including entrusted loans and wealth management products. We argue that the four-trillion-yuan stimulus package has the perhaps unintended consequence of modernizing China's financial market post 2012, and highlight the market forces behind the regulation changes in China in that period.

Keywords: Local Government Financing Vehicles, Trust and Entrusted Loans, Shadow Banking in China

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# 1 Introduction

Right after the 2007/08 global financial crisis hit the export-driven Chinese economy heavily, the State of Council of China announced the unprecedented four-trillion fiscal plan on November 2008, mainly on infrastructure projects, in order to stimulate China's economy to maintain its "usual" above-9% annual growth rate. Most of the massive 2009 stimulus package was implemented through China's local governments who finance the infrastructure investment by bank loans via the off-balance-sheet Local Government Financing Vehicles (LGFVs thereafter); see, e.g., Bai et al. (2016). Although this aggressive fiscal expansion helped bolster the slumping Chinese economy (and perhaps even the world economy), the resulting swelling local government debt in China followed by this massive plan caught wide attention of scholars and practitioners all over the world, and about five years later more and more studies emerged on the unintended consequences of the 2009 stimulus package on the China's economy growth post 2009.

This paper links China's recent fast-growing shadow banking activities to the four-trillion stimulus package in 2009; after all, local governments have to refinance their maturing stimulus loans several years later. Although the start of shadow banking in China around 2008 can be attributed to other reasons (e.g., Hachem and Song (2015)), we attribute the unprecedented rapid growth of shadow banking activities in China after 2012 as one of the unintended consequences of the massive fiscal stimulus package in 2009. We zoom in on the composition shift of the liability side of China's local governments, and show that the rollover pressure of bank loans that were taken on by LGFVs in 2009 pushed them toward non-bank debt financing after 2012. This fostered the rapid growth of shadow banking activities in China at that time: most of these non-bank debt financing sources are related to Trust and/or wealth management products, two off-balance-sheet items that are often regarded as the barometers of the shadow banking activities in China.

We started by explaining the background of the four-trillion fiscal stimulus package in 2009 and its connections to local governments in China. Due to the public-goods nature of the infrastructure-investment-centric stimulus package, it is local governments that carry out the four-trillion fiscal expansion. However, according to the 1994 budget law, local governments are not allowed to borrow. To facilitate and expedite the stimulus plan, different regulators–coordinated by the central government– released several official documents to encourage local governments to borrow from banks through their LGFVs, an important group of state-owned enterprises (SOEs) in China. As planned, bank loans and investment soared in 2009, but local governments were left with mounting bank debt.

One estimate by Bai et al. (2016) is that 90% of the newly increased local government debts during the stimulus period were in the form of bank loans.

Facing the rising warnings of local government debt, starting in the second half of 2010 Beijing reverted its ultra-expansive credit policy back to its normal level, and National Audit Office conducted two comprehensive surveys on local government debt. These two official reports, issued in December 2010 and June 2013, are the most authoritative documents that shape all discussions on the topic. Based on the mid-2013 report, we focus on four different kinds of debt that are sitting on the liability side of local governments: *bank loans*, *Munibonds*, *Municipal Corporate Bonds*, and *Trust loans*.

We give detailed background information on these four different categories of debts in Section 2.2.1, with the latter three types being non-bank debts. The third kind of debt, i.e., Municipal Corporate Bonds (MCBs hereafter) will be the focus of our paper and hence worth highlighting here.[1] These bonds are issued by the LGFVs, hence legally they are just corporate bonds; but of course they have implicit guarantees from the corresponding local governments, hence enjoy the extra safety of municipal bonds. These bail-out expectations, especially for LGFVs that are both SOEs and backed by local governments, are widely spread and particularly relevant in China.[2]

Based on the two snapshots of local government liability in December 2010 and June 2013, together with various sources, we fill in the detailed amount of each debt category over the period of 2008-2015 that are sitting on the liability side of local governments. A robust time-series pattern of the composition of local government debt emerges: a shift from bank loans to non-bank debt obligations over time.

This composition shift is consistent with the hypothesis that, following the back-to-normal credit policy after the 2009 stimulus package, local governments refinance/rollover their bank loans coming due by non-bank debt, e.g., Trust loans and MCBs. In fact,

[1]It is "Cheng-Tou-Zhai" in Chinese, or "city investment bonds" by a literal word-for-word translation. We adopt "Municipal Corporate Bond" from the English translation the "Cheng-Tou-Zhai" index provided by the China Securities Index Company Limited (CSI), which is the leading index provider in China (e.g., CSI300 index) jointly owned by the Shenzhen Stock Exchange and the Shanghai Stock Exchange. In the literature, papers have been using different translations; for instance, local government bond by Huang et al. (2016) , Chengtou bond by Ang et al. (2016), and urban construction and investment bond by Gao et al. (2016). Some practitioners' articles also use the term LGFV bond.

[2]Up to early 2017 there have been no single case of MCB default yet; and thanks to the debt-swap-program pushed by Ministry of Finance starting 2015, we do not expect MCB default in the future either. On the other hand, Chinese investors are learning to embrace the default risk on corporate bonds. Becuse of the slowdown of the Chinese economy in the recent five years, firms–whether privately owned or state owned–started default sporadically in 2014, and in the year of 2016 there are 34 firms that are defaulting on their bonds in China's corporate bond market. Although, there are still heavy involvement of local governments in bankruptcy resolutions, as many defaulting enterprises have strong ties to local governments.

we show that MCBs issued for "repaying bank loans" rose quickly around 2014, thanks to the MCB prospectus which revealed the purpose of the MCB issuance. This view is also confirmed with the post-2013 rapid growth of Trust loans as reported in "Aggregate Financing to the Real Economy" by China's central bank.

The hypothesis that local governments need to issue more MCBs later to repay the extra stimulus loans taken earlier has the following cross-sectional prediction: the areas with more bank-loan-fueled stimulus in 2009, whether demand-driven or supply-driven, should have more MCB issuance several years later as the after-effect of stimulus package. This prediction is confirmed in the data, a result that is robust at both regional and provincial levels, and with relevant controls (e.g., controlling provincial GDP growth in later years). We further decompose the MCB issuance by its purposes, and find that in the cross-sectional test only the repaying-bank-loans component is related to the 2009-stimulus bank loans in a statistically significant way. In terms of economic magnitude, we find that one more dollar of bank loans in 2009 leads to about 15 cents more issuance of MCB to repay bank loans in later years. This implies about a loan maturity of about 3.3 years, consistent with Kroeber (2016) who document that China's localities often take three- to five-years loans to fund decade-long infrastructure projects.

Finally, Section 4.4 provides some direct evidence linking our findings to China's shadow banking activities in recent years. The non-bank local government debt becomes increasingly significant relative to shadow banking activities in the overall Chinese economy, rising from 1.5% in 2008 to 34% in 2015. Cross-sectionally, we show that the provinces with more bank-loan-fueled stimulus in 2009 were experiencing more entrusted loan growth during 2012-2015. Finally, from publicly available data, in June 2016 there are 50% (or 3.05 trillion RMB) of MCBs invested by wealth management products. Due to its shortcoming of statistical criteria (e.g., not including wealth management product investment in some special-purpose-vehicles which can in turn buy MCBs), this number is bound to be an underestimate; one estimate from an anecdotal but trustworthy source is about 70%.

This paper paints a broad picture that links the 2007/08 financial crisis in US, the 2009 four-trillion stimulus expansion in China, and the surging shadow banking activities in China after 2012. Although both wealth management products and Trust loans existed in China's financial markets before 2008, and increased slightly during the period of the 2009 stimulus plan, our perspective helps understand why these shadow banking activities experienced "barbarous growth" after 2012. In short, the mounting rollover pressure of LGFVs that needed to repay maturing bank loans about four or five years later played an important role in driving the surging shadow banking activities in China

at that time.

In Concluding Remarks we also argue that the bank loan rollover mechanism following the 2009 stimulus plan has affected the way the government regulated the financial markets in China, and the enforcement of regulations. For instance, in 2010 the strict enforcement of regulations on LGFV successfully restrained the MCB issuance; but in 2014, facing the mounting rollover pressure, (various) regulators started proposing conflicting rule changes which intentionally facilitated LGFVs to borrow from the MCB market. This interesting observation highlights the power of market force in shaping the regulation in China, which becomes more and more endogenous in later years. In fact, this market force, which fundamentally is about how to place traditional banking in a market economy, is perhaps also responsible for the rapid growth of the interbank market, and the other two important milestones in the reform of banking in China: the interest rate liberalization in 2013 and the deposit insurance scheme in May 2015.

**Literature review** This paper belongs to three different but yet connected literatures in the recent development of Chinese economy and financial markets; each of them has been fast-growing in the past years. First, our paper analyzes one of the unintended consequence of China's four-trillion stimulus package in 2009. Bai et al. (2016) offer a comprehensive study of this unprecedented fiscal stimulus package, and show that the stimulus plan was implemented almost entirely through local government financial vehicles. In contrast to our paper, which focuses on the liability side of stimulus plan, Bai et al. (2016) emphasize the asset side and its resulting inefficiency; they argue that local government may have facilitated access to capital to favored firms and hence worsened the overall efficiency of capital allocation, with a potential permanent decline in the growth rate of China's aggregate productivity and GDP growth. Deng et al. (2015) emphasize the feature of "state control" of the 2009 stimulus package, with state-owned banks extending credit to SOEs and real estate in a massive way. Similarly, based on firm-level data, Cong and Ponticelli (2016) document that following the 2009 credit expansion in China new credit was allocated disproportionately more towards state-owned, low-productivity firms than towards privately-owned, high-productivity firms. This represents a reversal of the trend observed before 2008 during which capital allocations improved over time.

Second, the major evidence that this paper relies on is MCBs, the corporate bonds that are issued by the LGFVs. While we focus on how local governments use MCBs to refinance/rollover their previous bank loans,[3] several recent papers study other aspects

[3]The rollover risk emanating from refinancing maturing debt is an active research area in corporate

of MCBs. Ang et al. (2016) examine the cross-sectional pricing properties of MCBs, emphasizing the role of real estate dependence of local economy and local political risk associated with the post-2012 anti-corruption campaign. Zhang and Barnett (2014) provide a detailed description of local government debts, especially those taken by LGFVs. Ambrose et al. (2015) study the unique local government financing channel in China by investigating LGFVs' borrowing backed by land sales. Our paper adds to this line of literature by showing that local governments shift their bank loans to MCBs issued by LGFVs, as one form of non-bank debts, to release the rollover pressure. Gao et al. (2016) study the performance of policy bank loans to LGFVs, and how the political nexus between local politicians and policy bank officials affects local governments' default decisions on bank loans. Huang et al. (2016) observe a crowd-out effect of massive public debt issuance on private firms' investment post the four-trillion stimulus. They argue that such negative impact is especially severe for firms more dependent on external funding, suggesting that the stimulus-driven public debt sapped long-term growth in China.

Finally our paper belongs to the burgeoning literature that studies China's fast growing shadow banking activities, including both wealth management products and entrusted loans. Hachem and Song (2015) highlight the asymmetric competition between the Big-4 banks and their relatively smaller peers in China, and explain how stricter liquidity regulation can generate shadow banking, tighter interbank markets, and credit growth as unintended consequences. Acharya et al. (2016) analyze a proprietary panel data on the wealth management products issued by each bank, showing that the four-trillion stimulus package in 2009 also boosted China's shadow banking activities. Wang et al. (2016) propose a theoretical framework to understand these shadow banking activities as a part of the "dual-track" interest rate reform, in which wealth management products and trust/entrusted loans are ways to channel funds toward more efficient privately-owned firms, but at a higher interest rate than the bank rate offered to state-owned enterprises.

Entrusted loans, referring to the loans between two non-bank parties (e.g., industrial firms) using a bank as an intermediate, are another form of shadow banking that grow rapidly after the 2009 bank-loan-fueled stimulus. A couple of recent papers use entrusted loans as the platform to study China's shadow banking system. Chen et al. (2016) document commercial banks' engagement in intermediating entrusted loans and the various incentives of small and large banks in providing such service. Allen et al. (2016) focus

finance, especially after 2007/08 financial crisis; e.g., Diamond (1991); He and Xiong (2012); Diamond and He (2014).

more on the pricing side of entrusted loans and find that entrusted loans between two parties without any relationship charge higher interest rates potentially to compensate for fundamental and informational risks.

# 2 Institutional Background

We briefly describe the background of China's four-trillion fiscal stimulus package in 2009, and its connections to local governments and their financing vehicles. We then move on to document the evolution of the debt assumed by the local governments, with an emphasis on the slow composition shift from bank loans to non-bank financing, mainly bonds and trust financing.

## 2.1 Four-Trillion Fiscal Stimulus and Local Government Financing Vehicles

In the fall of 2008, China's export-driven economy experienced a head-on blow by the 2007/08 financial crisis which dragged the US economy into the Great Recession. Figure 1 shows that China's annualized GDP growth rate dropped from 9.5% in 2008Q3 to 6.4% in 2009Q1, as total export almost more than halved from Sept 2008 to Feb 2009.[4]

In response, in November 2008 the Chinese premier Wen Jiabao announced to great fanfare a four trillion RMB fiscal stimulus to be spent by 2010, with about 1.5 trillion RMB to be spent on railway, road, airport, water conservancy and urban power grids; 1 trillion on post-disaster reconstruction (Wenchuan earthquake in May 2008); 1.14 trillion on indemnificatory and comfortable housing, rural livelihood and infrastructure; and 0.36 trillion on environment protection and educatin. As shown in Figure 1, the massive stimulus brought an immediate acceleration in China's GDP growth, which recovered to 11.9% in 2009Q4 but later slowly landed to 7.0% in 2015.

Right after the announcement in November 2008, Dominique Strauss-Kahn, the then managing director of the International Monetary Fund, stated 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.*"[5] Indeed, in the short run many prominent researchers and policy makers viewed the China's massive fiscal stimulus helped preventing the world recession from deteriorating.[6]

[4] According to the General Administration of Customs of People's Republic of China, the total export drops from 136.7 billion USD in Sept 2008 to 64.86 billion USD in Feb 2009.

[5] New York Times, November 9, 2008, "China plans $586 billion economic stimulus."

[6] Paul Krugman wrote that China responded by "much more aggressive stimulus than any Western

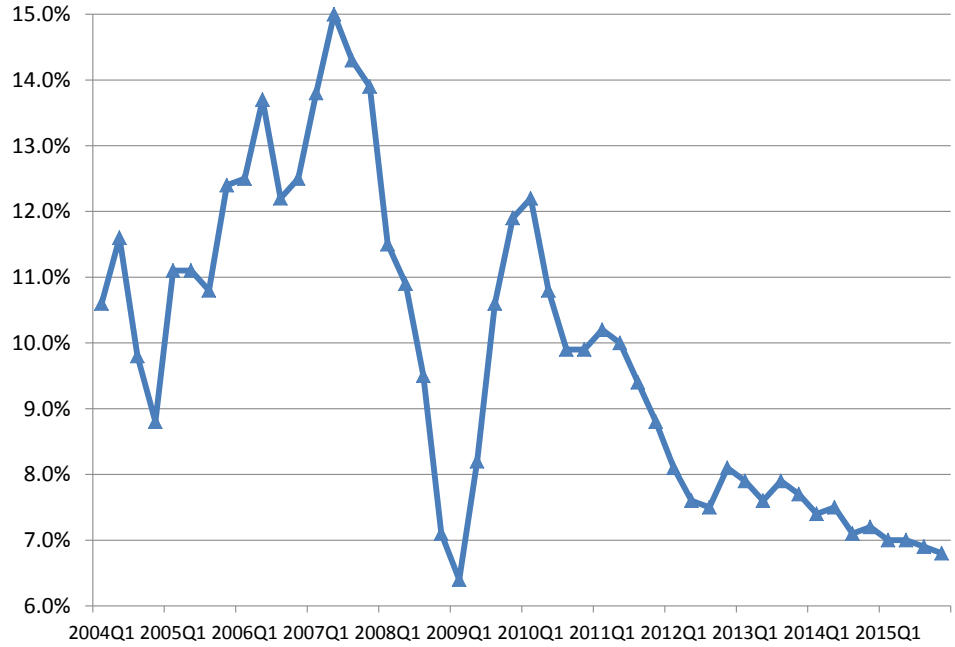



Figure 1: **China's quarterly real GDP growth (annualized), 2004-2015**. Data source: China National Bureau of Statistics.

