

Understanding the Risk of China's Local Government Debts and Its Linkage with Property Markets

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Abstract

The intertwining of local Chinese housing markets with government fiscal policies coincides with the significant economic growth in China over the past 25-years. This connection is the direct result of China's central government reforms to its fiscal system that have encouraged local governments to rely on land sales and development to fund required infrastructure projects. Since China does not allow local governments to directly participate in the municipal bond market, these governments rely on a unique funding mechanism known as Local Government Financing Vehicle (LGFV). We study the linkage between the solvency of local government debt and local housing market risk. Our results indicate that areas with higher expected house price growth issue debt with lower risk premiums. Furthermore, bonds issued by LGFVs from areas that experience greater changes in housing prices have a corresponding decline in observed yield spreads. Thus, the results suggest that investors do price local housing risk into Chinese municipal bond risk premiums.

Introduction

As an emerging economy, China has experienced significant economic growth over the past 25 years. Since 1989, the annual GDP growth rate in China averaged over 9%. Coinciding with this remarkable period of economic growth, local housing markets also saw significant expansion with real prices in the major cities increasing by approximately 225% during the previous decade (See Wu, Gyourko and Deng, 2012). This remarkable period of economic growth has created a number of social economic challenges (See Deng, Morck, Wu and Yeung, 2014, and Wu, Deng, Huang, Morck and Yeung, 2014 for more discussion). In particular, the link between government finances and the health of the housing market is of particular concern.

The intertwining of local Chinese housing markets with government fiscal policies is a result of the central government engaging in a number of reforms to China's fiscal system. These reform measures have created unique challenges for local governments and have raised global concerns about the impact of a possible correction of China's housing market on the Chinese and global economy.

The root of the concern lies in the efforts by China's central government to revise its tax revenue sharing policies in an effort to promote economic growth in less developed regions. Most notably, in 1994 China consolidated the provision for tax revenue collection and sharing in order to redistribute tax revenues to less developed areas while at the same time mandating increased local expenditures on infrastructure projects (and public housing projects recently). However, unlike local governments in western countries, local Chinese governments are prevented from directly issuing debt to fund mandated capital projects. As a result of the fiscal stresses and restrictions placed on local governments, China has developed a unique funding

source for local governments to obtain capital necessary to fund large-scale infrastructure investments.

Since China does not allow local governments to directly participate in the municipal bond market, these governments rely on a unique funding mechanism known as Local Government Financing Vehicles (LGFV; or Local Government-Backed Investment Units, LGBIU). Using these investment units, local governments access capital markets by issuing bonds. However, unlike traditional municipal debt in western countries, the Chinese investment units are not able to use tax revenues to fund coupon or principal payments. Rather, as detailed in Lu and Sun (2013), the local government often capitalizes the investment unit through transfers of land usage rights. Thus, in effect, the local governments tap into the growing housing market by selling public land to fund the investment units' coupon and principal payments. As a result of this unique dependence of local governmental fiscal policies on local housing markets, a substantial drop in housing or land values may increase the risk level of local government debt, or even trigger a systematic default.

According to the latest available statistics published by the National Audit Office, by the end of June 2013, the total volume of outstanding local government debt reached 10.89 trillion yuan RMB, equivalent to 19.15% of China's GDP in 2013. In contrast, the total volume of central government debt was 9.81 trillion at the same time. The risk level of this local government debt highly relies on the housing/land market conditions. For example, according to the National Audit Office, 37.23% of the debts of local governments explicitly promised that they would use future land sales revenue to repay the debt. In addition, land parcels are also the most widely-used collateral for local government debt.

The purpose of this paper is to study the linkage between the solvency of local government debt and local housing market risk. Of all the financial instruments involved in local government debt, bonds issued by local government-backed investment units are the only type that: 1) are publicly transacted; and 2) have public information available. We utilize a combination of several unique datasets to investigate how the market evaluates the risks associated with local government debt, especially focusing on the effect of housing market conditions. Our results indicate that areas with higher expected house price growth are able to issue debt with lower risk premiums. Furthermore, we also find that the bond market reacts to changes in local housing conditions, as expected. Bonds issued by LGFVs from areas that experience greater changes in housing prices also see a corresponding decline in observed yield spreads. Thus, the results suggest that investors do price local housing risk into Chinese municipal bond risk premiums.

Background about Local Government Debt in China

China's Fiscal System

With the transition away from a state controlled economic system, the Chinese economy has rapidly expanded. One of the outcomes of the increase in economic activity is a significant growth in government related expenditures. For example, as Figure 1 shows, between 1995 and 2012 Chinese government budgetary expenditures increased at an average real annual growth rate of 16.1%. To fund these expenditures, the Chinese government enacted new tax provisions such that the government's budgetary income increased substantially since the mid-1990s. For example, between 1995 and 2012 the real average annual compound growth rate in income

reached 16.2%, which was significantly higher than the GDP growth rate in the same interval. Consequently, the ratio between budgetary income receipts and GDP increased from 10.3% in 1995 to 22.6% in 2012. However, this huge and increasing government income masks a fiscal dilemma facing local governments.

During this period of rapid economic expansion, the fiscal relationship between the central Chinese government and local government units also experienced significant changes that have created substantial stresses on local government finances. For example, in 1994 China established the so-called “tax sharing system” (*fen shui zhi*) under which each type of tax is shared by the central and local governments according to a stated percentage.¹ Since local governments controlled most of these taxes before 1994, Figure 2 illustrates that this reform immediately decreased local government income. Figure 2 shows that in 1993 local governments accounted for 78.0% of all budgetary income. However, following enactment of the tax sharing system in 1994, local government share of income plunged to 44.3% and has remained below 50%. Unfortunately, local government budgetary expenditures were not shifted at the same percentages as income. Thus, local governments remain responsible for the majority of budgetary expenditures and their share of total government expenditures continues to increase creating significant fiscal pressure.

Although the central government does retain a significant share of tax revenue, it does transfer a large portion of this income back to local governments in an effort to mitigate regional inequality in economic development. According to latest available statistics, in 2012 the total volume of such transfer payments reached 4.54 trillion, or 80.8% of central government’s total

¹ For example, the central government receives 75% of the value added tax (VAT) and the local governments receive the left 25%. The corporate income tax from financial institutes and central state-owned enterprises goes to the central government, while local governments receive the corporate tax from other firms. All consumption tax goes to the central government, and all personal income tax goes to local governments.

budgetary income. Although these transfer payments are almost enough to fill the gap between local government budgetary expenditures and income, the transfer payments are generally concentrated in less developed areas. Thus, the relatively more prosperous urban areas have not benefited from the transfer payments.

In addition to the redistributive nature of the transfer payments, the central government places significant restrictions on the uses of most of these funds. For example, in most cases the transfer payments from the central government cannot be spent on investment on urban infrastructure projects. However, local governments have strong incentives to invest in large-scale urban infrastructure projects since such investments are effective in boosting local economic GDP growth, and GDP growth rate plays an important role in determining future political career of local government officials (Deng et al, 2014). Compounding the local government fiscal imbalance, the central government often imposes additional requirements on local governments' investment activities. For example, in China's 2008 stimulus package, the central government required that local governments fund 2.8 trillion (70%) of the 4-trillion package. In addition, since 2007 the central government has explicitly required local governments to develop more affordable housing units.

Unfortunately, unlike local governments in western countries, local Chinese governments are unable to tap into the traditional municipal bond market to fund required infrastructure projects. For example, the current Budget Law in China states that “*the local budgets at various levels shall be compiled according to the principles of keeping expenditures within the limits of revenues and maintaining a balance between revenues and expenditures, and shall not contain deficit...The local governments may not issue local government bonds, except as otherwise prescribed by laws or the State Council.*” Therefore, unlike their counterparts in other countries

like U.S., local governments in China cannot borrow loans or issue bonds directly to support their investment projects.

Emergence of Local Government Financing Vehicles

The strong incentives for local Chinese governments to invest in large projects such as urban infrastructure or affordable housing combined with the lack of traditional financing methods (budgetary income, bank loans or municipal bonds) created an environment for local governments in China to seek innovative financing vehicles. As a result, local Chinese governments have turned to the concept of the “local government financing vehicles” (*di fang zheng fu rong zi ping tai* or LGFV for short) as an important financial vehicle to fund basic infrastructure projects.²

LGFVs first appeared at the beginning of this century and became popular as a result of the 2008 stimulus period. In order to facilitate local government efforts to support the 2008 stimulus package, the Peoples’ Bank of China (China’s central bank) and China Banking Regulation Commission jointly issued a document in March 2009 that encouraged local governments to use LGFVs to finance their stimulus-related investment projects. This pronouncement immediately triggered the rapid development of LGFVs. According to the latest available statistics published by the National Audit Office, as of June 2013 the total volume of outstanding debt (including bonds and bank loans) borrowed by LGFVs was 4.08 trillion, accounting for 37.5% of the total volume of local government debts (10.89 trillion).

² Local Government Financing Vehicles (LGFVs) are also referred as Local Government-Backed Investment Units (LGBIUs) or Local Government Financing Platforms (LGFPs). Currently the Chinese government has not provided an official English translation for this term. So LGFV, LGBIU, and LGFP are used interchangeably in the current literature.

A LGFV is essentially a state-owned enterprise (SOE) with a corresponding local (provincial, prefectural, or district/county) government as the only (in most cases) or dominant shareholder.³ To create a LGFV, the corresponding local government transfers land parcels, utilities or infrastructure, or in some cases capital funds to the LGFV exchange for equity ownership.⁴ The LGFV then, following rules regulating regular corporations, raises capital via bank loans, corporate bonds, medium term notes, or other securities to finance large-scale investment projects such as urban infrastructure or affordable housing. LGFVs rarely raise capital by issuing new equity.

In general, LGFVs differ from regular, local non-LGFV SOEs in two major aspects. First, LGFVs focus on investments on large projects such as urban infrastructure or affordable housing developments and are seldom involved in manufacturing industries. Secondly, and even more importantly, in most cases LGFVs are companies with unlimited liability such that the corresponding local government ultimately assumes or backs the LGFV debt in case of default. In particular, since a large majority of LGFV investment projects do not generate income or are not profitable, LGFVs rely on the funding support from corresponding local governments to repay their debts. In contrast, following several SOE reform initiatives beginning in the late 1980s, most non-LGFVs do not receive direct funding transfers from local governments.

To illustrate the LGFV concept, consider the following example of Fushun Development Investment Corporation (FSDIC) that is reported by H. Ma (as cited in Zhang and Barnett, 2014, p.8). The Fushun Development Investment Corporation was established in June 2002 by the Fushun city government. The city provided an initial capital infusion of RMB150 million and

³ LGFVs are sometimes described as special purpose vehicles (SPVs). But currently in China SPV is not a strict legal concept, and thus legally LGFVs are founded and operated as regular corporations.

⁴ In a few cases, a LGFV may also own shares of other non-LGFV SOEs, which are also awarded by the local government

then in 2006 transferred a land usage right as additional paid-in capital. In 2009, FSDIC acquired three solely stated-owned companies as subsidiaries. With these acquisitions, FSDIC became the primary infrastructure development entity for the city. For example, FSDIC engages in development of the local sewage system, a flood protection project, road construction, and housing. FSDIC generates revenue from the subsidiaries, such as the water company, and from city government subsidies. However, the majority of revenue comes from the sale of land, which is used as collateral to support its bond issues.

While LGFVs rely on local governments as the major source for servicing debt, local governments cannot use their budgetary income as the funding source, and thus usually rely on revenues from land sales as the primary funding source. Accordingly, a sharp decline in housing/land prices may have a significant effect on the local governments and their LGFVs ability to repay their debts.

Data

To analyze the growing Chinese municipal bond market, we assembled a comprehensive panel encompassing the Chinese bond market, local and state government finances, and local housing markets. This section describes the data sources and documents the extent of the municipal bond market in China.

First, we collected detailed information on all 10,872 bonds issued by corporates in mainland China between 2003 and 2014 using the WIND database, a Compustat-style database in China.⁵ This dataset comprises 4,590 corporate bonds with maturities over 10 years, 2,000 medium-term notes with the maturities between 1 and 10 years, 3,892 short-term commercial notes (or commercial paper) with the maturities less than 1 year, and 390 other bonds (e.g., asset-

⁵ See www.wind.com.cn for more details.

backed securities, private placement notes, etc.). The majority of the bonds are issued and transacted in either the inter-bank market (8,090 bonds, or 74.4%) or on the exchanges in Shanghai (2,173 bonds, or 20.0%) or Shenzhen (496 bonds, or 4.6%). For each bond, we collect information on the issuer, coupon rate, issue amount, issue date, maturity, rate type (fixed, adjustable, or progressive), rating level of the issuer, rating level of the bond, credit enhancing arrangements (collateral, warrant by third party, or without any arrangement), and declared use of the funds raised.

One of the challenges in collecting data on Chinese municipal bonds is that the “local government financing vehicle” is actually not a strict legal concept in China. By contrast, LGFVs always contain some key features. For example, one widely accepted description promoted in a State Council document⁶ indicates that a local government-backed investment unit is “a legally independent corporation or institution, with a specific local government as the only or dominant owner that invests in (and operates) urban infrastructure projects.” However, as discussed in the previous section, one essential feature of LGFV is the (implicit) guarantee or funding support from the corresponding local government, which is not covered by such descriptions and cannot be directly observed.

In this paper we choose to borrow the list of LGFVs issued by China Banking Regulation Commission (CBRC). Since August 2010, CBRC started to maintain such a list of LGFVs around the country, which mainly serves a guideline from CBRC to the commercial banks in regulating their borrowing behaviors. This provides the most reliable information on the coverage of LGFVs. For each of the 10,872 bonds, we check whether its issuer was included in the list when the bond was issued. Based on such procedures, we identify 1,983 LGFV bond

⁶ State Council of China, “Circular on the Relevant issues on Strengthening the Management of Local Government-Backed Investment Units” (Document (2010) 19), June 13th, 2010.

issues, or 18.2% of all corporate bonds. As detailed in Table 1, the LGFV issues comprise 1,688 long-term bonds (or 85.1%), 129 medium-term notes (or 6.5%), with the remainder being short-term commercial paper and other types. LGFV bonds are primarily traded in the inter-bank market (1,240 bonds, or 62.5%) and on the Shanghai Exchange (696 bonds, or 35.1%).

Table 2 reports the distribution of LGFV bonds by corresponding government levels. In general provincial-level governments issued more bonds, with larger volumes, and with shorter intervals, followed by prefectural-level governments and district/county-level governments. The 26 provincial government units account for 297 LGFV bonds (or 15%); 215 prefectural-cities issued 933 bonds (or 47%); 76 district governments within prefectural-cities issued 399 bonds (or 20%); and 61 county or county-level cities issued 335 bonds (or 17%). The second panel of Table 2 provides preliminary information on regional variances in bond issuance. In particular, we note that local governments in the east region are generally more active, accounting for 12.4 bonds per issuer compared to the 5.7 bonds per issuer in the middle region and 6.0 bonds per issuer in the west region.

Panel A of Figure 3 shows the total volume of LGFV bonds issued each year, while Panel B displays the bonds' outstanding balances. Prior to 2008, the total volume of LGFV bonds was very small with less than 200 LGFV bonds issued. However, the volume of bond issuance boomed in 2009 as a result of the Chinese government's stimulus package, and then jumped again in 2012. Thus, by the end of June 2013, the total volume of outstanding LGFV bond balance reached 2.60 trillion yuan RMB, accounting for about 23.9% of the total volume of local government debts (10.89 trillion), as reported by the National Audit Office. By the end of 2014, the total amount outstanding had increased to 2.39 trillion yuan RMB.

Figure 4 shows how the issuance of LGFV bonds has shifted to lower level (or more local) governments during recent years. For example, by the end of 2014, LGFVs associated with provincial-level governments accounted for about one-fifth (20.13%) of issues while prefectural-level city governments comprised 47.33%, with the remaining from district- and county-level governments. County- and district level government units' share significantly increased since the stimulus period.

Corresponding to the growth in debt issuance by smaller government units, Figure 5 illustrates the rapid decline in issuers' ratings. Currently, in almost all cases ratings are provided by local rating agencies in mainland China. Since 2008 a significant number of higher risk issues have come to market. Thus, by the end of 2014, AAA-rated LGFVs accounted for only 12.81% of the total outstanding bond volume.

The maturity structure of LGFV debt has also changed substantially between 2003 and 2013. As noted in Figure 6, the average maturity of LGFV bonds issued before 2007 was more than 8 years, but it decreased to 4.7 years in 2008 and 6.5 years in 2009, and has fluctuated between 6 and 7 years after that. At the end of 2014, the average remaining maturity for the outstanding bonds was 6.65 years.