However, less than a decade later, more and more studies have shown the negative–or at best, unintended–consequences of this vast four-trillion stimulus package. One of these consequences is the massive debt burden assumed by local governments, which is the focus on our paper.

### 2.1.1 Local governments and their financial vehicles

Since the major component of the stimulus package is infrastructure projects, including urban and rural, almost all investment spending are naturally implemented and financed through local governments. But, only about 1 out of 4 trillion comes out of the budget of the central government, so there is a financing gap of three trillion.[7] What is more, given the institutional background of national budget law explained below, local governments were not allowed to borrow by themselves at that time, and hence were forced to finance their investment spending via the so-called LGFVs. This way, the four-trillion stimulus package and the mounting debt burden of local governments in China are just two sides

nation – and it has worked out well." See http://krugman.blogs.nytimes.com/2010/07/24/keynes-in-asia/.

[7]Still, this inference begs the question whether China successfully carried out the four-trillion stimulus package in full over the two years in 2009 and 2010. Numerous articles and sources suggested so; for instance, Bai et al. (2016) show that the gross abnormal investment amount in 2009 and 2010 roughly matches the planned stimulus.

of the same coin.

There are several excellent papers explaining the history and peculiarity of the financing of local governments in China. Here, we briefly mention the related institutional details on the regulations faced by local governments and their counter-measures when they are in need of financing. Bai et al. (2016) offer a greater recount of these legal details, and the following exposition is based on their paper.

Before 1994, local governments in China enjoyed much freedom in the allocation of local tax revenues. The "tax sharing reform" in 1994 overhauled the budget law and removed control of local governments over the local tax revenues; as a result, the tax share of local governments fell from about 80 percent to 40 to 50 percent in 1994. Not surprisingly, local governments responded by looking for other sources of revenues. One prominent and controversial channel is land sales, i.e., the seizure by local governments of land from farmers and urban residents and the resale/lease of the land to, say, developers (Zhang and Barnett (2014); Ambrose et al. (2015)). Nevertheless, land sales, which cannot be elevated immediately, are not the major financing source for local governments in implementing the 2009 stimulus package within such a short time.

The 1994 budget law also pushed the LGFVs onto the stage. Although the 1994 budget law made it illegal for local governments to run budget deficits, municipals can run implicit deficits by establishing LGFVs and borrowing against them. Legally, LGFV is a state-owned enterprise with the corresponding local government as the only or dominant shareholder, with its shares usually held by the State-owned Assets Supervision and Administration Committee (SASAC).[8] Prior to 2009, these LGFVs were severely restricted to limited financing activities,[9] with only two types of financing vehicles being allowed: i) companies specialized in road and bridge construction, and ii) investment companies specialized in urban development.

Things became quite different starting 2009. To push the four-trillion stimulus package, the central government decided to circumvent the 1994 budget law by encouraging local governments to use LGFVs to take on bank loans that are sitting on the off-balance-sheet of local governments. The central government orchestrated the relaxation of regulation from two directions: Ministry of Finance who is in charge of budgetary issues of local governments, and China Bank Regulation Committee (CBRC) who is in

[8]One example of LFGV in Bai et al. (2016) is the Beijing Capital Group 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. However, the Capital Group also has three subsidiaries that are essentially real-estate developers and another four financial service companies.

[9]There were only 12 LGFVs that issued bonds in 2008, while this number rose to 516 in 2013.

charge of commercial banks in China. On one hand, 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 funds 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.

In the meantime, to encourage banks to extend credit, CBRC made the following 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.

Given these green lights and, to some extent, explicit encouragement, local governments, that are also motivated by the central government to promote local economic growth over the past several decades (Li and Zhou (2005)), implemented the unprecedented stimulus package through their LGFVs by taking on a massive amount of loans extended by the banking system.

### 2.1.2 Stimulus package in 2009 fueled by bank loans

Bai et al. (2016) estimate that about 90% of local government investment was financed via bank loans in 2009. Most of the new credit was released by China's big-four state-owned banks and three policy banks;[10] these banks, especially the latter three policy banks, are in general expected to support the country's economic and political agenda besides the usual goal of profit-maximization. The stimulus package causes a sudden dramatic increase of newly issued bank loans in 2009, which is visualized in Figure 2.

[10]The big-four stated owned commercial banks are Industrial and Commercial Bank of China, Bank of China, Construction Bank of China, and Agricultural Bank of China; the three policy banks are Agricultural Development Bank of China, China Development Bank, and the Export-Import Bank of China.

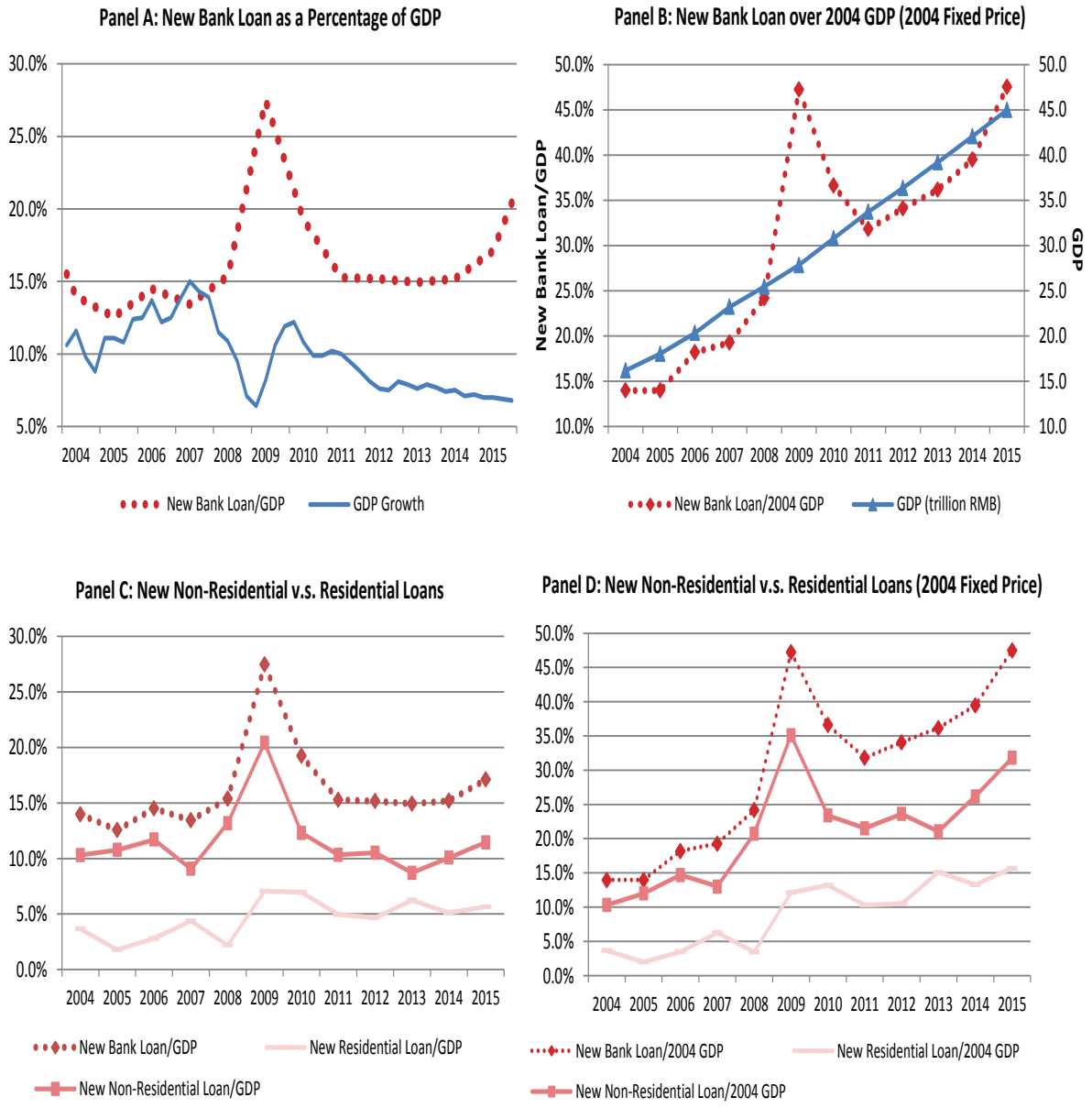



Figure 2: **New Bank Loan Growth in China, 2004-2015**. Panel A plots annual new bank loan over GDP and quarterly GDP growth; Panel B plots new bank loan over 2004 GDP (left scale) and GDP in trillion RMB in 2004 fixed price (right scale); Panel C plots new bank loan, new non-residential bank, and new residential bank loan, all over GDP; and Panel D plots new bank loan, new non-residential bank loan, and new residential bank loan, all over 2004 GDP and in 2004 fixed price. Numbers in fixed 2004 price are converted using GDP deflator. Data source: People's Bank of China (bank loans) and China National Bureau of Statistics (GDP and GDP deflator).

Panel A superimposes the annual new bank loans scaled by GDP of that year on the time-series of GDP growth shown in Figure 1. While in normal years new bank loans are about 15% of the GDP in China, this number clearly stands out in 2009 (27.5%) and 2010 (19.2%).[11] To address the concern that the unusually high ratio of new bank loans to GDP in 2009 might be driven by lower GDP that year, Panel B in Figure 2 plots new bank loans each year scaled by 2004 GDP in 2004 fixed price (left scale), together with GDP levels each year in 2004 fixed price (right scale). The pattern is even more striking: new bank loans in the two years after 2008, especially 2009, stood out abnormally high. Finally, Panels C and D show that most of the increase of new bank loans in 2009 are toward the non-residential sector (instead of the residential sector, which would be the case after the housing-related credit boom in 2015), consistent with the stimulus package being more infrastructure-investment oriented.[12]

Although this paper focuses on the financing of local governments during and after the 2009 stimulus plan, it is worth pointing out that not all additional new bank loans shown in Figure 1 went to local governments. The easy monetary policy, which was pushed by Beijing to help local governments obtain bank financing to implement the fiscal expansion, also led to abnormal bank credit growth to other sectors in China (see, e.g., in Cong and Ponticelli (2016)).[13] Based on our admittedly rough estimate, the 2009 stimulus caused 4.7 trillion RMB extra bank loans to the entire Chinese economy; among which, about 2.3 went to LGFVs, about 1 went to the non-residential sector (but excluding LGFVs), and the rest of 1.4 went to the residential sector.[14]

Several years later the consequences of mounting debt obligations, to which we turn next, surfaced.

[11]The newly issued bank loans in 2009 almost doubled from that of 2008, rises from 4.9 trillion RMB in 2008 to 9.6 trillion RMB in 2009. Data source: People's Bank of China (the central bank).

[12]Heavy infrastructure investment in 2009, which could be considered as part of the long-standing urbanization plan in China, is consistent with the rising land prices around 2009-2010 (Deng et al. (2015)), even without heated residential lending (to the household sector).

[13]As Premier Jiabao Wen stated in 2009 Davos World Economic Forum, the success of 2009 stimulus was due to the combination of "the proactive fiscal policy and moderately easy monetary policy."

[14]First, the total abnormal new bank loan (4.7 trillion) is the difference between the actual 2009 new bank loan (9.6 trillion) and the estimated 2009 normal new bank loan (4.9 trillion, based on the average BL/GDP ratio in 2004 to 2008). Following the same approach, the 2009 abnormal new non-residential bank loan is estimated at 3.3 trillion, implying an abnormal residential new bank loan of 1.4 trillion (4.7-3.3). Second, we decompose this 3.3 trillion number further into LGFVs and the rest. To this end, we estimate the 2009 normal new bank loan to LGFVs to be 0.75 trillion (the ratio of LGFV new bank loan over new bank loan in 2008 multiplied by the estimated 2009 normal new bank loan; the 2008 LGFV new bank loan is based on the 2010 national audit report and Wind). Taking this number out of the 2009 actual LGFV bank loan 3.05 trillion (Bai et al. (2016), p.14), we estimate the 2009 abnormal LGFV bank loan to be 2.3 trillion (3.05-0.75), which then left 2009 abnormal non-residential (excluding LGFV) new bank loan to be 1 trillion (3.3-2.3).

## 2.2 National Audit Reports and Debt Obligations of Local Governments

Shortly after the stimulus package got successfully implemented via LGFVs in mid 2010, many economists and practitioners raised alarming warnings on the solvency of local governments, as it may jeopardize the economic growth in China. What is worse, at that time the central government has no direct statistics to even gauge the aggregate debt balance of local governments in China, let alone monitoring the potential default risk of the LGFVs.

As a result, the State Council of China ordered the National Audit Office to conduct the first nation-wide survey on local government debt. This report provides the first comprehensive snap-shot description of China's local government debt at the end of 2010. Another somewhat more detailed official report, dated June 2013, was published by the same office who conducted another follow-up survey in 2013.

These two reports, dated December 2010 and June 2013, are the most authoritative documents that shape all discussions on this topic. In both reports, Table 4 lists the break-downs of the various categories of debt obligations assumed by local governments, which we reproduce in Table 1 in this paper.

### 2.2.1 Categories of debt obligations

Given our paper being about the substitution between bank loans and non-bank financing of local government borrowing, in our later analysis we focus on the break-down based on debt investors, such as bank loans and bonds. The mid-2013 national audit report gives a finer break-down of debt sources than the 2010 report does. One immediate observation, which forms the base of this paper, is the shift of bank loans toward bonds: bank loans were about 80% of total local government debt at the end of 2010, which dropped to below 60% in the mid-2013 report; in contrast, the fraction of bonds rose from 7% in 2010 to 10% by mid-2013.

This paper investigates the composition shift of the four debt obligations reflected in the 2013 national audit report: *Bank loans*, *Municipal corporate bonds (MCBs), Munibonds*, and *Trust*. Why do we focus on these four categories of the local government liability? First, they are all in the form of debt with implicit bail-out expectations from government, whether local or central. Second, which will be explained later, these liabilities, one way or another, are under the "shadow" of the traditional banking business.

MCBs, which are the sum of three different kinds of bonds (*corporate bonds*, *mid-term notes*, and *short-term bills*) in the mid-2013 report, are public bonds issued by

LGFVs. One example of LGFVs is given in footnote 8; up to now there has been no single case of MCB default in China. We will turn to MCB in more detail in Section 3.1. A conservative estimate in Section 4.4 shows that half of MCB are invested by Wealth Management Products, which are sold through commercial banks and considered as the most important form of shadow banking in China (e.g., Hachem and Song (2015); Acharya et al. (2016)).

We then turn to Munibonds. As explained, the 1994 Budget Law prohibited local governments in China from borrowing by themselves, but they may issue Munibonds via Ministry of Finance. In late 2011, Ministry of Finance started allowing several selected provinces and prefectures to issue Munibonds by themselves, but was still in charge of the debt repayments. In October 2014, Ministry of Finance released its authority fully back to several municipalities, who were then allowed to issue and repay Munibonds by themselves. As we argue shortly, this reform is likely a response to the mounting rollover pressure of LGFVs, and starting 2015 we observe a rapid growth of Munibonds under the so-called local government bond-swap program (i.e., issuing Munibonds to repay existing due debt) overseen by Ministry of Finance. It is intriguing that the majority of Munibonds are held by commercial banks; according to China Central Depository and Clearing Corporation, at the end of 2015, banks held 83% of Munibonds in China (this ratio has risen to 87% in 2016).