Not surprising, the shift to debt issues by smaller government units is associated with an upward trend in yield. Panel A of Figure 7 depicts the yield-to-maturity (in our sample all the bonds were issued at par) and the corresponding offering yield spread at issuance. The offering yield spread is calculated by matching each bond to a China treasury bond with a similar maturity as a proxy for the risk-free rate. Specifically, we match each LGFV bond with a China treasury bond having a maturity date within three months of the LGFV bond maturity date. In

general the yield spread increased from around 1% at the beginning of the sample period to about or even over 3% after 2008.

We next merged the LGFV bond dataset with several other sources to obtain comprehensive statistics on local government finances, and since now we mainly focus on LGFV bonds issued by prefecture-, district-, or county-level local governments in 90 major cities, where we can get access to comparably reliable information. The distribution of these 1,187 bonds is listed in the last column of Table 1. First, as Chinese law requires corporations issuing bonds in mainland China to publicly release annual financial information, we collect key accounting information (such as annual total assets, liabilities, earnings, etc.) for LGFV issuers. Second, since China prevents local government units from directly issuing debt, we use the financial information-reporting requirement to obtain information on the wholly owned corporate entities issuing LGFVs on behalf of local governments. For each LGFV issuing unit, we collect local economic and demographic information (such as population, GDP, government fiscal income and expenditure, etc.) from the official statistics published by National Bureau of Statistics of China. Finally, we introduce the monthly constant quality housing price index discussed in Wu, Deng and Liu (2014), which provides a direct link between the LGFV bonds and local housing market conditions.

Table 3 reports the descriptive statistics for the bonds at each bond's issue date. The average coupon rate for LGFV bonds is 6.6% and ranges between 1.6% and 10.6%. The majority of bonds (80%) are fixed-coupon and do not have any credit enhancements (57%). In terms of intended use of funds, about half of the bonds (48%) listed investment on urban infrastructure as the major designated usage, and other major usages include public housing development and operating funding of LGFVs.

Since the WIND database also reports quarterly transaction prices for each bond, we calculate the bonds' yield-to-maturity based on the closing price on the last trading day of each quarter, and match to a China treasury bond with a similar maturity in order to calculate the bond's quarterly yield spread over the risk-free rate. Table 4 provides the summary statistics for the unbalanced quarterly panel. Figure 7, Panel B reports the average quarterly yield-to-maturity and yield spreads of all outstanding bonds. On average, the LGFV bond yield to maturity was 6.2%.

Initial Yield Spread and Housing Risk

Our investigation of the China municipal bond market begins by recalling that most LGFV entities rely on land sales to facilitate coupon and principal payments. Figure 8 shows the quarterly series year-on-year growth rate of the national level constant-quality housing price index compared to the average LGFV offering yield spread.⁷ The graph suggests a negative relationship between LGFV bonds' offering yield spread and historical housing price growth. Building on this insight, our analysis begins by assuming that market participants price expectations of local housing price risk in LGFV bonds. To analyze this risk, we follow the modeling set-up of Ambrose and Warga (1992) to include a variable reflecting local housing market risk as a supplement to the standard structural models of bond yield spreads derived in the literature. Thus, we test the hypothesis that bonds issued by LGFV reflect the risk associated with trends in the local housing markets. As noted by Ambrose and King (2002), prior research shows that bond yields reflect market liquidity conditions and the liquidity of fixed-income

⁷ See Wu, Deng and Liu (2014)

securities is a function of many factors including issue size, age, coupon, and general economic trends.⁸

Following Chen, Lesmond and Wei (2007), our initial analysis focuses on differences in the LGFV bond offering yield spreads. To control for bond liquidity, credit risk, and macro-economic factors, as well as differences in local real estate market conditions, we estimate the following regression:

$$y_i = \alpha + \beta_1 E(R_{i,H}) + \beta_2 B_i + \beta_3 L_i + \varepsilon_i$$

where y_i is the yield on LGFV bond i less the yield on the China Treasury bond with maturity closest to the LGFV bond i , $E(R_{i,H})$ is the expected return to the local housing market associated with bond i 's LGFV, B_i represents a vector of bond characteristics, and L_i represents a vector of local market factors. The set of bond characteristics (B) reflect the typical factors that capture differences in bond liquidity such as maturity, bond type (long-term, medium-term, or short-term), coupon payment type (fixed, adjustable or progressive), bond rating at issuance, the presence of credit enhancements (collateral or warrants), and the market where the bond is expected to trade (inter-bank or exchanges). The set of local market factors (L) reflect systematic differences in locality or LGFV. The specific factors associated with the LGFV's include the log of total assets, estimated earnings (ROA), and total debt (Liability/total assets). We control for differences in local governments by including a set of variables that (1) denote whether the local government expects to invest the funds raised on infrastructure projects, (2) capture differences in population size (the log of the population), (3) control for differences in economic output (log

⁸ For example, Amihud and Mendelson (1991), Warga (1992), and Sarig and Warga (1989) document that bond liquidity is related to security age and maturity; Kamara (1994) finds that interest rates impact liquidity; Crabbe and Turner (1995) and Flemming (2001) relate bond size to liquidity; Bernanke (1983, 1991), Stock and Watson (1989), and Hand, Holthausen and Leftwich (1992) relate yield spreads to macro-economic factors and credit quality.

of the per capita GDP), and (4) reflect the government level (city, county, districts, or prefectural).

Table 5 presents the results for the regression of offering yield spread levels. Column (1) starts with the sample of all LGFVs in 90 major cities. After controlling for quarterly time fixed effects, bond ratings and other bond specific factors (*B*) as mentioned before, we mainly focus on three groups of factors. First, we add a set of variables to capture differences across the LGFVs. We note that larger LGFVs, as reflected in total assets, have lower yield spreads. Interestingly, the other indicators on LGFVs' performance, including their profitability (ROA), total liabilities (scaled by total assets), and previous record in issuing bonds (i.e., whether this is the first bond issued by the LGFV) are all insignificant in the model. In other words, it seems that the LGFVs' own performance is not perceived to be very important in measuring the risk level of LGFV bonds. Second, we introduce controls for differences across the local governments that created the LGFVs. A noteworthy fact is, the level of the corresponding local government plays an important role: relative to prefectural level governments, bonds issued by LGFVs backed by county governments have higher offering yields while bonds issued by capital cities have lower yield spreads. Bonds issued by LGFVs affiliated with local governments in more developed areas, measured by higher per capita GDP, have lower offering yield spreads. Finally, as our focus in this paper, we include the variable denoting the cumulative housing price growth during the 12 months prior to the bond issuance. As noted by Deng, Gyourko and Wu (2012) and Wu, Deng and Liu (2014), housing markets in China display high degrees of persistence. Thus, we use the previous 12-month return as a forecast for expected returns. The estimated coefficient is negative and marginally significant. This is consistent with the hypothesis that areas with higher anticipated house price growth are able to borrow at lower costs. Since the majority of LGFVs

rely on land sales to cover coupon and principal payments, the results are consistent with investors pricing the housing market into the offering yields. In column (2) and (3) we further find that, such linkage between offering yield spread and housing market conditions is especially important for corporate bonds with maturity no less than one year.

In Table 6 we compare the pattern revealed before with corporate bonds issued by non-LGFV SOEs (column 1) and private firms (column 2). There are several noteworthy differences compared with column (3) in Table 5. In general the issuers' own performance is more important in affecting offering yield spread for non-LGFV SOEs and private firms: besides total asset, firms with higher profitability or lower liability can also enjoy lower offering yield spread, while firms have to pay higher rate for their first bond. By contrast, the corresponding local government level is insignificant for non-LGFV SOEs. And, most importantly, the linkage between housing market condition and offering yield spread does not exist in either of these two groups, which is consistent with the fact that neither non-LGFV SOEs nor private firms can rely on local governments' land sales revenues as a major source of repayment. Such results also imply that, the effect of housing market condition revealed in Table 5 should not be interpreted just as a result of endogeneity. For example, if such linkage only results from, e.g., omitted variables such as demand shock, such effect should also apply to non-LGFV SOEs and private firms, instead of the LGFVs only.

The last two columns in Table 6 refer to bonds from a special group of firms. In 2010 (Document 2010-19) the State Council explicitly required that a SOE should no longer be treated as a LGFV if its daily operating can be supported by its own operating income. Accordingly the CBRC regularly updated its LGFV list, and would delist a LGFV if it is believed to be profitable enough. In 2010, 121 LGFVs were delisted according to such procedures, and this number

jumped to 1,456 in 2011. In the following three years 284, 241, and 113 LGFVs were delisted, respectively. In column (3) we focus on the offering yield spread of corporate bonds issued by these delisted LGFVs after they were explicitly excluded from the LGFV list. Among others, we can find that the linkage between housing market condition and offering yield spread no longer exists. Then in the last column we introduce the difference-in-difference model to investigate the change when a previous LGFV is delisted. Controlling for other factors, compared with bonds issued by the same firm before it is delisted as a LGFV, the offering spread significantly decreases after the previous LGFV is delisted. Meanwhile, the effect of housing market conditions disappears.

In Table 7 we turn to the effect of housing market conditions on issuers' (column 1) or bonds' (column 2) ratings based on ordered logic models. The question is, as we have found that housing market conditions are perceived by the bond market participants to play a significant role in affecting bond risks, whether the rating agencies would take such factors into considerations. The answer is no. Controlling for other available information for LGFVs and corresponding local governments, as well as bond characteristics (for bond rating), the proxy of housing market condition is negative in these two models, but both statistically insignificant. These results are consistent with the fact that, the role of land sales revenue as a major potential source of LGFV bond repayment, although recognized by market participants, is actually not explicitly stated in any official documents and thus cannot be formally considered by rating agencies.

Changes in Yield Spreads and Housing Risk

In this section we explore the role of changing housing market expectations on bond yield spread changes. Following Ambrose and King (2002), Chen, Lesmond and Wei (2007), and Collin-Dufresne, Goldstein and Martin (2001), we estimate the following regression for the period from 2005 to 2014:

$$y_{i,t} = \gamma_0 + \gamma_1 R_{i,H,t} + \gamma_2 \left(\frac{Exp}{Inc} \right)_{i,t} + \gamma_3 GDP_{i,t} + \gamma_4 Assets_{i,t} + \gamma_5 \left(\frac{Liab}{Asset} \right)_{i,t} + \gamma_6 (ROA)_{i,t} + \gamma_7 B_i + \varepsilon_{i,t}$$

Where: $R_{i,H,t}$ is the housing price growth rate for LGFV locality i ; GDP_i represents the local LGFV GDP, $Assets_i$ is the LGFV i 's total assets, $Liab/Asset$ is the ratio of total liabilities to total assets for LGFV i ; ROA is the ratio of LGFV i 's earnings over total assets; and B_i represents the set of individual bond fixed effects.

Table 8 reports the estimated coefficients for the change in yield spread regression. Column (1) reports the base quarterly model focusing on the risk associated with changing housing market returns. The negative and statistically significant coefficient for $R_{i,H,t}$ indicates that, as expected, changes in bond yields are related to changes in local real estate values (as reflected by increases in housing market returns). The negative coefficient indicates that bonds issued by LGFVs in areas with higher housing returns have lower yields, reflecting a decline in the risk premium. The negative relation is expected since LGFVs rely predominately on land sales to fund coupon and principal repayments. In columns (2), we further introduce indicators on LGFVs and corresponding local governments, although such information is only updated annually. The proxy of housing market conditions remains consistent in this specification.

Local Governments' Decisions on Bond Issuances

The analysis above suggests that, the LGFV bonds are perceived by market participants to be with lower risks when the housing prices are expected to keep growing; in other words, local governments or their LGFVs can reduce their financing costs during a housing market booming. Then our last question is, do local governments or LGFVs take advantage of such pattern and choose to issue more bonds during the booming period?

In Table 8 we test this from two aspects. In column 1 we adopt the city-level panel data; that is, for the 90 major cities between 2010 and 2014, we focus on whether any prefecture-, district-, or county-level LGFVs affiliated to a city issue any bonds within a specific year. Controlling for both city and year fixed effects, as well as the economic development and budgetary expenditure conditions, we find that, somewhat surprisingly, the housing market condition proxy is negative and marginally significant. In column 2 we choose to conduct the analysis on the LGFV level. Unfortunately, we cannot get access to LGFV information if it has not issued any bonds, or for the years before it starts to issue bonds. Accordingly in this model we adopt an imbalanced panel for LGFVs that has at least issued one bond. Again the housing price growth variable is negative in the model, although statistically insignificant.

Both these two models suggest that, there is no evidence that local governments and their LGFVs intentionally take advantage of the pattern revealed before, and choose to issue more bonds during a booming housing market; by contrast, it is more likely that they actually issue less bonds. One possible explanation is, local governments actually do not care much about the financial costs, and thus have few incentives to reduce the offering yield spread. By contrast, they only choose to issue bonds whenever they need to raise more funds from the capital market. This can well explain the negative effect of housing market condition proxy in Table 8 – during a

booming market local governments are able to get more funding from land sales to finance their infrastructure investments, and thus rely less on borrowing.

Conclusion

The linkage between the health of China's local government finances and the sustainability of the housing market is not very well understood in academic literature and by policy makers. The intertwining of local Chinese housing markets with government fiscal policies is a result of the central government engaging in a number of reforms to China's fiscal system. As a result of the fiscal stresses and restrictions placed on local governments, China has developed a unique funding source for local governments to obtain capital necessary to fund required large-scale infrastructure investments.

The purpose of this paper is to study the linkage between local government debt and local housing market risk. We utilize a combination of several unique datasets to investigate how the market evaluates the risks associated with local government debt, especially focusing on the effect of housing market conditions. Our results indicate that areas with higher expected house price growth are able to issue debt with lower yield spreads. Furthermore, we also find that the bond market reacts to changes in local housing conditions, as expected. Bonds issued by local investment units from areas that experience greater changes in housing prices also see a corresponding decline in observed yield spreads. Thus, the results suggest that investors do price local housing risk into Chinese municipal bond risk premiums.

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Trillion Yuan
(in 2010 price)

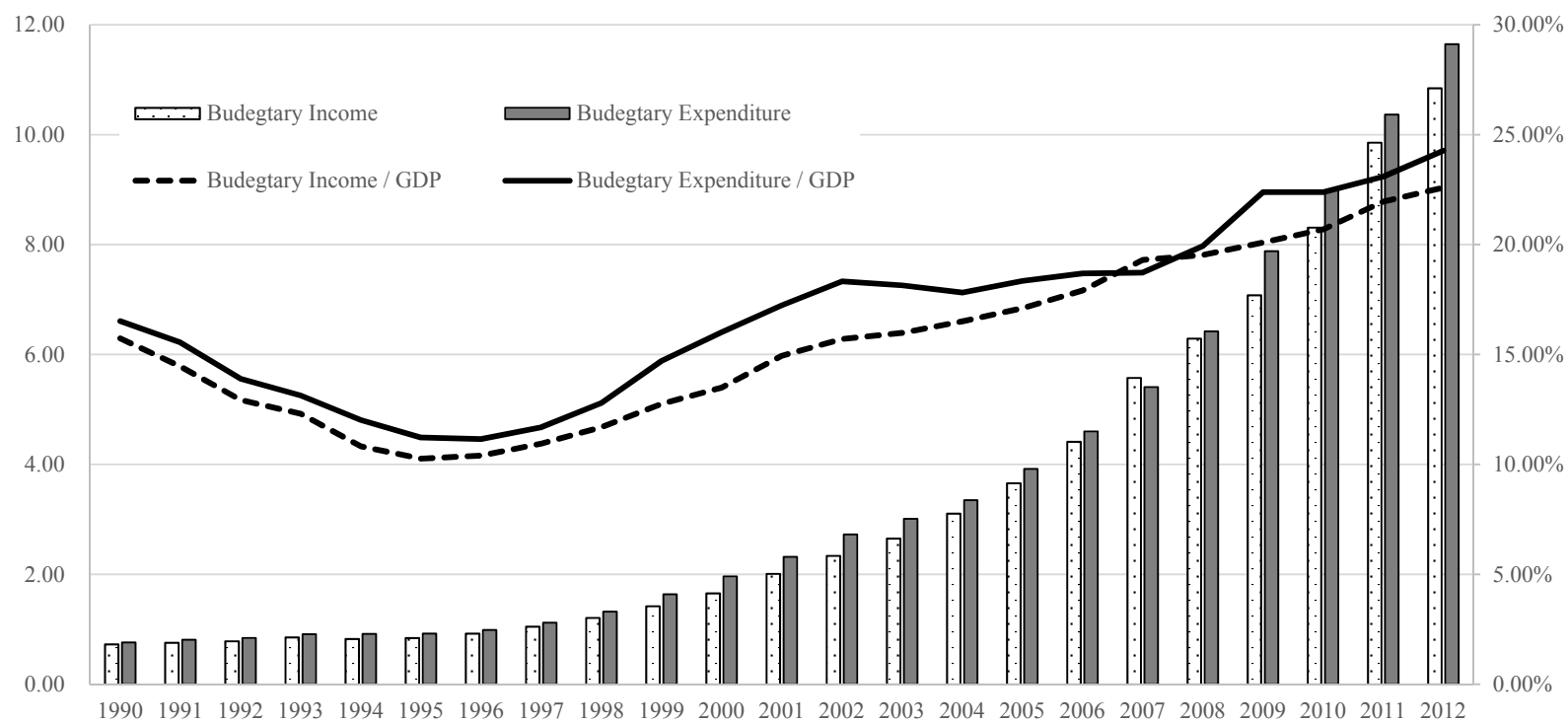


Figure 1: Budgetary Income and Expenditure of Chinese Government

Source: authors' calculations based on data reported by National Bureau of Statistics of China.