Another important category of the local government liability in the mid-2013 national audit report is Trust. This item includes both Trust loans and Entrusted loans, which are two major sources of the Aggregate Financing to the Real Economy in China (see later discussion in Section 4.4). They are basically loans from individuals to firms (Trust loans) and loans from firms to firms (Entrusted loans), which help channel funds to the real sector in China outside the traditional commercial banking sector. However, as explained in detail later in Section 4.4, traditional commercial banks play an important intermediating role in channeling both forms of loans, and are widely considered the barometer of shadow banking activities in China. Starting from 2010, given the surging financing demand of LGFVs backed by local governments, one particular form of Trust loans, termed Trust-Municipality cooperation, becomes popular. In this Trust-Municipality cooperation, a trust company raises fund from investors directly or via Wealth Management Products sold by commercial banks, and in turn invests the fund into the LGFVs.

Before leaving this section, we mention several liability items that are significant but excluded from our later analysis. "*Accounts receivable*" is excluded due to its nature of working capital (not debt). "*Built-to-transfer*" is the usual source of financing in

the Public-Private-Partnership; it is in the same nature as "*Borrowing from entities & individuals*," which involves private entities and local government. We, unfortunately, have no data source on this item. Finally, "*Fiscal on-lending*" captures borrowing from higher authorities (like Ministry of Finance).

### 2.2.2 Contingency of debt obligations

There is another dimension of break-down shown in Table 1, in which debt is classified in "*fully guaranteed*," "*contingent obligation*," or "*contingent bailout obligation*;" there is no way to quantify the differences between these three obligations.

In this paper we treat all these three categories equal and study the sum of these obligations. First, this treatment is consistent with our research question, which is less about actual debt obligations but the composition shift. Second, the mere existence of these categories reflects the uncertainty toward the nature of debts assumed by LGFVs. Are they municipality debt? Or just corporate debt? In China the rules and regulations are in flux, and nobody knows to what extent local governments are liable to pay down the debt assumed by LGFVs. Nevertheless, given that LGFVs are set up to implement the stimulus plan pushed forward by the central government, which is the ultimate rule maker, investors naturally expect some forms of bail-out from local or central governments in case LGFVs default (which has not occurred so far).

In fact, this wide-spread perception pushed the State Council of China to issue the 43th Document of 2014, "Opinions of the State Council on Strengthening the Administration of Local Government Debts", on September 2014. The "No. 43 Document" and the following regulatory rules banned local governments providing guarantee to LGFVs' bond offerings, prohibited local governments from raising debt via LGFVs, and ordered local governments to restructure and substitute existing debt with more transparent Munibonds. But as explained later in Section 5, during that time there were some other new changes coming out from other regulatory bodies to counter this strict ruling, and the government's implicit bailing-out on MCB and related debt is still widely expected among investors in China.

# 3 Bank Loan Wanes and Shadow Banking Waxes

After describing our data sources, in this section we first present the time-series pattern that the debt liability of local governments in China has slowly shifted from mostly bank loans in 2009 to a significant fraction of non-banks debt after 2012. We then present the

evidence that LGFVs are issuing MCBs several years later to rollover their banks loans taken in 2009.

## 3.1 Data Sources and Municipal Corporate Bond (MCB)

Our data come from various sources. Details of variable constructions can be found in Appendix A.

### 3.1.1 Municipal corporate bond data

LGFVs issue MCBs in five forms according to the WIND terminology, which includes corporate bond, enterprise bond, medium-term note, short-term financing bill, and private placement note. Throughout the paper we use the term "corporate bonds" to refer to all of the above bonds, which are publicly traded either in exchnages or the interbank market.[15]

We download bond-specific information of every MCB issuance from WIND, including actual issuing amount, issuing date, maturity date, issuer's province, bond rating, issuer's rating, and the purpose of raised funds. If one bond is traded on both exchange and inter-bank market, WIND records it as two different bonds. We drop those duplicate bonds.

China has 34 provincial-level administrative divisions, including 23 provinces, 5 autonomous regions, 4 direct-controlled municipalities (Beijing, Shanghai, Tianjin, and Chongqing), and two special administrative regions (Hong Kong and Macau). After excluding Taiwan, Hong Kong, and Macau, mainland China has 31 provincial-level administrative divisions that have MCBs issued by LGFVs. We drop Xizang as it only has one MCB ever issued in our sample, leading to 30 provinces in our final sample. We aggregate the actual issuing amount across all MCBs for each province and each year. In addition, we also classify these 30 provinces of mainland China into seven geographic regions. The classification of these seven regions is widely used in China in other contexts like reporting economic activities, which include North China, East China, South China, Center China, Northeast, Northwest, and Southwest.

For all MCBs except the private placement notes, the bond issuance prospectus provides information on the purpose of issuance proceeds. We manually read the prospectus

[15]Strictly speaking, the bonds issued by these non-listed LGFVs are often translated to "enterprise bonds," as "corporate bonds" in China refer to bonds that are issued by publically listed companies. These two bonds used to be traded on different platforms (exchanges or the interbank market), but nowadays this is no longer the case. Another important difference between corporate bonds and enterprise bonds is the different regulatory bodies: the former is overseen by China Securities Regulatory Commission (CSRC), while the latter by the National Development and Reform Commission.

and classify the issuance purpose into three categories: repayment of existing bank loan, investment in projects such as rebuilding shanty areas or constructing infrastructure, and others (including replenishing working capital, repaying trust, repaying bank acceptance bill, and repaying other liabilities without information on debt types).

### 3.1.2 Bank loans and other data

Country-wide and province bank loan data are from the People's Bank of China (PBOC) and provided by WIND. Annual new trust loan and new entrusted loan are from the Aggregate Financing to the Real Economy released by PBOC since 2011.

Data on real GDP growth and GDP RMB value at the country and province level are from National Bureau of Statistics of China. Other macroeconomic variables used in this paper include provincial fiscal deficit measured as the fiscal expense minus the fiscal revenue, fixed asset investment, and local government's land sale RMB value. All these macroeconomic variables are reported by National Bureau of Statistics and downloaded through WIND.

The structure of local government debt is estimated from 2008 to 2015, with details in Appendix A. The National Auditing Office provides two official auditing reports on local government debt that we recreate in Table 1. We fill in other years with several data sources. Annual Municipality-Trust cooperation data are reported officially by China Trustee Association and available on WIND. Data on bank loan balance of LGFV before 2012 are from various validated news sources and collected by WIND. Individual Munibonds and MCBs are downloaded from WIND and aggregated into one time series.

Finally, the aggregate Wealth Management Product (WMP) balance and the year-end balance of credit bonds by ratings are from WIND. We get the WMPs' holding in credit bonds by rating from China Commercial Bank Wealth Management Products Annual Reports issued by China Banking Wealth Management Registration System.

### 3.1.3 Summary statistics

Table 2 reports the summary statistics of the variables used in this paper. Panels A presents the MCB issuance number and issuance amount (billion RMB) by region. East China, which has the largest economic share, issued around 38% of total MCB. The Southwest region that experienced the Wenchuan earthquake in 2008 has the second largest share of MCB issuance (15%). The detailed province-level MCB issuances are reported in Panel B. Panels C and D present the summary statistics various explanatory variables in each province, both in their raw values and abnormal values (defined as raw

minus the correpsonding 2004-2008 avarage). We provide more detailed discussions later in Section 4.

## 3.2 Evolution of Debt Obligations of Local Governments

We construct the composition of local governments liability in China following 2009.

### 3.2.1 Credit policy tightening and rollover pressure

Witnessing the wild surge of bank credit in 2009, the central government realized the policy-driven credit boom may grow out of control, with potential distortions and liquidity overhang devastating to the economy. As early as January 10, 2010, a Financial Times article titled "Beijing Seeks to Curtail Bank Lending 'Binge' " reported that banks were expecting the government to tighten the monetary policy in the following months.[16]

To be fair, the word "tightening" does not mean banks stopped extending credit; it was "tighter" relative to the extremely slack credit policy of 2009. In Figure 2 we observe that the new bank loan over GDP, following the unprecedentedly high level of 27.2% in 2009, dropped to 19.2% in 2010 (which still exceeded the normal level). Afterwards, the credit policy in China seemed to revert to normal, as shown in Figure 2.

The somewhat unexpected credit tightening following 2009 pushed local governments to explore other sources of financing for their on-going investment. Shortly, we will present evidence that LGFVs are issuing MCBs to fund their projects, potentially the continuation of initial investment in 2009.

Our paper highlights another distinct channel. According to PBOC public statistics, most of bank credit extended in 2009 are medium- and long-term loans, with medium-term being above 1 but below 5 years, and long-term above 5 years. However, Chen and Gu (2012) and the national audit reports suggest that local governments were experiencing significant amount of bank loans due after 2013, indicating the majority of loan maturity being toward the medium end.[17] On the asset side, these stimulus loans were

[16]The report writes "*the authorities (CBRC) had ordered some Chinese banks temporarily to halt lending altogether after the sector extended a total of 1.1 trillion RMB in new loans in just the first two weeks of January.*" The beginning-of-the-year abnormal loan growth in 2010 is exacerbated by the banks' expectation that the government will tighten monetary policy in the coming months. By Jamil Anderlini, January 10, 2010. URL: http://www.ft.com/cms/s/0/320cf850-0a1a-11df-8b23-00144feabdc0.html?ft_site=falcon&desktop=true#axzz4SeC0xGT8.

[17]Written in August 2012, Chen and Gu (2012) analyze in length the situation of local government debt after the 2009 stimulus plan, together with its potential impact on the commercial banking system in China. In that paper, according to an internal report by CBRC, standing at Nov 2010 the bank loan due schedules for LGFVs are 0.8 trillion RMB due in one year, 2.2 trillion due after one year but before three years, 3.5 trillion after three years but before 10 years, and 2.6 trillion after 10 years (see their Figure 12).

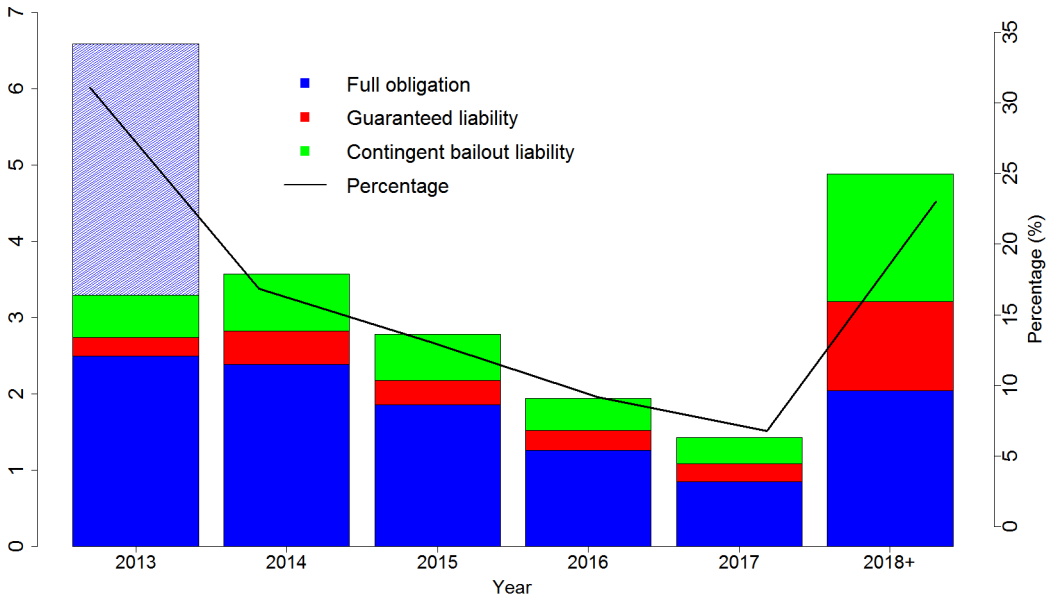



Figure 3: **Local Government Debt Due Schedule as of June 30, 2013.** The total outstanding local government debts are classified into three categories: full obligation, guaranteed liability, and contingent bailout liability. We assume the debt due at the first half of 2013 is the same as the debt due at the second half of 2013. Data source: local government debt auditing report in 2013 issued by National Audit Office of China.

backed by infrastructure projects whose cash-inflows likely occur in the remote future. Kroeber (2016) explains this classic "maturity mis-match" of Chinese local governments by writing "*Localities often used three- to five-year bank loans to finance infrastructure projects whose economic benefits (and revenue streams, if any) would only materialize over two or three decades*" on page 122, Chapter 6. Naturally, LGFVs faced unprecedented heavy pressure to rollover the loans coming due about three to five years later.

Figure 3 gives the detailed debt due schedules standing at June 30th, 2013 based on the national audit report. Because June 2013 is the mid of that year, we simply double the debt due in the second half of 2013 to proxy for the debt due that year (indicated by the height with the hatched area). The magnitude of rollover pressure starting from 2013 was enormous. Local governments needed to pay back about 3.25 trillion RMB of debt in the second half of 2013 (so about 6.5 trillion in 2013), and about 3.5 trillion in 2014. To put these numbers into perspective, they account for about 45% of local government debt obligations; most of these soon-to-be-due debt obligations are bank loans, and more importantly, they are huge relative to other non-bank financing sources. We claim so, because standing at the end of 2013 the sum of other three debt categories (including Munibonds, MCB, and Trust loans) is only about 5 trillion. This mounting rollover pressure is why at that time leading economists in many institutions were concerned

about the debt situation of China's local government debt.

### 3.2.2 Bank loans down, non-bank debt up

Facing tightening/normal credit policy, local governments responded by refinancing part of maturing bank loans with non-bank debt, including Munibonds, MCBs, and Trust loans. Both government guidance and market forces played certain roles during this transition, and we will discuss how these two forces interacted with each other in Concluding Remarks. For LGFVs with a full flexibility to choose who to borrow and/or refinance from, what matters is the easiness and the rate at which they can obtain financing. The trade-off has slowly leaned toward non-bank sources since 2012; for instance, from loan pricing terms it has become more attractive to tap credit from MCBs than bank loans.[18]

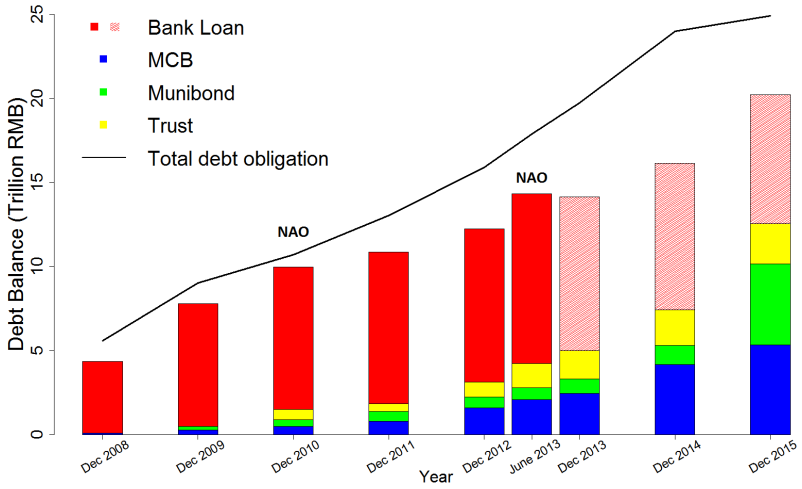
As the main result of this section, Figure 4 depicts the evolution of total local government debt balance and the composition of each category (Panel A), and the evolution of the percentage for each category (Panel B). In Panel A, there is a gap between the solid line (the total debt obligations of local governments) and the sum of bars (aggregating four debt categories). As explained in Section 2.2.1, it is because we miss several other debt liability items, such as build-to-transfer and fiscal on-lending.