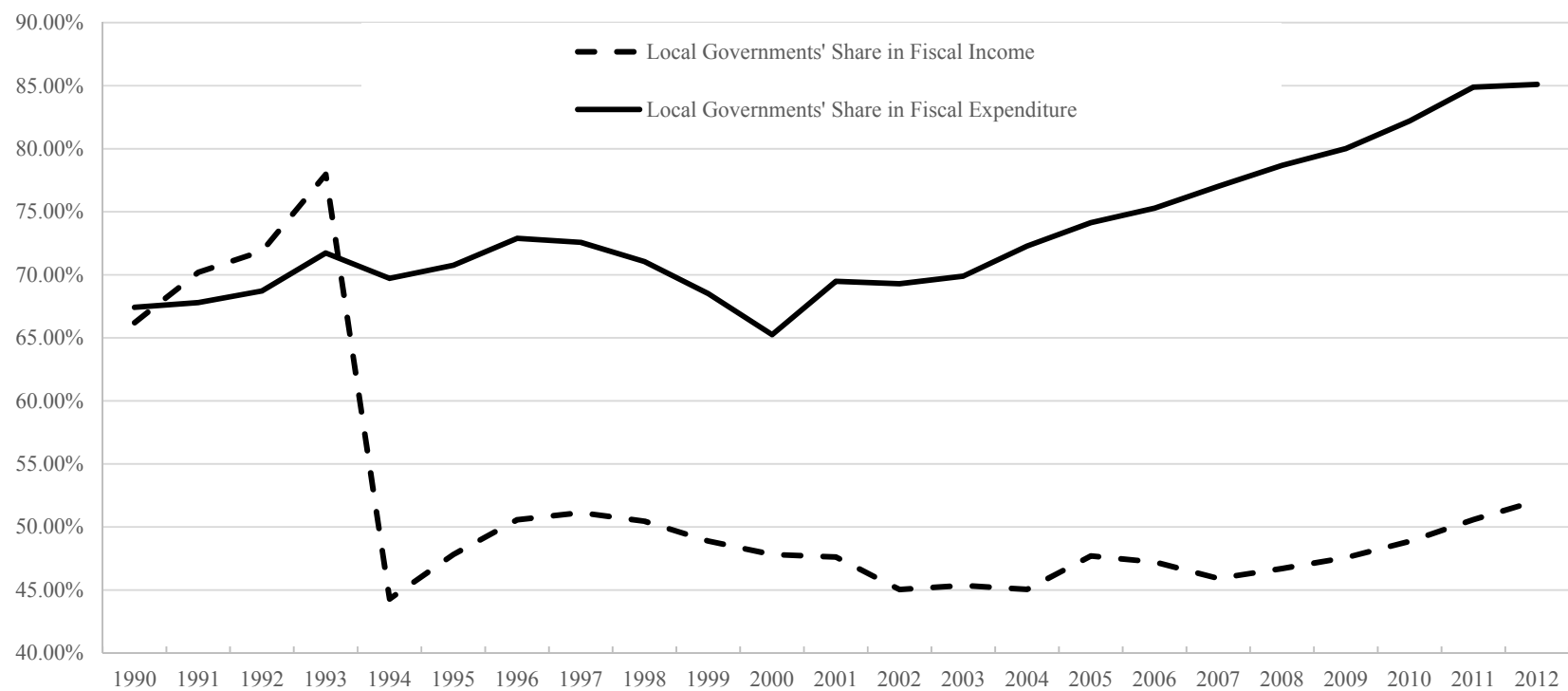
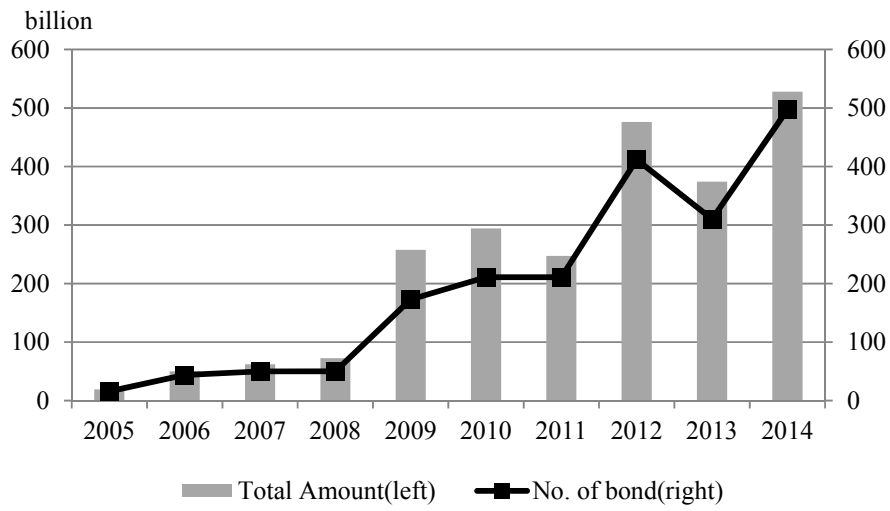
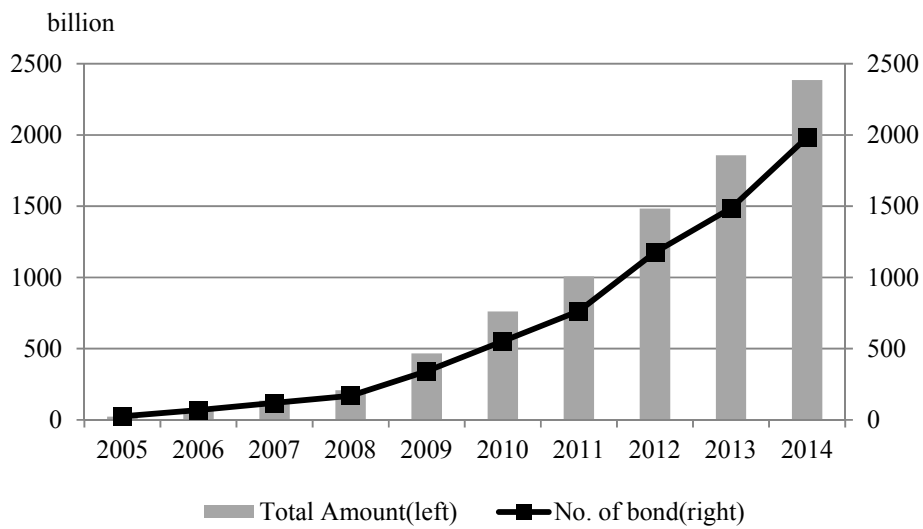


Figure 2: Local Governments' Share in Total Budgetary Income and Expenditure

Source: authors' calculations based on data reported by National Bureau of Statistics of China.

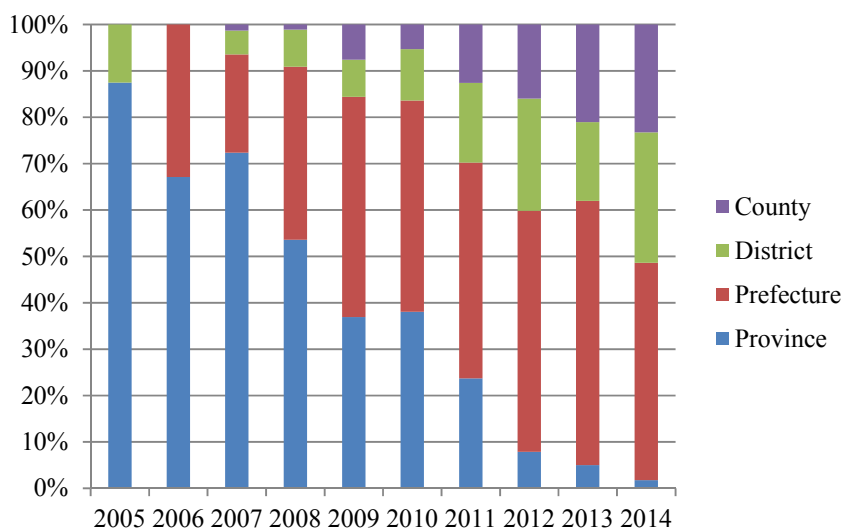


(A) Bonds Issued during the Year



(B) Outstanding Bonds at the End of the Year

Figure 3: Total Volume of LGFV Bonds

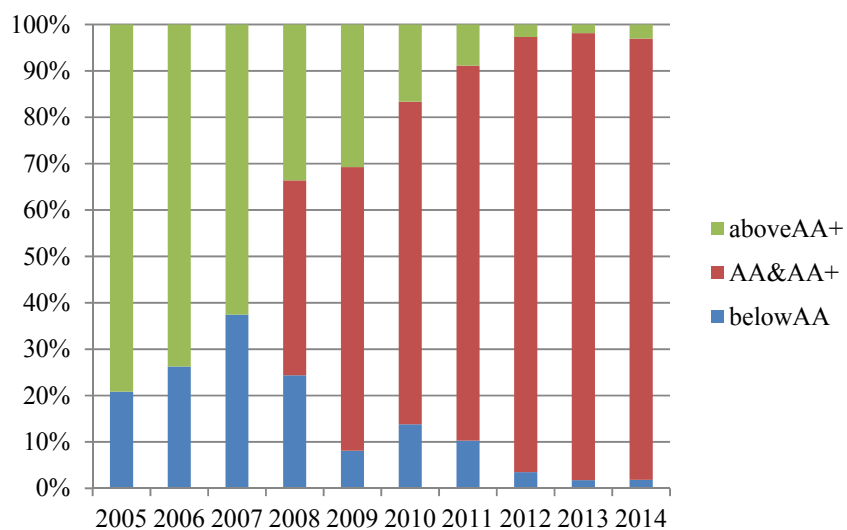


(A) Bonds Issued during the Year

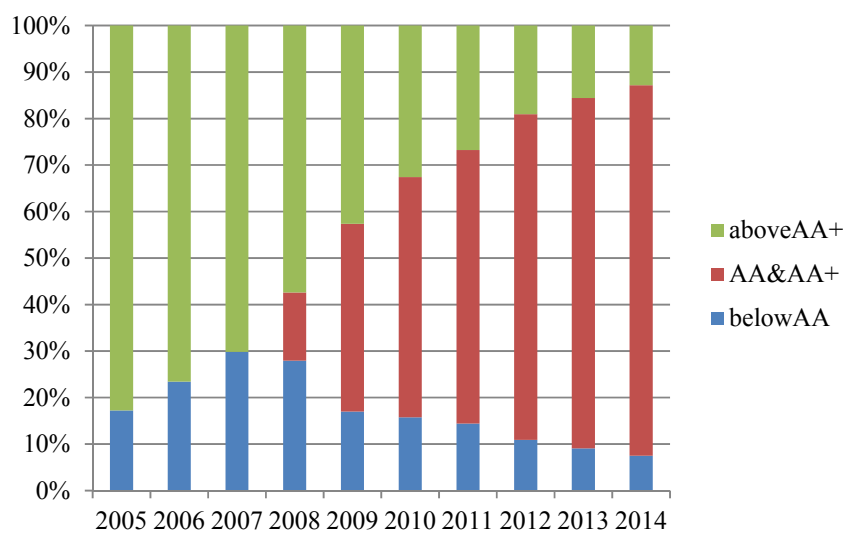


(B) Outstanding Bonds at the End of the Year

Figure 4: Structure of Corresponding Government Levels



(A) Bonds Issued during the Year



(B) Outstanding Bonds at the End of the Year

Figure 5: Structure of Bond Issuer Ratings

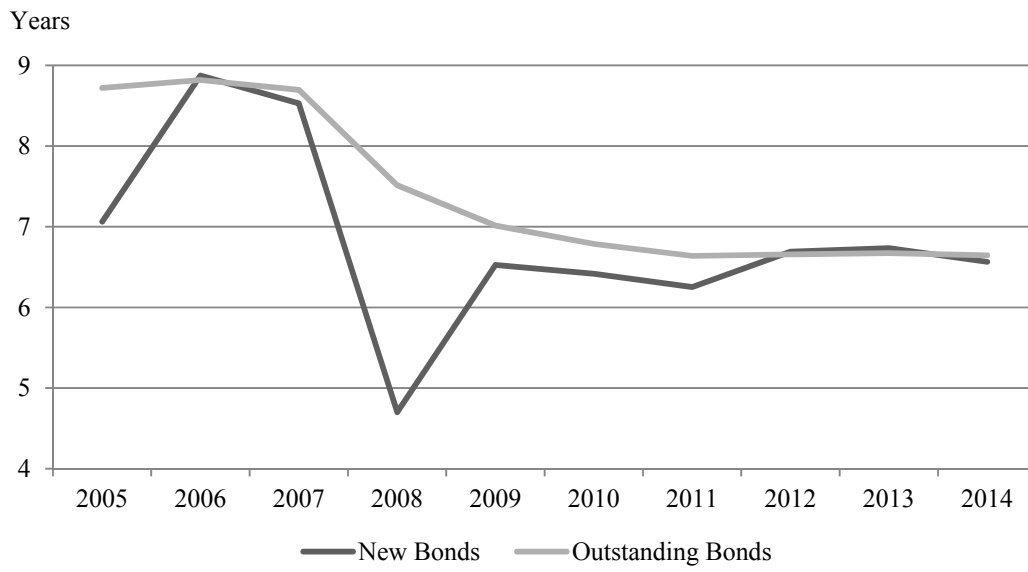
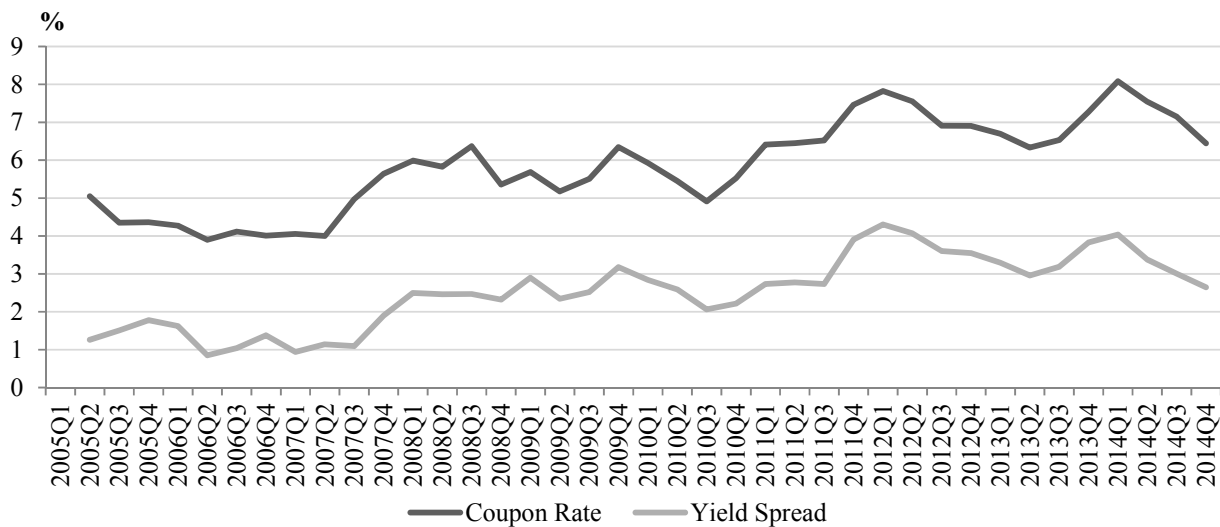
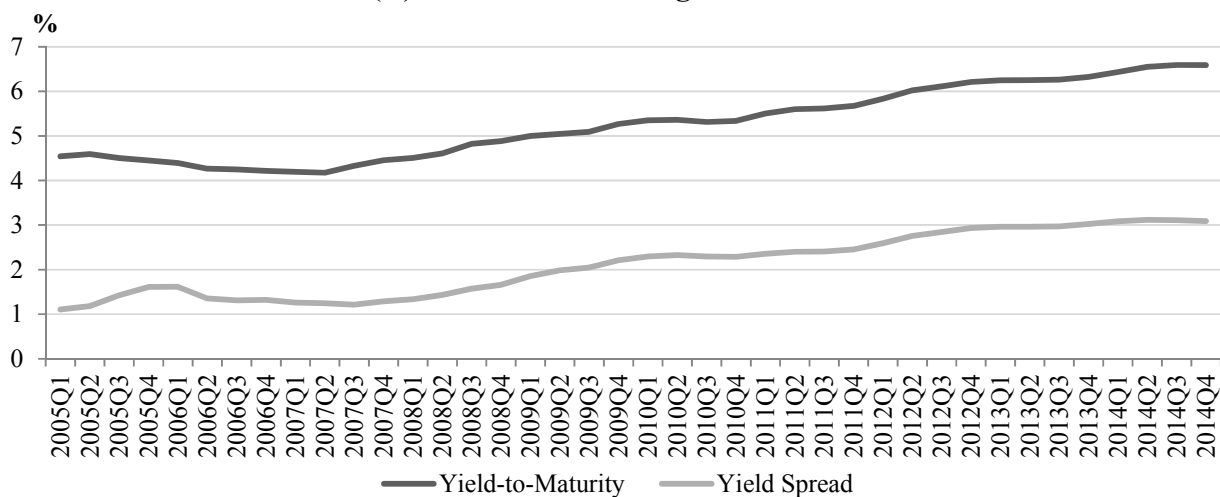