On both panels in Figure 4, we indicate NAO (i.e., National Audit Office) on Dec 2010 and June 2013 to highlight that these two snapshots are authoritative numbers from national auditing reports. We have tried our best (as explained below) to fill in the entire time series for each category from 2008 to 2015; for details, see Appendix A.

The data of total local government debt are from the two NAO auditing reports (2008, 2009, 2010, 2012), interpolation (2011, 2013), and public news release (2014, 2015); the public news release often time is from the speech of the top head of regulators. In the literature there are several other academic papers (e.g., Chen and Gu (2012); Bai et al. (2016); etc) that report numbers on total debt obligations assumed by local governments, and we confirm that our numbers are quite close to theirs. WIND provides the accurate issuance data for Munibonds and MCBs. The evolution of Trust loans is estimated by combining the snap-shot of the total Trust loans to local government in the mid-2013 NAO auditing report, together with the annual outstanding balances of Municipality-Trust cooperation (reported officially by China Trustee Association and available on

[18] According to practitioners, the loan rate that LGFVs can obtain from banks is about 110~115% of the benchmark lending rate set by PBOC. In 2012, based on the information of prevailing benchmark lending rate and MCB rate, we find that the LGFV bank borrowing rate exceeds MCB rate by about 2 percentage points.

Panel A: Composition of local government debt balance, level




Panel B: Composition of local government debt balance, percentage

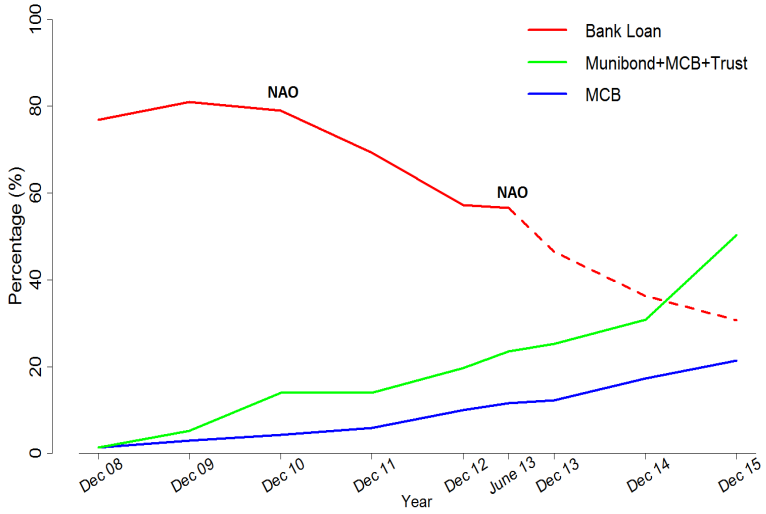



Figure 4: **Local Government Debt Composition, 2008-2015.** Panel A plots the composition of local government debt balance in trillion RMB and Panel B plots the percentage of local government debt balance by composition. Four forms of local government liability include bank loan, municipal corporate bond, municipal bond, and trust. The data construction details are in Appendix A.

WIND), under the assumption that the fraction of Municipality-Trust cooperation over total Trust loans remains a constant over years.

For bank debt, before the second national audit gets released on June 2013, the president of CBRC (Fulin Shang) regularly reveals the aggregate exposure of the banking system to local governments, via the official website of CBRC (and WIND recorded this information over time). After June 2013, it seems that this information started becoming sensitive and hence is no longer available on the website of CBRC. Instead, we resort to the annual reports of listed commercial banks, hoping that some banks keep reporting their loan exposures to local governments. Only one of the Big-4 banks (Construction Bank of China) reported this information, based on which we construct the outstanding bank loans to local governments of the entire banking sector after June 2013. We acknowledge that it is much less accurate than the numbers before June 2013, and indicate them with dashed line in both panels of Figure 4.[19]

There are two purposes to construct Figure 4. The first is more for fact-recording, as we have produced perhaps the most reliable estimates (based on public information only) for local government debt and its various compositions. The second is our main point: starting in 2012, besides the fast growth of total debt balance of Chinese local governments (from 5 trillion in 2008, 17.4% of GDP, to 25 trillion in 2015, 36.4% of GDP), there is also a steady and noticeable composition shift from bank loans to non-bank debt. In fact, this point is already quite evident based on the two snap-shot national auditing reports only.

## 3.3 Refinancing Bank Loans by MCB: Direct Evidence

In this section we focus on MCB and present the first evidence that support the stimulus loan rollover channel. Panel A in Figure 5 plots the evolution of the MCB issuance activities over the period of 2004 to 2015; in the background we plot the new bank loan over GDP as before. The solid line depicts how the total gross MCB issuance evolves over time. There is not that much going on in MCB before 2009; and we observe steady growth of MCB issuance starting 2009, with two notable jumps in 2012 and 2014. The dashed line plots the net MCB issuance (gross issuance minus those matured in that year). The difference between solid and dashed lines are negligible before 2015, indicating that the rollover pressure from maturing MCB is not that much a concern until 2015. Overall, Panel A in Figure 5 is consistent with the story that LGFVs are

[19]The potentially poor estimate of bank loans to local governments after June 2013 does not affect the estimated percentage of non-bank debt as a fraction of total local government debt obligations, as both inputs (non-bank debt and total debt) are rather accurate.

issuing MCB to refinance their bank loans coming due.

We have a more direct evidence supporting the stimulus loan rollover story. As explained in the data section 3.1.1, since MCB is a public offering, every LGFV who is issuing MCB has to provide a prospectus, in which the bond issuer reveals the purpose of issuance.[20] We group various issuance purposes into three categories: *investment*, *repaying bank loans*, or *others* (e.g., replenishing working capital, repaying bank acceptance bill, repaying trust, etc.); for details see Section 3.1.1. Panel B in Figure 5 plots the time-series of each category over the period from 2008 to 2015. We observe that in the first two years right after stimulus (2009 and 2010) almost all MCB issuance were for investment; but repayment-driven MCB issuance has picked up its pace since 2011. It reached about a quarter of total MCB issuance in 2013, and experienced a blasting growth afterwards. In 2015, almost half of MCB issuance deals are for repaying maturing bank loans.

# 4 Cross-Sectional Evidence from MCB and Links to Shadow Banking

Taking the stock of time-series evidence so far, we have painted the following picture: in 2009 China's local governments took on massive bank loans due to the four-trillion stimulus plan, and about three to five years later, they resorted to non-banking financing to rollover their maturing bank loans. Based on the municipal-level MCB data, this section explores the cross-sectional implication of the bank-loan-rollover mechanism. In short, the more the bank loans an area was taking on in 2009, the more the MCBs that area will issue in later years around 2013. In Section 4.4, we connect the shift toward non-bank debt with shadow banking activities in China, which experienced "barbarian growth" starting in 2013.

Before we delve into the detailed empirical results, it is worth emphasizing one additional advantage offered by MCB that is particularly important for testing our study. In general, for cross-sectional analysis, researchers need to be careful in distinguishing *the source of funds* and *the use of funds*, especially when studying shadow banking. It is quite common for some wealthy individuals in developed coastal cities (say Shanghai) to buy wealth management products that are backed by trust products investing in some projects from underdeveloped inner land cities (say Qinghai). Fortunately, be-

[20] In our sample, about 80% of MCB issuances have prospectus, except the bond is issued in the form of "private placement note" so that the information is only revealed to private investors. "Private placement note" only becomes available after 2014.

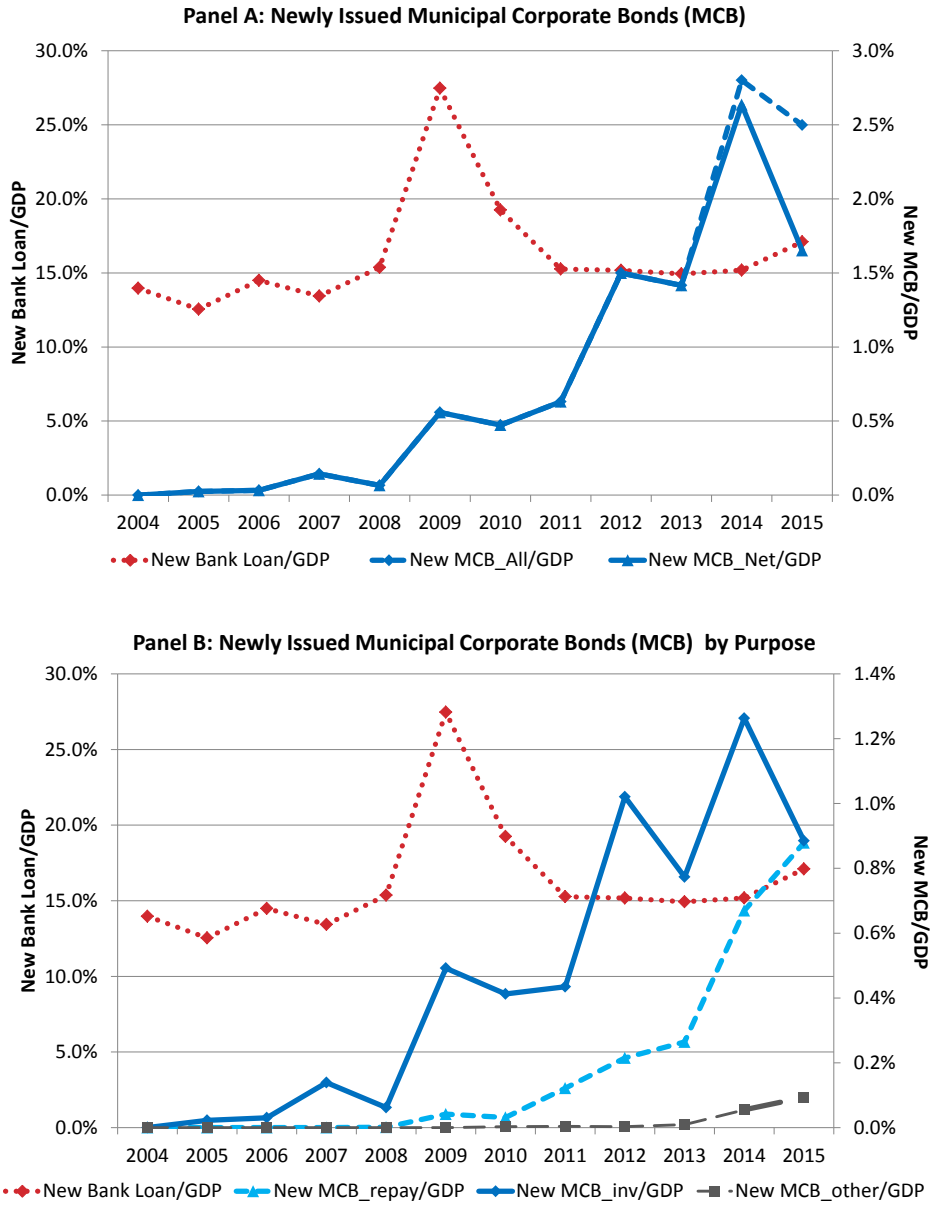



Figure 5: **Municipal Corporate Bond Issuance, 2004-2015.** Panel A plots the total MCB issuance over GDP, the net MCB issuance over GDP, and new bank loan over GDP. Panel B plots the total MCB issuance over GDP by usage, including repayment of bank loans, financing of an investment, and other purposes. The new bank loans over GDP are plotted against left vertical axis and MCB issuance over GDP are plotted against right vertical axis. The annual MCB issuance data are aggregated from individual municipal corporate bonds downloaded from WIND.

cause MCBs are issued for the infrastructure projects in particular prefectures or cities, we know the use of funds, i.e., where the funds go to; and clearly this is what our cross-sectional prediction is about.

To give a counter example, consider the alternative of collecting data on individual trust products that are also available on WIND. Although the prospectus of a typical trust product also identifies perfectly where the funds get raised, there is only extremely vague information—often nothing at all—on where the funds are used. A similar but less profound issue arises later when we use entrusted loans, not trust loans, to perform the cross-sectional analysis which links 2009 stimulus loans to the growth of shadow banking several years later.

## 4.1 Main Hypothesis

The rollover mechanism discussed above has the following hypothesis with a straightforward cross-sectional prediction.

*Hypothesis. If a region/province was more aggressive in taking on bank loans in 2009, then this region/province will issue more MCBs to rollover the maturing stimulus loans several years later.*

To test this hypothesis, for each province/region, we first construct the "abnormal" bank loan over GDP at 2009, which is defined as the 2009 value minus its average in the past five years (here BL stands for bank loans and "i" indicates province/region):

$$(\text{2009 Abnormal BL/GDP})_i=(\text{2009 BL/GDP})_i - (\text{Average BL/GDP 2004\~{}08})_i \quad (1)$$

Similarly, we construct the provincial/regional "abnormal" MCB over GDP in each future year from 2012 to 2015:

$$(\text{201t Abnormal MCB/GDP})_i=(\text{201t MCB/GDP})_i - (\text{Average MCB/GDP 2004\~{}08})_i,$$

for $t = 2, 3, 4, 5$. Our regressions treat (2009 Abnormal BL/GDP) as the independent variable while (201t Abnormal MCB/GDP) as the dependent variable, i.e.,

$$(\text{201t Abnormal MCB/GDP})_{\text{i,t}}=\alpha_t+\beta_t(\text{2009 Abnormal BL/GDP})_{\text{i}} + \text{Controls}_{i,t} +\epsilon_{i,t}. \quad (2)$$

Later we also run a panel regression in which we pool observations from different years 2012-2015 altogether (so that $\alpha_t$ and $\beta_t$ no longer depend on $t$), and report standard errors robust to two-way clustering at the province and year level.

According to Table 2, on average a province issued MCBs worth of 2.2% of its GDP each year over the priod of 2012-2015 (Panel C). The number is quite similar (2.1%) if we substract the average of 2004-2008 MCB/GDP (Panel D), suggesting that LGFVs issued few MCBs in early years. The cross-provincial average 2009 bank loan (BL)/GDP is 27.5% with an abnormal BL/GDP of 16.4%, which is around 1.5 times increase from the 2004-2008 average of 11.1%. Consistent with the fact that the four-trillion stimulus was announced on November 2008, we do not observe much increase in the BL/GDP during the first three quarters of 2008 (2008Q1-Q3), a variable that we will use in a placebo test later.

Table 2 Panel B indicates a vast heterogeneity in MCB issuance across provinces in China. To address the potential concern of a significant cross-region disparity in financial development in China, we have taken out the past-five-year average of BL/GDP for each province when constructing the key independent variable (2009 Abnormal BL/GDP) in (1). In other words, (2009 Abnormal BL/GDP) captures the heterogeneous deviations—here, the aggressiveness in credit expansion—in response to the stimulus plan away from the province-dependent steady state.

We emphasize that it matters little whether the variation in (2009 Abnormal BL/GDP) was driven by demand-side shocks (e.g., LGFVs in some provinces really would like to start some infrastructure projects in 2009) or supply-side shocks (e.g., banks in some provinces were pushed by Beijing to lower their lending standards). Either way, bank loans that LGFVs had taken in 2009 need to be repayed when these bank loans become due, giving rise to heterogeneous rollover pressures in later years across provinces. What concerns $\beta_t$ in (2) to be biased is that, at the province level, (201t Abnormal MCB/GDP) in later years—which may be neither loan repayment nor for continuing phases of 2009 infrastructure projects—is correlated with (2009 Abnormal BL/GDP) given disparate economic growth across regions in China. This is why in regression (2) we include province-level economic variables, say province GDP growth, that the prior literature has found to be relevant for MCB issuances.

Nevertheless, it is interesting to mention two arguably exogenous shocks that drive the heterogeneous aggressiveness across areas. The first is the May 2008 Wenchuan earthquake which is located in the Southwest region of China. Recall that one fourth of stimulus plan is for post-disaster reconstruction, and we will see this Southwest effect shortly. Another important driver, which is particularly relevant in China, is the personal attribute of the party secretary of that province; and the exclusive restriction likely holds because there is a heavy personnel turnover due to the planned government transition in 2012. Indeed, in a related paper which studies the growth of Wealth Management

Products following the 2009 stimulus plan, Acharya et al. (2016) exploit an interesting observation that the president of Bank of China is more obedient to the central government than his peers in other three Big-4 banks in China. We leave the challenging task of identifying instrumental variables for this question to future research.[21]

## 4.2 Cross-Sectional Evidence: MCB Issuance

We first present the univariate evidence based on the scatter plot between the 2009 abnormal bank loan and MCB issuance in later years. Panel A in Figure 6 gives the first-pass regional scatter plot for each year from 2012 to 2015. The region of "Southwest," where the Wenchuan earthquake in May 2008 was located, had the largest abnormal bank loan growth in 2009 for post-disaster reconstruction; and consistent with our hypothesis, in three out of four later years, this region ranked top in its abnormal MCB issuance. Panel B then zooms in further to present the provincial scatter plot.

Table 3 conducts the formal regression analysis. Focus on Panel B which is for provincial data. For each year, cross-sectionally, the 2009 abnormal bank loan growth positively predicts the abnormal MCB issuance in that province, with 1% level significance in both 2013 and 2014, and 10% level significance in 2015; and magnitude-wise we obtain similar coefficients over years. The statistical insignificance in 2012 but significance in later years is reasonable; according to Figure 5, the bank-loan-repayment-driven MCB issuance only picks up after 2012. For 2015, Munibonds issuance due to the new Budget Law passed in late 2014 relieved part of the rollover pressure of local governments.

Panel C of Table 3 presents the results of provincial regressions with economic controls; we follow Bai et al. (2016) to include abnormal fiscal deficit over GDP, abnormal fixed asset investment over GDP, abnormal land sale over fiscal revenue, and GDP growth, all at the same year and the same province as the abnormal MCB issuance.[22] The 2009 abnormal bank loan growth still positively predicts the abnormal MCB issuance in years 2013 to 2015. As expected, we find that the coefficient in front of the province GDP growth is always significantly positive across different specifications, reflecting the mechanical relation between economic activities (GDP) and investment (financed by MCB).

[21] In unreported results, we have used two province-level dummies as instrumental variables that potentially drive the exogenous variations in 2009 abnormal bank loans across areas. As explained, the first dummy is being in the "Southwest" region (Wenchuan earthquake in May 2008), and the second dummy is the local party secretary's connection with central government (ever worked in Beijing). Although the second stage results are still positive and significant, we suffer from the "weak instrument" problem as the $F$-stat in the first stage is only 2.35 (while the convention is to have a $F$-stat above 10).

[22] Throughout the paper, "abnormal" means we take the year $t$ observation and subtract its average

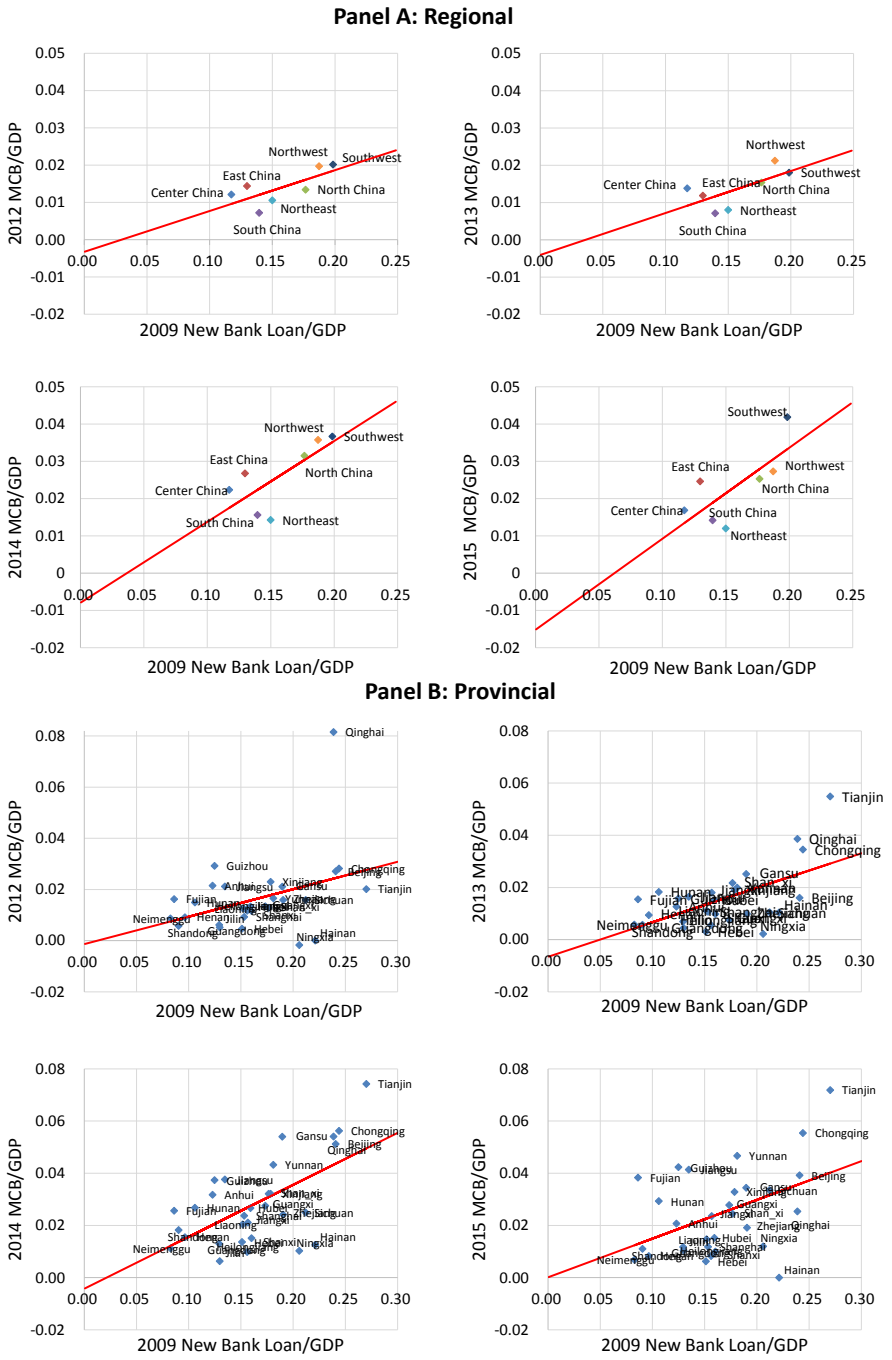



Figure 6: **2009 Abnormal New Bank Loan and 2012-2015 Abnormal Municipal Corporate Bond Issuance.** Panel A (B) presents the scatter plot with a fitted line for regional (provincial) data. Abnormal new bank loan and abnormal MCB issuance (as a percentage of GDP) are calculated over their average values between 2004 and 2008, respectively. The bank loan data are from the People's Bank of China and the MCB issuance data are from WIND.

## 4.3 Robustness Results and Economic Magnitude

We provide further validating evidence for our rollover mechanism, and discuss the economic magnitude of our estimated coefficient.

### 4.3.1 Placebo test of 2008 bank loan growth

Table 4 presents the placebo test which considers the 2008Q1-Q3 abnormal bank loans for each province as the explanatory variable; we focus on the first three quarters of 2008 because the stimulus plan started in November 2008. Similar to the construction of 2009 abnormal bank loans, 2008Q1-Q3 abnormal bank loans at each province are defined as the 2008 first-three-quarter new bank loans over the GDP of that period, minus their average over the past four years (2004-2007). The concern of seasonality is minimal because we are exploiting the cross-province variations in the bank loan growth in the first three quarters.

According to our mechanism, the cross-province pattern of 2008Q1-Q3 abnormal bank loans cannot explain the cross-province pattern of future MCB issuance in 2012-2105; and this test also helps rule out the standard concern that there is some pre-trend for the cross-province distribution of 2009 abnormal bank loans. Panel A in Table 4 first reports the regression result by replacing the independent variable with the 2008Q1-Q3 abnormal bank loans. As expected, none of the coefficient in front of the new explanatory variable is significant for years 2012-2015. Panel B further reports the regression results by combining both 2008Q1-Q3 and 2009 abnormal bank loans in the regression, and provides a formal statistical test for the hypothesis of equal coefficients in front of two abnormal bank loans. The $F$-statistics reported in Panel B reject this hypothesis at the 10% level for 2012 and 2013, 1% level for 2014, and 5% level for 2015.

### 4.3.2 Panel regression results

Table 5 reports the panel regression results when we group the MCB issuance observations for years 2012-15 altogether, with province-level controls that are relevant for the MCB issuance by local governments. The first column has no controls, while the second column we include the same control variables as in Panel C of Table 3; both give a statistically significant coefficient in front of (2009 Abnormal BL/GDP). We include the year fixed effect in the regression, and report $t$-statistics double-clustered at province and year levels (so errors can be correlated for the same province or the same year).

between 2004 and 2008.

Comparing our panel regression result in Table 5 to those separate regressions in Table 3, we find it interesting that the coefficient for (2009 Abnormal BL/GDP), which is about 0.15, is relatively stable across all specifications, either panel or year-by-year regression, with control or without. This lends further support for the robustness of our result.

#### 4.3.3 MCB issuance by purposes

We can do better. Recall that we have information on why LGFVs are issuing MCB, as about 80% of MCB issuances publish prospectuses revealing their issuance purposes (except private placement notes; see Section 3.3). The MCB with prospectus information is representative of our entire MCB sample.[23] We repeat the same cross-sectional analysis for three different kinds of usage: bank loan repayment ($MCB_{repay}$), investment ($MCB_{inv}$), and others ($MCB_{others}$), and present the results in the next three columns in Table 5. Under the reasonable assumption that our controls (e.g., GDP growth) can absorb the effect that local governments are issuing MCB for economic activities, we expect only the part for bank loan repayment to be significant in this regression. This is indeed the case as shown in Column 3 to Column 5. Not surprisingly, we have a much lower coefficient for bank loan repayment only (0.04), and we have much less statistical significance in general.

#### 4.3.4 Economic magnitude

The last column in Table 5 provides the economic interpretation of our regression coefficient. In a crude sense, the coefficient in front of the abnormal 2009 bank loans in the regression of $MCB_{repay}$ reflects the annual repayment rate of the bank loan, which can be interpreted as the inverse of the loan maturity. However, this exercise requires us to make two crucial adjustments to our regression. First, for each province we need to scale the future MCB issuance by its 2009 GDP, the same scaling as the explanatory variable of 2009 abnormal bank loans. Second, ideally, the regression coefficient should be identified from different bank loans taken by different provinces in 2009; we do not want the coefficient to be affected by the cross-sectional divergences in provincial GDP levels. To achieve this goal, we sort provinces based on their 2009 GDP and take the ten

[23] The fraction of MCB with prospectus information, i.e., issuances excluding private placement notes, is 81.6% in RMB value and 79.7% in number of bonds, indicating no systemic size bias in the sample with prospectus information. And there should be little concern about whether LGFVs use private placement notes to avoid releasing the loan rollover information, because this type of information is required to be revealed to private investors anyway even in private placement notes.

provinces that have the most similar level of GDP in 2009.[24] This way helps mitigate the GDP-driven divergence of observed abnormal BL/GDP.

The resulting coefficient for 2009 abnormal bank loans, when explaining the MCB issuance for bank loan repayment, is 0.15. Taking into account that about half of the abnormal bank loans goes to LGFVs (see foonote 14), this implies that if an LGFV borrows an extra dollar in 2009, then after 2012 this LGFV needs to issue 30 cents more MCB each year to pay back bank loans. This estimate implies an average maturity of 3.3 years, which is reasonable given the reported three- to five-year bank loan maturity discussed in Section 3.2.1.

## 4.4 Linking to Shadow Banking in China

This section attempts to connect the non-bank debts on the liability side of local governments to the recent surging shadow banking activities in China. We take the following two angles.

The first one is the off-balance-sheet Trust loans (including entrusted and trust loans); often time, these deals are arranged via banks to move the resulting loans out of their balance sheets. Recognizing that the structure of Aggregate Financing to the Real Economy has slowly shifted from bank loans to various other forms (e.g., Trust loans) after the 2009 stimulus plan, since 2011 the Statistics and Analysis Department at PBOC has started releasing the quarterly statistics of Aggregate Financing to the Real Economy, which measures the total amount of financing that the real economy receives from the financial system in a given period. This measure is divided into four categories: on-balance-sheet financing (e.g., bank loans), off-balance-sheet financing (e.g., trust and entrusted loans), direct financing (e.g., bond and equity issuance), and others. Historical statistics dating back to 2002 became available in 2012, and more importantly, PBOC started releasing these statistics at the province level in 2013.

The second angle is the so-called Wealth Management Product (WMP), which is often sold by China's commercial banks to unsophisticated household investors at a rate higher than the deposit rate. Banks then turn around to lend the proceeds to firms that need financing, or invest them in corporate bonds or other assets, including WMPs

[24]These ten provinces are Yunnan, Chongqing, Jilin, Shanxi, Tianjin, Jiangxi, Guangxi, Shan_xi, Heilongjiang, Neimenggu. To select the ten provinces with the most similar level of GDP in 2009, we first rank all 30 provinces according to their 2009 GDP values. We then examine groups containing ten sequentially sorted provinces, i.e., group one contains province 1 (highest GDP value) to province 10, group two contains province 2 to province 11, etc. The selected group ($15^{th}$) has the smallest "divergence" ratio, which is defined as the difference between the top and the bottom GDP divided by the mean GDP.

themselves. Because WMP does not represent the ultimate financing received by the real sector, it is not one of the items of the Aggregate Financing to the Real Economy mentioned above. However, this activity is widely recognized as a form of regulatory arbitrage, because these transactions are considered to be off-balance sheet and hence face much less regulatory restrictions than traditional banks (e.g., Hachem and Song (2015); Acharya et al. (2016)). Another reason that WMP is considered as the symbol of China's shadow banking activities is for its potentially sophisticated structure, especially when financial institutions develop WMPs together with Trust or other financial innovations.[25]

### 4.4.1 Shadow banking activities and local government non-bank debt

Figure 7 Panel A plots the new Trust loans and increase of WMPs, together with new bank loans, all of three scaled by GDP, over the period of 2004 to 2015. Both Trust loans and WMPs are growing much faster than the GDP growth starting 2012, a pattern consistent with the mechanism proposed by this paper. At the end of 2015, the magnitude of these two shadow banking activities becomes comparable to the traditional on-balance sheet credit extended by banks (these three variables are all scaled by GDP). Finally, after 2014 we observe some sharp decline of new Trust loans but rapid rise of new WMPs. This is a result of substitution from Trust loans toward WMPs after China Banking Regulatory Commission tightened the regulation on trust products in 2014,[26] and it is interesting to see the similar magnitude between the decline of Trust and the rise of WMPs in Panel A post 2014.

Connecting China's shadow banking activities back to local government debt, Figure 7 Panel B plots the fraction of local government non-bank debt, which is the sum of MCB, Munibond, and Trust in Figure 4, relative to the sum of three items in the "Aggregate Financing to the Real Economy" that proxies for shadow banking activities in China: Trust loans (trust and entrusted loans) as mentioned above, Undiscounted bankers' acceptances, and Corporate bonds.[27] We observe a steady growth of local government non-bank debt as a fraction of shadow banking balance in China, starting from a negligible 1.5% in 2008 to 22% in 2014 and 34% in 2015. This suggests that local

[25] See "Four Fresh Worries About China's Shadow Banking System" by Bloomberg, September 7th, 2016.