Figure 6: Average Maturity of LGFV Bonds

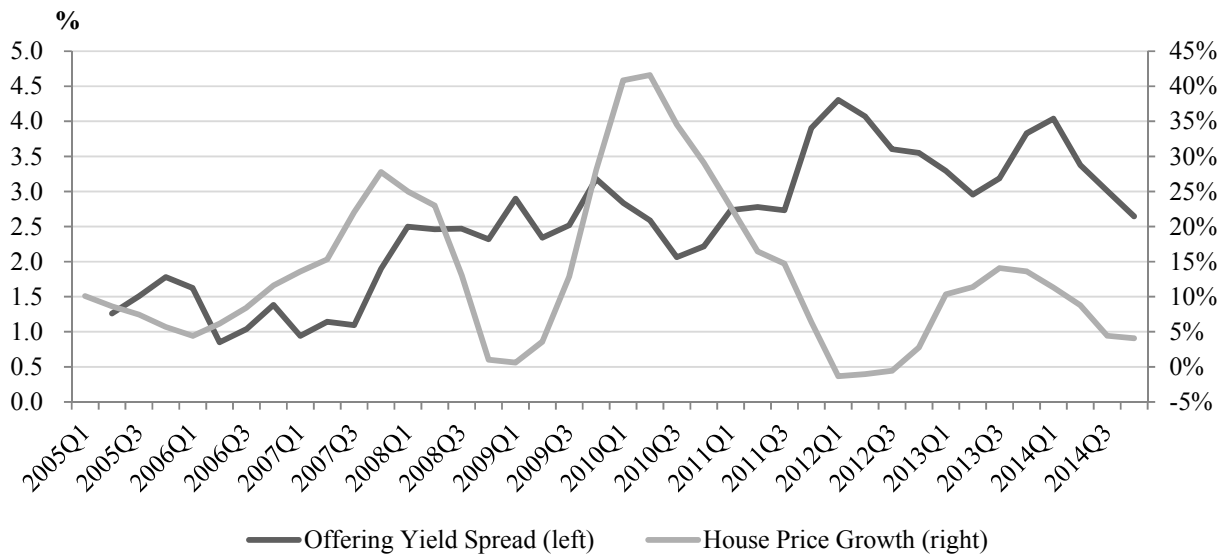


(A) Bonds Issued during the Quarter

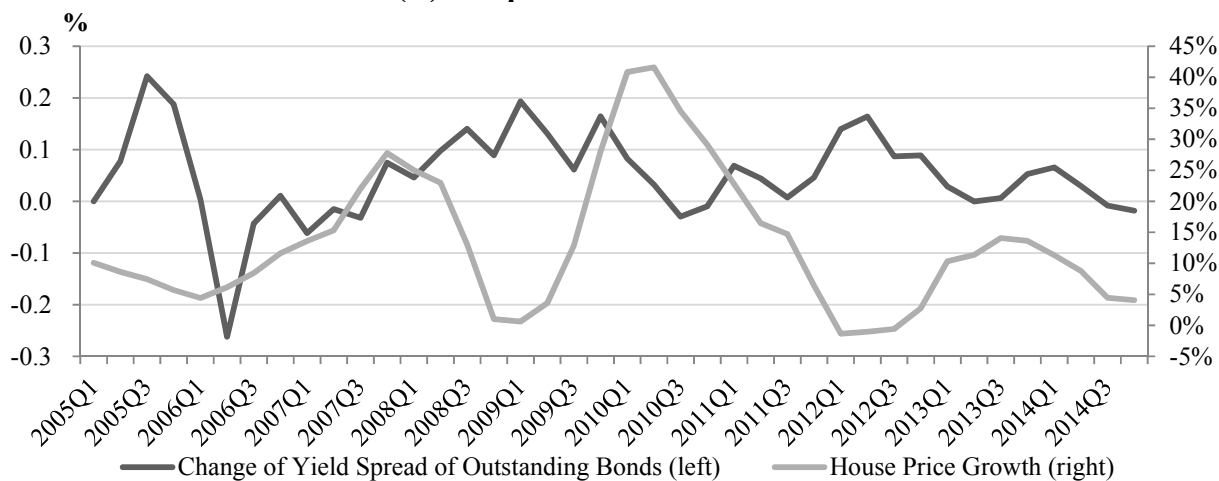


(B) Outstanding Bonds at the End of the Quarter

Figure 7: Average Rates and Yield Spreads of LGFV Bonds



(A) Comparison with New Bonds



(B) Comparison with Change of Outstanding Bonds

Figure 8: Relationship between LGFV Bond Rates and Housing Price Change

Table 1: Number of Bonds in the Sample

		All Bonds Issued by Corporates	LGFV Bonds	LGFV Bonds in 90 Major Cities Since 2010
Total		10,872	1,983	1,187
Market	Inter-Bank Market	8,090	1,240	783
	Shanghai Exchange	2,173	696	371
	Shenzhen Exchange	496	30	20
	Others	113	17	13
Bond Type	Corporate Bonds	4,590	1,688	920
	Medium-Term Notes	2,000	129	113
	Short-Term Commercial Paper	3,892	140	131
	Others	390	26	23

Table 2: Comparison between Different Local Governments

	Average No. of Bonds Issued per Gov.	Average of Total Amounts Issued by each Gov. (in million yuan)	Average Interval between Two Issuing by each Gov. (in days)
Provincial Level Governments	11.42	18541.16	146.52
Prefectural-Level City Governments	4.34	5273.49	244.64
District Governments in Cities	5.25	5726.81	154.46
County/County-Level City Governments	5.49	5641.97	132.2
East Region	12.41	15139.98	117.81
Middle Region	5.74	6856.56	207.02
West Region	5.96	7187.33	133.62