[26] On May 8th, 2014, the CBRC issued its 2014 99th Document "Directive Opinions on the Regulation of Trust Companies' Risk Management".

[27] Undiscounted bankers' acceptances, which are only about 4.2% of Aggregate Financing to the Real Economy (8.5% of GDP) in 2015, represent contingent credit to the real sector, in the sense that firms can use bankers' acceptances as collateral to obtain loans from banks (which then will be recorded as on-balance bank loans). We also include aggregate outstanding corporate bonds in calculation, which are about 10.6% of Aggregate Financing to the Real Economy (21.3% of GDP) in 2015, as MCB in local government debt is counted as part of Corporate bonds.

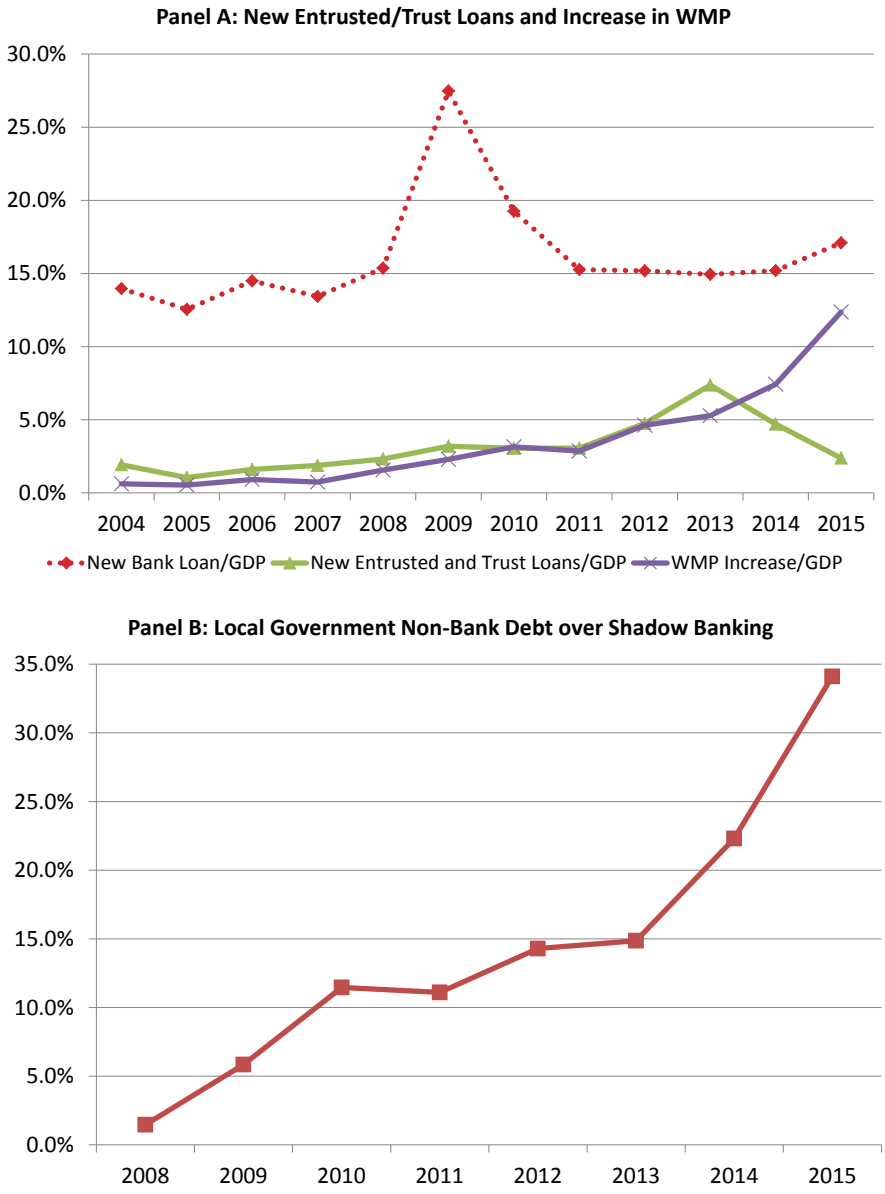



Figure 7: **Shadow Banking Activities and Local Government Non-Bank Debt.** Panel A plots new trust loans (entrusted and trust loans) and change in WMPs over GDP from 2004 to 2015. The aggregate new bank loan over GDP is also plotted for comparison. Panel B plots local government non-bank debt balance as a fraction of China's shadow banking balance from 2008 to 2015. Local government non-bank debt is the sum of MCB, munibond, and local government trust balance. Shadow banking balance is proxied by three items in Aggregate Financing to the Real Economy, including trust loans (trust and entrusted loans), undiscounted bank's acceptable bills, and corporate bonds. The annual WMP balance data are from China Commercial Banks' Wealth Management Products Annual Report issued by China Banking Wealth Management Registration System. The Aggregate Financing to the Real Economy by category data are from People's Bank of China.

government non-bank debt is crucial to understand the recent surge of shadow banking activities in China.

### 4.4.2 Bank loan wanes and trust loans waxes

Panel A in Figure 7 presents the similar time-series pattern of "bank loan down and shadow banking up" when stepping outside the box of local governments. We further perform a cross-sectional test in this subsection, following the same idea as in Section 4 but replacing MCB issuance by new entrusted loans at the corresponding province. Of course, these entrusted loans might be part of loans to LGFVs. Because we do not have provincial information for entrusted loans before 2013, and because entrusted loans were tiny before 2008 anyway, we take the entrusted loans in future years (2013-2015) as "abnormal" and scale them by the corresponding provincial GDP directly as the dependent variables.

Table 6 shows that our result still holds for entrusted loans, implying that areas with more stimulus bank loans in 2009 ended up engaging with more entrust loans in later years. The magnitude identified from this regression is greater, suggesting that entrusted loans are more important than MCBs as financing tools at the economy-wide level.

We perform the cross-sectional test for entrusted loans, not trust loans. Magnitude wise, each year there were always more new entrusted loans than there were new trust loans over the past decades; standing at the end of 2015, the newly issued entrusted loans are about 1.6 trillion RMB (2.3% of GDP), compared to trust loans being 0.04 trillion RMB (0.06% of GDP).[28] But there is a deeper economic reason why we pick entrusted loans for our cross-sectional test. As we discussed at the beginning of Section 4, the way these statistics are reported is that the region of a trust loan is the place where the trust gets financed (i.e., location of source), not the place where the trust funds go (i.e., location of use).[29] Our mechanism relies on identifying the location of fund use, and hence this source-use mismatch of locations is devastating for our purpose. Entrusted loans suffer the same problem, but it is much less severe. This is because entrusted loans are firm-to-firm credit, and these firms tend to be intermediated by the same bank. Given that banks typically finance local firms only (easier monitoring, less information

[28]Even in 2013 when the new trust loan reaches its peak, the number is 1.8 trillion RMB (3.1% of GDP) while the number for entrusted loan is 2.5 trillion RMB (4.3% of GDP).

[29]For trust data from Aggregate Financing to the Real Economy, we checked with the Statistics and Analysis Department at PBOC, the way they collected the data is from the reporting of local CBRCs which receive the trust prospectus information from trust companies that are geographically located in a province. As a result, the provincial trust data only reflects the fund raising place instead of the fund using place.

asymmetry), the location of source should be more correlated with the location of use.[30]

### 4.4.3 WMP invested in MCB via interbank market

MCBs, as one type of corporate bonds, are mostly traded by qualified financial institutions (including banks, mutual funds, insurance companies, etc) in China's interbank market.[31] We now give some institutional background on this financial market, which has grown rapidly in recent years and became the third largest in the world by May 2016, behind only the United States and Japan (Borst (2016)).

China's interbank market has two important parts: the money market where the central bank (PBOC) conducts its monetary operations akin to what Federal Reserve Bank does in U.S., and the bond market where financial institutions invest and trade various bonds, including Munibonds issued by local governments and MCBs issued by LGFVs. These two submarkets and their functionings are intertwined, but our paper focuses on the latter bond market, in which there are two major classes of bonds traded. Government bonds (including Treasuries and Munibonds) and financial bonds (issued by large state-owned banks) are considered riskless and often called "interest rate bonds," while corporate bonds issued by non-financial firms are called "credit bonds" for their potential credit risk.

MCB, which stands for Municipal Corporate Bond, becomes interesting as it sits in between these two categories. From its name, it has the feature of "interest rate bonds" which enjoys the implicit backing of the corresponding local government (the word Municipal), but in a strict legal sense it is issued by the LGFV entity, which is just corporations like other credit bonds issuers (the word Corporate). What is more, MCB represents a significant fraction of credit bonds in China: it accounted for 40.9% of total credit bonds at the end of 2015 and 42.9% at mid-2016. This fraction has been rising dramatically in the past five years, with only 12.6% at the end of 2010, likely to be explained by our stimulus-loan-rollover story.

It is widely reported that WMP products, sold by commercial banks in China, are aggressively investing in MCB in the interbank market. Thanks to the hide-and-seek games between the regulators and financial institutions (outside and inside the interbank market), the list of participants in China's bond market has been constantly changing during the past years. In February 2014, in response to the rapidly growing demand of investment in the interbank market, PBOC opened the interbank market access to 16

[30] Indeed, Allen et al. (2016) find that entrusted loans tend to be provided to firms within the same area in China.

[31] Only a small part of corporate bonds are traded in exchanges in Shenzhen and Shanghai.

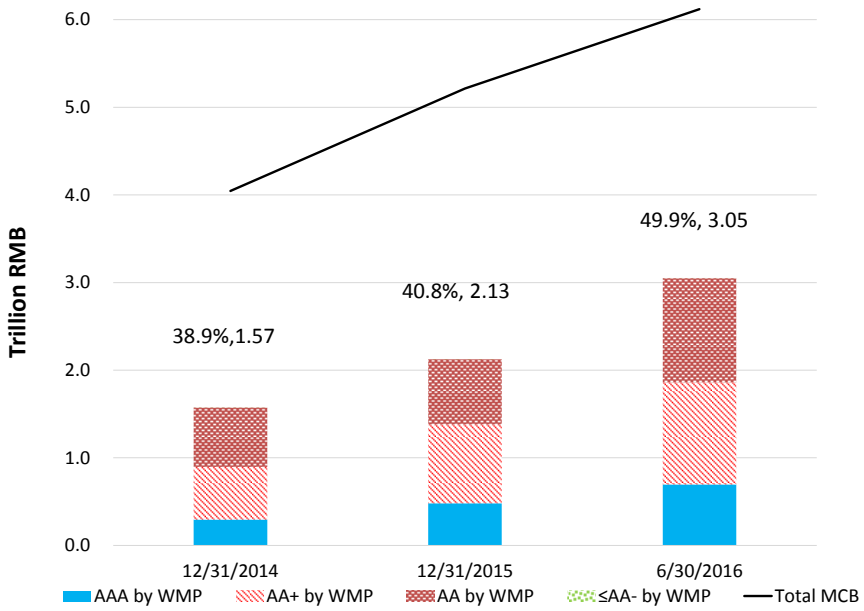



Figure 8: **Wealth Management Product Investment in Municipal Corporate Bonds, from 2014 to June 2016.** The solid line plots the total MCB balance, and bars represents WMP invested in MCB with various ratings. The percentage and RMB value (trillion) of MCB held by WMP are given above the bars. The MCB data are from WIND, and the WMP investment data are from China Commercial Bank Wealth Management Products Annual Report issued by China Banking Wealth Management Registration System. More estimation details are in Appendix B.

large commercial banks for their own WMP products. But unqualified smaller banks can easily circumvent this regulation by engaging with the "counterpart" business with qualified large banks. Two years later in May 2016, facing more and more complicated financing structures created to channel WMP funds into the interbank market, PBOC removed the previous restrictions and allowed all qualified institutional investors, including WMP and trust companies, to participate directly in the interbank market and invest in corporate bonds. This deregulation propelled another round of expansion of WMP products and "innovative" trading strategies, as WMP products started Repo transactions with embedded leverage for juicy returns.[32] This soon caught wide attention of many economists and regulators, triggering another round of regulation by PBOC to include the off-balance-sheet WMP in its Macro Prudential Assessment (MPA) system in early 2017.

Gauging the risk exposure of shadow banking activities is always a challenge; and

[32]https://www.bloomberg.com/news/articles/2016-09-07/four-fresh-worries-about-china-s-shadow-banking-system.

there is no difference for WMP which in principal could invest in everything, including other WMPs. Fortunately, since 2014, China Banking Wealth Management Registration System has started issuing annual official statistics on WMP, including its investment in corporate bonds (the many of which are MCBs) with various rating categories. And, given the rapid growth of WMP starting in 2016, the same organization issued a semi-annual report on June 2016. Combining these reports together with the rating information of MCB, we estimate the MCB holdings by WMP, which are plotted in Figure 8 together with the corresponding MCB outstanding balance.

Figure 8 shows that WMPs are mainly investing in high-quality MCBs: almost all of them are above AA-rating. The official reports suggest that about 40% of MCB was held by WMP in the end of 2014; this fraction rose to about 50% in mid-2016. Nevertheless, these numbers are quite likely to represent a severe underestimation of the extent to which WMPs are investing in MCB. It is because before the May 2016 deregulation, it was popular for managers of WMPs (raised by some small banks) to invest these funds in some Trusts, which lend the money to another bigger bank who then eventually invest in MCB. From reading the way the statistics are reported in the Annual Report, this indirect exposure of WMP in MCB is not reflected in the WMP's exposure to credit bonds (hence introducing a downward bias of our estimate). Anecdotally, one personal friend of ours who is a trader in one of the biggest banks in China estimates that about 70% of MCBs are invested by WMP.

# 5 Concluding Remarks

By presenting time-series and cross-sectional evidence on China's local governments resort to shadow banking starting in 2012 for repaying the massive stimulus bank loans taken in 2009, this paper paints a broad picture that connects the 2007/08 financial crisis in US, the 2009 four-trillion stimulus loans in China, and the surging shadow banking activities in China after 2012. Although both wealth management products and Trust loans existed in China's financial markets before 2008, and increased slightly during the period of 2009 stimulus plan, our perspective helps understand why these shadow banking activities experienced "barbarous growth" after 2013: the surging shadow banking activities were partly driven by the mounting rollover pressure of LGFVs that needed to repay maturing bank loans about four or five years later.

We conclude this paper by providing the following discussions about the potential systemic risk of local government debt and the development of China's financial market.

**Systemic risk of local governments debt** Although the systemic risk of local governments debt is an extremely important issue, we write this paper not to answer this question. To do so, one needs better data on fiscal positions of China's local governments and profitability situations of LGFVs, which have been relying heavily on land sales to balance their budget (e.g., Zhang and Barnett (2014); Ambrose et al. (2015)). But it is more than the simple default risk; these debts are directly or indirectly backed by governments at different authority levels, and the majority of them are still held by banks which play a dominant role in China's economy. The market participants, whether those naive WMP investors who do not even know they are buying MCBs or sophisticated bond fund managers who study the default risk of LGFVs extensively, all have "bail-out" expectations, implying that either banks (who sold WMPs) or local governments (who sold MCBs) are bearing the loss ultimately. Since 2015, Ministry of Finance has started the "swap program," which allows provincial level governments to issue Munibonds to replace their maturing "qualified" debt. The implicit understanding is that these Munibonds are ultimately fully backed by the central government, who seems to have plenty of resources to absorb the losses. This greatly reduces the uncertainty of the local governments' repayment ability and the default risk of MCB.[33]

**The political economy of regulation and the market force behind the modernization of financial market** Since the two stock exchanges in Shanghai and Shenzhen which were set up in early 1990's, China has made tremendous effort to build a modern financial market that is known to be crucial for economic development. Unfortunately, due to the history of being an economy with central planning, almost all economic activities are linked back to certain regulation and/or the intention of regulators. The 2009 stimulus loans, the local government financial vehicles (LGFVs), and the popularity of municipal corporate bonds (MCBs) studied in this paper are the best example for this "regulation-driven" economic phenomena.