Table 3: Major Summary Statistics at Bond Issuing

	Average	Std. Dev.	Max.	Min.
A. Bond Information				
Amount (in million yuan RMB)	1210.402	625.715	10000	32.8
Coupon Rate (in %)	6.586	1.295	10.640	1.600
Yield Spread (in %; see text for more details)	3.091	1.029	7.585	-0.088
Maturity (in months)	79.750	28.508	240	6
<i>Rate Type</i>				
- Fixed Rate (dummy)	0.795	0.404	1	0
- Adjustable (dummy)	0.020	0.141	1	0
- Progressive (dummy)	0.185	0.388	1	0
<i>Credit Enhancement Arrangement</i>				
- With Collateral (dummy)	0.194	0.395	1	0
- With Warrant (dummy)	0.237	0.425	1	0
- Without Any Enhancement (dummy)	0.570	0.495	1	0
<i>Usage</i>				
- Investment on Infrastructure	0.492	0.500	1	0
<i>Rating</i>				
- AAA	0.097	0.296	1	0
- AA+	0.286	0.452	1	0
- AA	0.535	0.499	1	0
- AA- & Below	0.082	0.274	1	0
B. Issuer Information				
Total Asset (in million yuan RMB)	24788.700	34199.880	425384	748
ROA	3.068	2.369	31.308	-2.078
Liability / Asset	45.449	16.765	88.396	0.304
<i>Rating</i>				
- AAA	0.043	0.202	1	0
- AA+	0.138	0.345	1	0
- AA	0.587	0.492	1	0
- AA- & Below	0.232	0.422	1	0
First Bond Issued	0.345	0.475	1	0
C. City Attribute				
GDP per capital (in thousand yuan RMB)	56.916	36.742	256.377	6.075
Ratio between local fiscal expenditure and local fiscal revenue	1.810	1.128	14.577	0.649
Accumulative housing price growth during the previous 12 months	0.089	0.142	0.803	-0.235

Table 4: Major Summary Statistics of the Quarterly Panel Data

	Average	Std. Dev.	Max.	Min.
A. Bond Information				
Return Rate (in %)	6.214	2.483	61.347	-176.087
Yield Spread (in %; see text for more details)	2.714	2.414	58.232	-179.294
Maturity (in months)	61.923	26.958	217.676	0.197
B. Issuer Information				
Total Asset (in million yuan RMB)	42075.030	63520.240	542449.000	748.000
ROA	2.701	2.180	31.308	-2.078
Liability / Asset	50.119	15.683	89.961	0.314
C. City Attribute				
GDP per capital (in thousand yuan RMB)	66.315	43.075	256.377	6.075
Ratio between local fiscal expenditure and local fiscal revenue	1.708	0.991	14.577	0.649
Accumulative housing price growth during the previous 12 months	0.080	0.127	0.803	-0.506

Table 5: Factors affecting offering yield premiums

	(1) Yield Spread (All Bond)	(2) Yield Spread (All Bond)	(3) Yield Spread (Long-Term)
log(total asset)	-0.106** (-2.58)	-0.110*** (-2.68)	-0.124*** (-2.95)
Return on Asset	-0.014 (-1.41)	-0.013 (-1.24)	-0.007 (-0.63)
Liability/Total Asset	0.000 (0.14)	0.001 (0.49)	0.002 (1.09)
First Bond Issued of the Firm	-0.027 (-0.45)	-0.027 (-0.47)	-0.024 (-0.41)
<i>Government Level</i>			
- Prefectural	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Districts	0.205*** (3.80)	0.202*** (3.75)	0.197*** (3.57)
- Counties	0.241*** (3.63)	0.229*** (3.47)	0.227*** (3.41)
- Capital Cities	-0.284*** (-2.58)	-0.316*** (-2.88)	-0.253 (-1.64)
log(per capita GDP)	-0.315*** (-6.09)	-0.320*** (-6.23)	-0.299*** (-5.83)
Budgetary Expense /Budgetary Income	-0.002 (-0.05)	-0.002 (-0.04)	-0.010 (-0.24)
Accumulative housing price growth during the previous 12 months	-0.291 (-1.35)	-0.547** (-2.39)	-0.504** (-2.28)
Accumulative housing price growth during the previous 12 months * Short or Medium Terms		1.088*** (3.21)	
Bond Ratings	Yes	Yes	Yes
Bond Attributes	Yes	Yes	Yes
Quarterly Fixed Effect	Yes	Yes	Yes
<i>N</i>	761	761	659
<i>R</i> ²	0.71	0.72	0.72

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Factors affecting offering yield premiums: Other types of issuers

	(1) Non-LGFV SOEs	(2) Private Firms	(3) Delisted LGFVs	(4) DID on Delisted LGFVs
log(total asset)	-0.253*** (-4.38)	-0.097** (-2.17)	-0.068 (-1.51)	-0.449** (-2.53)
Return on Asset	-0.043*** (-4.35)	-0.043*** (-5.46)	-0.006 (-0.50)	-0.077** (-2.45)
Liability/Total Asset	0.006** (2.28)	0.004* (1.70)	0.000 (0.16)	-0.000 (-0.03)
First Bond Issued of the Firm	0.166** (1.97)	0.121* (1.67)	0.154** (2.44)	0.101* (1.89)
<i>Government Level</i>				
- Prefectural	<i>Default</i>	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Districts	-0.084 (-0.96)	-	0.041 (0.71)	-
- Counties	0.108 (1.12)	-	0.207*** (2.90)	-
- Capital Cities	0.010 (0.12)	-	-0.192* (-1.90)	-
log(per capita GDP)	-0.128* (-1.72)	-0.141** (-2.25)	-0.115* (-1.83)	-2.070*** (-4.65)
Budgetary Expense /Budgetary Income	0.017 (0.18)	-0.002 (-0.03)	0.135* (1.72)	-0.120 (-0.23)
Accumulative housing price growth during the previous 12 months	0.052 (0.16)	-0.144 (-0.56)	0.109 (0.38)	-2.969*** (-5.63)
Delisted				-0.343*** (-2.95)
Accumulative housing price growth during the previous 12 months * Delisted				4.209*** (5.77)
Bond Ratings	Yes	Yes	Yes	Yes
Bond Attributes	Yes	Yes	Yes	Yes
Issuer Fixed Effect	No	No	No	Yes
Quarterly Fixed Effect	Yes	Yes	Yes	Yes
<i>N</i>	407	597	540	719
<i>R</i> ²	0.66	0.61	0.69	0.89

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Factors affecting LGFV and bond ratings

	(1) LGFV Ratings	(2) Bond Ratings
log(total asset)	0.827*** (8.62)	0.102 (1.10)
Return on Asset	-0.004 (-1.23)	-0.008 (-0.33)
Liability/Total Asset	-0.030 (-1.23)	-0.002 (-0.46)
First Bond Issued of the Firm	-0.178* (-1.67)	0.255* (1.90)
<i>Government Level</i>		
- Prefectural	<i>Default</i>	<i>Default</i>
- Districts	-0.845*** (-6.25)	0.187 (1.42)
- Counties	-1.693*** (-9.63)	0.160 (0.98)
- Capital Cities	1.520*** (5.65)	-0.936*** (-3.47)
log(per capita GDP)	1.136*** (8.67)	-0.287** (-2.28)
Budgetary Expense /Budgetary Income	0.104 (0.91)	-0.005 (-0.05)
Accumulative housing price growth during the previous 12 months	-0.126 (-0.27)	-0.309 (-0.68)
Bond Attributes	Yes	Yes
Issuer Ratings	No	Yes
Quarterly Fixed Effect	Yes	Yes
<i>N</i>	761	761
<i>Pseudo R</i> ²	0.38	0.32

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Factors affecting yield spread

	(1) Yield Spread	(2) Yield Spread
log(maturity)	0.571*** (7.38)	0.338*** (3.11)
Accumulative housing price growth during the previous 12 months	-0.950*** (-3.62)	-1.195*** (-4.30)
log(total asset)		-0.375** (-2.19)
Return on Asset		-0.011 (-0.40)
Liability/Total Asset		0.014** (2.40)
log(per capita GDP)		-0.511 (-1.46)
Budgetary Expense /Budgetary Income		-0.784*** (-6.60)
Bond Fixed Effect	Yes	Yes
<i>N</i>	9298	9246
<i>R</i> ²	0.298	0.303

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Effects on the decisions on bond issuance

	(1) Whether Any Bond is Issued by LGFVs in this City-Year	(2) Whether Any Bond is Issued in this LGFV-Year
Accumulative housing price growth during the previous 12 months	-0.014*	-0.002
	(-1.65)	(-0.57)
log(per capita GDP)	1.534	0.230
	(0.53)	(0.17)
Budgetary Expense /Budgetary Income	0.245	-0.149
	(0.66)	(-0.49)
log(total asset)		0.615**
		(2.25)
Return on Asset		-0.093**
		(-2.25)
Liability/Total Asset		-0.014
		(-1.64)
Year Fixed Effect	Yes	Yes
City Fixed Effect	Yes	No
LGFV Fixed Effect	No	Yes
<i>N</i>	438	1585
<i>Pseudo R</i> ²	0.41	0.15

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$