With the perspective offered in this paper, we would like to emphasize that regulations themselves are endogenous, and mostly are responses to the underlying market forces. As explained in Section 2.1.1, Ministry of Finance encouraged the creation of LGFVs to help implement the stimulus plan in 2009, which itself was a response to China's suddenly halted economic growth after it was hit by the negative external shock due to the 2007/08 global crisis.

[33]One upper-bound estimate of the default risk is from the "contingent bailout liability" which consists of about 24% of total debt standing at mid-2013 (Table 1). The "bail-out" expectation can be fulfilled as long as local governments themselves are able to cover the potential losses of these "contingent bailout liability," which is likely to be "unqualified" for replacement of Munibonds.

What is more interesting is the evolution of regulations and the actual implementations when dealing with the explosive growth of debt taken by LGFVs. In June 2010, the State Council issued the No. 19 Document on LGFVs, underscoring the importance of regulating and monitoring the mounting debt raised by LGFVs. The market responded by lower issuance of MCB in 2010 and 2011, as shown in Figure 5. But starting 2014 MCB grows even faster; why? It is not because the regulator deemed the LGFVs being safer after 2014. In fact, as mentioned toward the end of Section 2.2.2, the State Council issued No. 43 Document on September 2014, titled by "Opinions of the State Council on Strengthening the Administration of Local Government Debts", banned local governments providing guarantee to LGFVs' bond offerings, prohibited local governments from raising debt via LGFVs, and ordered local governments to restructure and substitute existing debt with more transparent Munibonds. However, because the budget of Munibonds for 2015 were preapproved at the end of 2014, and in 2015 it became apparent that the preapproved amount was not enough to absorb all the refinancing needs by LGFVs, Beijing in turn issued other "conflicting" regulation changes that aimed to facilitate the LGFVs to borrow via MCB. For instance, the Interbank Market relaxed the restrictions on eligible LGFVs to issue MCB in early 2015; similar relaxations were reflected in a series of documents released by National Development and Reform Commission (the regulatory body of MCB issuance) and Ministry of Finance.[34]

The perspective of our paper delivers a fresh view on why regulators successfully suppressed MCB growth around 2010 but somehow failed to do so after 2013. This is because LGFVs had to rollover their bank loans due around 2013 and 2014, a market force that demanded full respect and had to be released one way or another. The central government was likely pondering the trade-off between putting these debt back to the balance sheet of commercial banks, or finding support from non-bank (or even shadow banking) financing sources; and from the outcome it seems that the central government picked the latter.

We would like to push this view a bit further to posit that the stimulus package in 2009, which is triggered by the US 2007/08 financial crisis, has the unintended consequence of modernizing China's financial market five years later. In fact, this market force, which fundamentally is about how to place traditional banking in a market econ-

[34]As early as May 2014, the State Council issued the Guiding Principles for the Healthy Development of Capital Markets, calling for an increase in the share of "direct financing" (via bonds and equity), as opposed to "intermediated" bank lending, in the economy and easing restrictions on bond (including MCB) issuance. The regulation rules have gone back and forth since then. For a complete list of regulations and documents released after 2014, see "MCB Regulation, Review, and Outlook" by Qiming Liu in PengYuan Research, Feb 2016.

omy, is perhaps also responsible for the rapid growth of the interbank market, and the other two important milestones in the reform of banking in China: the interest rate liberalization in 2013 and the deposit insurance scheme in May 2015.

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Table 1: **Sources of Local Government Debts from the National Auditing Office Reports**

This table reports sources of local government debt from two reports issued by the National Auditing Office of China. Panel A reports the auditing results as of December 31, 2010 (billion RMB) and Panel B reports the auditing results as of June 30, 2013 (billion RMB).

Panel A: Local government debt balance as of December 31, 2010

| | | Contingent Liability | | |
|---|---|---|---|---|
| | Full Obligation | Guaranteed Liability | Contingent Bailout Liability | *Total Debt* |
| Bank loan | 5,023 | 1,913 | 1,532 | *8,468* |
| Fiscal on-lending | 213 | 235 | 0 | *448* |
| Bond | 551 | 107 | 99 | *757* |
| Other entity and individual borrowing | 924 | 82 | 39 | *1,045* |
| Total | 6,711 | 2,337 | 1,670 | *10,717* |

Panel B: Local government debt balance as of June 30, 2013

| | | Contingent Liability | | |
|---|---|---|---|---|
| | Full Obligation | Guaranteed Liability | Contingent Bailout Liability | *Total Debt* |
| Bank loan | 5,525 | 1,909 | 2,685 | *10,119* |
| Build & Transfer | 1,215 | 47 | 215 | *1,476* |
| Bond | 1,166 | 167 | 512 | *1,846* |
| MuniBond | 615 | 49 | 0 | *664* |
| Corporate bond (MCB) | 459 | 81 | 343 | *883* |
| Mid-term note (MCB) | 58 | 34 | 102 | *194* |
| Short-term bill (MCB) | 12 | 1 | 22 | *36* |
| Accounts payable | 778 | 9 | 70 | *857* |
| Trust | 762 | 253 | 410 | *1,425* |
| Other entity and individual borrowing | 668 | 55 | 116 | *839* |
| Construction loan | 327 | 1 | 48 | *376* |
| Other financial institution borrowing | 200 | 31 | 106 | *337* |
| Fiscal on-lending | 133 | 171 | 0 | *303* |
| Capital lease | 75 | 19 | 137 | *232* |
| Other fund raising | 37 | 4 | 39 | *80* |
| Total | 10,886 | 2,666 | 4,339 | *17,891* |

Table 2: **Summary Statistics of Municipal Corporate Bond Issuance**

This table reports the summary statistics of municipal corporate bond (MCB) issuance and other variables. Panel A reports total MCB issuance amount, MCB issuance amount by purpose (repayment of bank loan, investment, and other), and outstanding MCB balance by year. Panels A and B report MCB issuance number, issuance amount (billion RMB), and issuance amount by purpose (repayment of existing bank loan, investment, and other) for 7 regions and 30 provinces, respectively. Panels C and D report the various variables in their raw and abnormal values (relative to their 2004-2008 average) over 2012 to 2015. Variables include provincial MCB/GDP, MCB for repayment of bank loan over GDP, MCB for investment over GDP, MCB for other purpose over GDP, 2009 provincial bank loan over GDP, 2008Q1-Q3 provincial bank loan over GDP, provincial fiscal deficit over GDP (FD/GDP), provincial fixed asset investment over GDP (FAI/GDP), provincial land sale over fiscal revenue (LS/FR), provincial GDP growth (DGDP), and provincial entrusted loan over GDP (EL/GDP).

Panel A: MCB Inssuance by Region, amount in Billions (RMB)

| Province | Number of Bonds | Amount | Amount (repay) | Amount (inv) | Amout (other) |
|---|---|---|---|---|---|
| Center China | 554 | 635.9 | 109.7 | 371.8 | 6.4 |
| East China | 2428 | 2272.9 | 610.0 | 1268.7 | 54.1 |
| North China | 630 | 1004.7 | 234.5 | 493.3 | 26.8 |
| South China | 404 | 448.0 | 138.5 | 258.4 | 6.2 |
| Northeast | 245 | 292.5 | 48.0 | 193.8 | 1.9 |
| Northwest | 393 | 428.3 | 101.4 | 205.2 | 4.3 |
| Southwest | 800 | 845.1 | 235.4 | 449.9 | 16.5 |
| Total | 5454 | 5927.3 | 1477.5 | 3241.2 | 116.1 |

Panel B: MCB Issuance by Province, amount in Billions (RMB)

| Province | Number of Bonds | Amout | Amount (repay) | Amount (inv) | Amout (other) |
|---|---|---|---|---|---|
| Anhui | 206 | 218.7 | 55.6 | 131.6 | 5.1 |
| Beijing | 210 | 368.0 | 99.5 | 201.2 | 4.9 |
| Chongqing | 265 | 287.8 | 87.2 | 147.4 | 6.0 |
| Fujian | 293 | 244.3 | 93.3 | 114.7 | 9.3 |
| Gansu | 78 | 97.6 | 21.4 | 44.3 | 3.0 |
| Guangdong | 232 | 303.2 | 114.6 | 168.1 | 2.7 |
| Guangxi | 165 | 135.6 | 23.0 | 82.0 | 3.5 |
| Guizhou | 89 | 118.1 | 17.2 | 85.8 | 1.5 |
| Hainan | 7 | 9.2 | 0.9 | 8.3 | 0.0 |
| Hebei | 93 | 98.4 | 12.1 | 67.1 | 2.4 |
| Heilongjiang | 58 | 61.4 | 3.6 | 51.7 | 0.0 |
| Henan | 143 | 156.3 | 30.1 | 78.9 | 0.4 |
| Hubei | 198 | 204.7 | 35.9 | 117.8 | 0.2 |
| Hunan | 213 | 274.9 | 43.7 | 175.1 | 5.8 |
| Jiangsu | 997 | 859.0 | 203.5 | 447.9 | 17.0 |
| Jiangxi | 136 | 140.2 | 29.8 | 95.0 | 2.9 |
| Jilin | 36 | 42.9 | 14.0 | 18.7 | 0.5 |
| Liaoning | 151 | 188.2 | 30.4 | 123.5 | 1.4 |
| Neimenggu | 64 | 70.5 | 6.9 | 54.3 | 0.0 |
| Ningxia | 9 | 12.1 | 0.5 | 11.6 | 0.0 |
| Qinghai | 36 | 44.9 | 23.7 | 15.2 | 0.0 |
| Shan_xi | 149 | 176.4 | 41.3 | 69.9 | 0.9 |
| Shandong | 251 | 273.3 | 75.0 | 158.0 | 9.2 |
| Shanghai | 165 | 202.3 | 83.1 | 95.1 | 3.3 |
| Shanxi | 51 | 67.7 | 5.2 | 38.0 | 1.5 |
| Sichuan | 275 | 265.5 | 87.3 | 133.2 | 3.7 |
| Tianjin | 212 | 400.0 | 110.7 | 132.8 | 18.0 |
| Xinjiang | 121 | 97.4 | 14.5 | 64.2 | 0.4 |
| Yunnan | 171 | 173.7 | 43.7 | 83.5 | 5.2 |
| Zhejiang | 380 | 335.0 | 69.8 | 226.3 | 7.2 |

Panel C: Summary Statistics of Variables' Raw Values

| | Obs | Mean | SD | Min | P25 | Median | P75 | Max |
|---|---|---|---|---|---|---|---|---|
| MCB/GDP | 120 | 0.022 | 0.016 | 0.000 | 0.011 | 0.016 | 0.028 | 0.083 |
| MCB_repay/GDP | 120 | 0.006 | 0.007 | 0.000 | 0.001 | 0.004 | 0.008 | 0.037 |
| MCB_inv/GDP | 120 | 0.011 | 0.006 | 0.000 | 0.006 | 0.010 | 0.014 | 0.035 |
| MCB_other/GDP | 120 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 |
| 2009 BL/GDP | 30 | 0.275 | 0.082 | 0.158 | 0.219 | 0.259 | 0.330 | 0.452 |
| 2008Q1-Q3 BL/GDP | 30 | 0.151 | 0.051 | 0.076 | 0.115 | 0.143 | 0.190 | 0.239 |
| FD/GDP | 120 | 0.127 | 0.100 | 0.014 | 0.045 | 0.117 | 0.150 | 0.529 |
| FAI/GDP | 120 | 0.794 | 0.220 | 0.254 | 0.684 | 0.821 | 0.917 | 1.301 |
| LS/FR | 120 | 0.173 | 0.118 | 0.035 | 0.096 | 0.144 | 0.194 | 0.650 |
| DGDP | 120 | 0.089 | 0.038 | -0.007 | 0.066 | 0.089 | 0.113 | 0.202 |
| EL/GDP | 90 | 0.033 | 0.026 | -0.018 | 0.017 | 0.027 | 0.041 | 0.142 |

Panel D: Summary Statistics of Variables' Abnormal Values

| | Obs | Mean | SD | Min | P25 | Median | P75 | Max |
|---|---|---|---|---|---|---|---|---|
| MCB/GDP | 120 | 0.021 | 0.016 | -0.002 | 0.010 | 0.016 | 0.027 | 0.081 |
| MCB_repay/GDP | 120 | 0.006 | 0.007 | 0.000 | 0.001 | 0.004 | 0.008 | 0.037 |
| MCB_inv/GDP | 120 | 0.010 | 0.006 | -0.002 | 0.005 | 0.010 | 0.014 | 0.035 |
| MCB_other/GDP | 120 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 |
| 2009 BL/GDP | 30 | 0.164 | 0.050 | 0.083 | 0.129 | 0.158 | 0.190 | 0.270 |
| 2008Q1-Q3 BL/GDP | 30 | 0.041 | 0.029 | -0.020 | 0.022 | 0.032 | 0.060 | 0.101 |
| FD/GDP | 120 | 0.042 | 0.046 | -0.007 | 0.013 | 0.030 | 0.055 | 0.265 |
| FAI/GDP | 120 | 0.301 | 0.177 | -0.111 | 0.204 | 0.307 | 0.424 | 0.799 |
| LS/FR | 120 | 0.001 | 0.075 | -0.147 | -0.043 | -0.013 | 0.024 | 0.411 |

Table 3: **The Effects of 2009 Abnormal Bank Loan on Future Municipal Corporate Bonds Issuance, Year-by-Year Regressions**
This table reports the year-by-year regressions of 2012 to 2015 provincial municipal corporate bonds (MCB) issuance on 2009 bank loan. The dependent variable is the abnormal MCB issuance scaled by GDP in years 2012 to 2015 compared to the average value between 2004 and 2008. Annual MCB issuance at the provincial/regional level are aggregated over individual MCB bonds. The independent variable is the abnormal new bank loan scaled by GDP in 2009 compared to the average value between 2004 and 2008. Panels A and B report the cross-regional and the cross-provincial results, respectively. Panel C reports the cross-provincial results with control variables, including abnormal fiscal deficit (FD) scaled by GDP, abnormal fixed asset investment (FAI) scaled by GDP, abnormal local government land sale income (LS) scaled by fiscal revenue (FR), and GDP growth. Data about bank loan are obtained from PBOC, data about MCB are obtained from Wind, and data about control variables are obtained from National Bureau of Statistics of China. Heteroscedasticity consistent $t$-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: 2009 bank loan and 2012-2015 MCB issuance, regional

| | (1) $MCB_{2012}$ | (2) $MCB_{2013}$ | (3) $MCB_{2014}$ | (4) $MCB_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.11*** | 0.11** | 0.22*** | 0.24** |
| | (2.66) | (2.24) | (3.29) | (2.52) |
| Constant | 0.00 | 0.00 | -0.01 | -0.02 |
| | (-0.46) | (-0.47) | (-0.65) | (-0.99) |
| Observations | 7 | 7 | 7 | 7 |
| Adj. $R^2$ | 0.42 | 0.35 | 0.44 | 0.46 |

Panel B: 2009 bank loan and 2012-2015 MCB issuance, provincial

| | (1) $MCB_{2012}$ | (2) $MCB_{2013}$ | (3) $MCB_{2014}$ | (4) $MCB_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.11 | 0.13*** | 0.20*** | 0.15** |
| | (1.55) | (2.61) | (3.45) | (2.05) |
| Constant | 0.00 | -0.01 | 0.00 | 0.00 |
| | (-0.15) | (-0.89) | (-0.50) | (0.01) |
| Observations | 30 | 30 | 30 | 30 |
| Adj. $R^2$ | 0.10 | 0.31 | 0.34 | 0.17 |

Table 2 continued

Panel C: 2009 bank loan and 2012-2015 MCB issuance, with controls

| | (1) $MCB_{2012}$ | (2) $MCB_{2013}$ | (3) $MCB_{2014}$ | (4) $MCB_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.03 | 0.10* | 0.18** | 0.22*** |
| | (0.80) | (1.82) | (2.50) | (3.29) |
| FD/GDP | 0.23*** | 0.03 | 0.04 | -0.08* |
| | (3.20) | (0.37) | (0.55) | (-1.83) |
| FAI/GDP | -0.04** | -0.00 | -0.01 | 0.02 |
| | (-2.19) | (-0.37) | (-0.38) | (1.55) |
| LS/FR | 0.03 | -0.04 | -0.02 | -0.08*** |
| | (0.87) | (-0.81) | (-0.43) | (-3.31) |
| $\Delta$GDP | 0.10** | 0.12** | 0.24*** | 0.22*** |
| | (2.12) | (2.28) | (4.04) | (3.89) |
| Constant | -0.00 | -0.01 | -0.02 | -0.02** |
| | (-0.09) | (-1.53) | (-1.19) | (-2.46) |
| Observations | 30 | 30 | 30 | 30 |
| Adj. $R^2$ | 0.54 | 0.38 | 0.42 | 0.48 |

Table 4: **The Effects of 2009 Abnormal Bank Loan on Future Municipal Corporate Bonds Issuance, Placebo Tests**

This table reports the year-by-year regressions of 2012 to 2015 provincial municipal corporate bonds (MCB) issuance in 2008 first-to-third-quarter bank loans. The dependent variable is the abnormal MCB issuance scaled by GDP in years 2012 to 2015 compared to the average value between 2004 and 2008. Annual MCB issuance at the provincial/regional level are aggregated over individual MCB bonds. The independent variable is the abnormal new bank loan scaled by GDP in 2008 Q1-Q3 compared to the average value between 2004 and 2007. Panel A reports the cross-provincial results of 2008 Q1-Q3 abnormal bank loan. Panel B reports the cross-provincial results of both 2009 and 2008 Q1-Q3 abnormal bank loans, where the $F$-stat and the associated $p$-values for the hypothesis of equal coefficients of 2009 bank loan and 2008Q1-Q3 bank loan are also reported. Data about bank loan are obtained from PBOC and data about MCB are obtained from Wind. Heteroscedasticity consistent $t$-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: 2008 Q1-Q3 bank loan and 2012-2015 MCB issuance

| | (1) $MCB_{2012}$ | (2) $MCB_{2013}$ | (3) $MCB_{2014}$ | (4) $MCB_{2015}$ |
|---|---|---|---|---|
| 2008Q1-Q3 BL/GDP | 0.07 | -0.00 | -0.01 | -0.06 |
| | (0.74) | (-0.01) | (-0.09) | (-0.36) |
| Constant | 0.01*** | 0.02** | 0.03*** | 0.03*** |
| | (5.02) | (2.53) | (3.86) | (3.43) |
| Observations | 30 | 30 | 30 | 30 |
| Adj. $R^2$ | -0.02 | -0.04 | -0.04 | -0.03 |

Panel B: 2009 and 2008Q1-Q3 bank loan and 2012-2015 MCB issuance

| | (1) $MCB_{2012}$ | (2) $MCB_{2013}$ | (3) $MCB_{2014}$ | (4) $MCB_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.11* | 0.15*** | 0.23*** | 0.18*** |
| | (1.68) | (2.73) | (4.72) | (2.74) |
| 2008Q1-Q3 BL/GDP | 0.01 | -0.09 | -0.15 | -0.16 |
| | (0.12) | (-0.98) | (-1.61) | (-1.50) |
| Constant | -0.00 | -0.01 | -0.00 | 0.00 |
| | (-0.14) | (-0.92) | (-0.40) | (0.14) |
| $F$-test $\beta^{09} = \beta^{08Q1-Q3}$ | 2.94* | 3.20* | 11.69*** | 6.08** |
| $p$-value | 0.10 | 0.08 | 0.00 | 0.02 |
| Observations | 30 | 30 | 30 | 30 |
| Adj. $R^2$ | 0.07 | 0.34 | 0.38 | 0.24 |

Table 5: **The Effects of 2009 Abnormal Bank Loan on Future Municipal Corporate Bonds Issuance, Panel Regressions**
This table reports the panel regressions of 2012 to 2015 provincial municipal corporate bonds (MCB) issuance on 2009 bank loan. The dependent variable is the abnormal MCB issuance scaled by GDP in years 2012 to 2015 compared to the average value between 2004 and 2008. Annual MCB issuance at the provincial level are aggregated over individual MCB bonds. The independent variable is the abnormal new bank loan scaled by GDP in 2009 compared to the average value between 2004 and 2008. Control variables include abnormal fiscal deficit (FD) scaled by GDP, abnormal fixed asset investment (FAI) scaled by GDP, abnormal local government land sale income (LS) scaled by fiscal revenue (FR), and GDP growth. $\text{MCB}_{repay}$ indicates the proceeds of MCB that are used to pay back bank loans. $\text{MCB}_{inv}$ indicates the proceeds of MCB that are used for investment. $\text{MCB}_{other}$ indicates the proceeds of MCB that are used for other purposes. $\text{MCB}^{10}_{repay}$ includes those ten provinces with the most similar value of GDP in 2009, including Yunnan, Chongqing, Jilin, Shanxi, Tianjin, Jiangxi, Guangxi, Shan Xi, Heilongjiang, and Neimenggu. The denominator to scale $\text{MCB}^{10}_{repay}$ in 2012 to 2015 is the 2009 GDP in each of those 10 provinces. Data about bank loan are obtained from PBOC, data about MCB are obtained from Wind, and data about control variables are obtained from National Bureau of Statistics of China. Heteroscedasticity consistent $t$-statistics clustered by province and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) MCB | (2) MCB | (3) $\text{MCB}_{repay}$ | (4) $\text{MCB}_{inv}$ | (5) $\text{MCB}_{other}$ | (6) $\text{MCB}^{10}_{repay}$ |
|---|---|---|---|---|---|---|
| 2009 BL/GDP | 0.15*** | 0.12** | 0.04* | 0.02 | 0.01 | 0.15*** |
| | (3.45) | (1.98) | (1.70) | (1.38) | (1.25) | (5.21) |
| FD/GDP | | 0.07 | 0.07* | 0.02 | -0.01 | -0.12*** |
| | | (0.80) | (1.78) | (1.33) | (-1.21) | (-3.18) |
| FAI/GDP | | -0.01 | -0.01** | 0.00 | 0.00 | -0.02* |
| | | (-0.67) | (-2.46) | (-0.06) | (1.00) | (-1.77) |
| LS/FR | | -0.03 | -0.01 | -0.01 | 0.00 | 0.04 |
| | | (-0.98) | (-0.98) | (-0.67) | (-0.07) | (0.92) |
| $\Delta$GDP | | 0.17*** | 0.05* | 0.09*** | 0.00 | 0.15* |
| | | (3.75) | (1.67) | (5.26) | (0.98) | (1.88) |
| Constant | -0.00 | -0.01* | -0.00 | -0.00* | -0.00 | -0.03*** |
| | (-1.13) | (-1.82) | (-1.62) | (-1.78) | (-1.12) | (-2.77) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 120 | 120 | 120 | 120 | 120 | 40 |
| Adj. $R^2$ | 0.31 | 0.44 | 0.46 | 0.33 | 0.17 | 0.75 |

Table 6: **The Effects of 2009 Abnormal Bank Loan on Future New Entrust Loans**

This table reports the regression results of new entrusted loans (EL) on 2009 bank loan. The dependent variable is the new entrusted loan scaled by GDP in years 2013 to 2015. The independent variable is the abnormal new bank loan scaled by GDP in 2009 compared to the average value between 2004 and 2008. Control variables include abnormal fiscal deficit (FD) scaled by GDP, abnormal fixed asset investment (FAI) scaled by GDP, abnormal local government land sale income (LS) scaled by fiscal revenue (FR), and GDP growth. Results of year-by-year and panel regressions are reported. Data about bank loans and entrusted loans are obtained from PBOC and data about control variables are obtained from National Bureau of Statistics of China. Heteroscedasticity consistent $t$-statistics clustered by province and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) $EL_{2013}$ | (2) $EL_{2014}$ | (3) $EL_{2015}$ | (4) $EL_{panel}$ | (5) $EL_{panel}$ |
|---|---|---|---|---|---|
| 2009 BL/GDP | 0.20** | 0.23** | 0.14 | 0.19** | 0.20** |
| | (2.00) | (2.08) | (1.37) | (2.35) | (2.54) |
| FD/GDP | | | | | -0.04 |
| | | | | | (-0.48) |
| FAI/GDP | | | | | -0.05* |
| | | | | | (-1.79) |
| LS/FR | | | | | 0.01 |
| | | | | | (0.26) |
| ΔGDP | | | | | 0.10 |
| | | | | | (0.68) |
| Constant | 0.01 | -0.00 | 0.00 | 0.00 | 0.01 |
| | (0.41) | (-0.25) | (0.16) | (0.68) | (0.83) |
| Year fixed effects | | | | Yes | Yes |
| Observations | 30 | 30 | 30 | 90 | 90 |
| Adj. $R^2$ | 0.13 | 0.14 | 0.04 | 0.14 | 0.27 |

# Internet Appendix to "The Financing of Local Governments in China: Stimulus Loan Wanes and Shadow Banking Waxes"

This Internet Appendix consists of three sections. In Section A, we provide data construction details of total local government debt balance and its four major components. In Section B, we describe how we estimate the investment of wealth management products in municipal corporate bonds. In Section C, additional figures and tables are presented.

## A Construction of Local Government Debt Balance

### A.1 Total local government debt balance

1. The numbers as of the end of 2010, 2012, and 2013H1 are provided by two auditing reports (2011 and 2013) on local government debt issued by National Audit Office (NAO).

2. The numbers as of the end of 2008 and 2009 are calculated according to local government debt growth given in Figure 2 of the 2011 NAO report.

3. The number as of the end of 2014 is from the proposal to the State of Council submitted by the Ministry of Finance (MOF), in which it was said that by the end of 2014 the local government full obligation was 15.4 trillion RMB and the total local government guaranteed/contingent liability was 8.6 trillion RMB.

4. The number as of the end of 2015 is calculated according to the 2015 local government full obligation of 16 trillion and the 2014 fraction of local government full obligation as the total local government debt.

5. The numbers as of the end of 2011 and 2013 are interpolated assuming that the growth rate of local government debt is constant between 2010 and 2012, and between 2012 and 2014.

### A.2 Local government bank loan balance

1. The numbers as of the end of 2010 and June, 2013 are from the two NAO reports.

2. The numbers as of the end of 2008, 2009, 2011, and 2012 are adjusted from local government financing vehicle (LGFV) bank loan balance data available from Wind.

   (a) The ratio between the average 2010 and June, 2013 local government bank loan balance from the NAO reports and the average 2010 and June, 2013 LGFV bank loan balance is used as the adjustment factor.

   (b) LGFV bank loan balance data are from Wind as of the end of 2008, 2009, and 2012.

   (c) LGFV bank loan balance as of the end of 2011 are interpolated, assuming that the growth rate between 2010 and 2012 is constant.

3. The numbers as of the end of 2013, 2014, and 2015 are adjusted from LGFV bank loan balance estimated using China Construction Bank's (CCB) LGFV balance.

   (a) The country-wide LGFV bank loan balance in commercial bank measurement as of the end of 2013 to 2015 are estimated using CCB's LGFV bank loan balance and CCB's bank loan balance share as of all commercial banks.

   (b) The growth rates of country-wide LGFV bank loan balance in commercial bank measurement are used to estimate the LGFV bank loan balance in Wind measurement from 2013 to 2015.

   (c) The numbers of local government bank loan balance as of the end of 2013 to 2015 are estimated from section 3(b) LGFV bank loan balance adjusted by section 2(a) adjustment factor.

## A.3 Municipal corporate bond balance

1. Individual municipal corporate bonds, both outstanding and matured, are aggregated over their corresponding outstanding periods to calculate MCB balance as of the end of each year.

## A.4 Municipal bond balance

1. Individual municipal bonds, both outstanding and matured, are aggregated over their corresponding outstanding periods to calculate municipal bond balance as of the end of each year.

### A.5 Local government trust financing balance

1. Quarterly local government-trust cooperation balance data are available since 2010.
2. As of June 30, 2013, the NAO report shows that the total local government trust financing balance is 1.43 trillion and the local government-trust cooperation balance is 0.8 trillion. The adjustment factor is therefore $1.43/0.8 = 1.77$.
3. The numbers of local government-trust cooperation balance as of the end of 2010 to 2015 are multiplied by 1.77 to reflect the total local government trust financing balance.

## B Construction of Wealth Management Product Investment in Municipal Corporate Bonds

1. Total MCB balance by rating (AAA, AA+, AA, and $\leq$AA) are aggregated from individual MCBs using bonds rating at issuance. If a bond does not have rating information at issuance, we use its issuer's rating at issuance as a proxy. Only 1.57% of MCB in terms of RMB issuance value do not have any rating information.
2. Total credit bond balance by rating (AAA, AA+, AA, and $\leq$AA) are from China Central Depository and Clearing Corporation, downloaded from WIND.
3. Credit bond balance by rating (AAA, AA+, AA, and $\leq$AA) held by WMP are from China Commercial Bank Wealth Management Products Annual Reports issued by China Banking Wealth Management Registration System.
4. Fractions of credit bond balance held by WMP by rating are calculated from numbers in 2 and 3.
5. Assuming that WMP hold MCB with the same percentage as WMP hold all credit bonds, we estimate MCB balance held by WMP from numbers in 1 and 4.

## C Additional Results

Table 7: The Effects of 2009 Abnormal Bank Loan on Future Municipal Corporate Bonds Net Issuance, Year-by-Year Regressions

This table reports the year-by-year regressions of 2012 to 2015 MCB issuance on 2009 bank loan. The dependent variable is the abnormal MCB issuance scaled by GDP in years 2012 to 2015 compared to the average value between 2004 and 2008. Annual MCB issuance at the regional and provincial levels are aggregated over individual MCB bonds. The independent variable is the abnormal new bank loan scaled by GDP in 2009 compared to the average value between 2004 and 2008. Panel A and Panel B report the regional and provincial results, respectively. Data about bank loan are obtained from PBOC and data about MCB are obtained from Wind. Heteroscedasticity consistent $t$-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: 2009 bank loan and 2012-2015 MCB net issuance, regional

| | (1) $MCB^{net}_{2012}$ | (2) $MCB^{net}_{2013}$ | (3) $MCB^{net}_{2014}$ | (4) $MCB^{net}_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.11*** | 0.11** | 0.21*** | 0.18* |
| | (2.66) | (2.24) | (3.20) | (1.66) |
| Constant | -0.00 | -0.00 | -0.01 | -0.01 |
| | (-0.46) | (-0.47) | (-0.64) | (-0.79) |
| Observations | 7 | 7 | 7 | 7 |
| Adj. $R^2$ | 0.42 | 0.35 | 0.47 | 0.31 |

Panel B: 2009 bank loan and 2012-2015 MCB net issuance, provincial

| | (1) $MCB^{net}_{2012}$ | (2) $MCB^{net}_{2013}$ | (3) $MCB^{net}_{2014}$ | (4) $MCB^{net}_{2015}$ |
|---|---|---|---|---|
| 2009 BL/GDP | 0.11 | 0.13*** | 0.18*** | 0.08 |
| | (1.55) | (2.61) | (3.65) | (1.54) |
| Constant | -0.00 | -0.01 | -0.00 | 0.00 |
| | (-0.15) | (-0.89) | (-0.45) | (0.52) |
| Observations | 30 | 30 | 30 | 30 |
| Adj. $R^2$ | 0.10 | 0.31 | 0.33 | 0.06 |