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

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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 have also seen 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 interesting 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 market 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 housing and infrastructure projects. 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 required large-scale infrastructure investments.

Since China does not allow local governments to directly participate in the municipal bond market, the central government created a unique funding mechanism known as Local Government-Backed Investment Units. Using these investment units, local governments are able to access capital markets and issue 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. Thus, 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 mixing of local governmental fiscal policies with local housing markets, a substantial drop of housing or land prices 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 balance of local government debts reached 10.89 trillion yuan RMB, equivalent to 19.15% of China's GDP in 2013. 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, although the accurate number is not available.

The purpose of this paper is to study the linkage between 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 is: 1) publicly

transacted; and 2) has 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 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.

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 most of these taxes were purely controlled by local governments 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 for local governments.

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 2009 the total volume of such transfer payments reached 2.86 trillion, or 79.7% of central government's total 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.

[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.

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.

<u>Emergence of Local Government-Backed Investment Units</u>

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) has 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-backed investment units" (*di fang zheng fu rong zi ping tai* or LGBIU for short) as an important financial vehicle to fund basic infrastructure projects. [2]

LGBIUs 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 LGBIUs to finance their stimulus-related investment projects. This pronouncement immediately triggered the rapid development of LGBIUs. 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 LGBIUs was 4.08 trillion, accounting for 37.5% of the total volume of local government debts (10.89 trillion).

A LGBIU 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 share holder.[3] To create a LGBIU, the corresponding local government transfers land parcels, utilities or infrastructures, or in some cases capital funds to the LGBIU exchange for equity ownership.[4] The

[2] Local Governemnt-Backed Investment Units (LGBIUs) are also referred as Local Government Financing Vehicles (LGFVs). Currently the Chinese government has not provided an official English translation for this term. So LGBIUs and LGFVs are used interchangeably in the current literature.
[3] LGBIUs are sometimes mentioned as SPVs (special purpose vehicles). But currently in China SPV is not a strict legal concept, and thus legally LGBIUs are founded and operated as regular corporations.
[4] In a few cases, the LGBIU also owns shares of other non-LGBIU SOEs, which are also awarded by the local government

LGBIU 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. LGBIUs rarely raise capital by issuing new equity.

In general, LGBIUs differ from regular local SOEs in several aspects. First, LGBIUs focus on investments on large projects such as urban infrastructure or affordable housing developments and are seldom involved in manufacturing industries. Second, in most cases LGBIUs are companies with unlimited liability such that the corresponding local government ultimately assumes or backs the LGBIU debt in case of default. Finally, since a large majority of LGBIU investment projects do not generate income or are not profitable in the market standard, LGBIUs 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-LGBIUs do not receive direct funding transfers from local governments.

While LGBIUs rely on local governments as the major source for servicing debt, local governments cannot use their budgetary income as the funding source. As a result, local governments rely on revenues from land sales as the primary funding source. Accordingly, a sharp decline in housing/land prices may have significant a significant effect on local governments and their LGBIUs 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 10,015 bonds issued by corporates in mainland China between 2003 and 2013 using the WIND database, a Compustat-style database in China.[5] This dataset comprises 3,421 corporate bonds with maturities over 10 years, 2,040 medium-term notes with the maturities between 1 and 10 years, 4,210 short-term commercial notes (or commercial paper) with the maturities less than 1 year, and 344 other bonds (e.g., asset-backed securities, private placement notes, etc.). The majority of the bonds are issued and transacted in either the inter-bank market (8,055) or on the exchanges in Shanghai (1,462) or Shenzhen (427). For each bond, we collect information on the issuer, coupon rate, issue amount, issue date, maturity, rate type (fixed, adjustable, or progressive), credit enhancing arrangements (collateral, warrant by third party, or without any arrangement), and declared use of the funds raised.

Unfortunately, one of the challenges in collecting data on Chinese municipal bonds is that the designation "local government-backed investment unit" is not a strict legal concept in China. As a result, the central government and other institutions do not maintain any official list of such units. However, LGBIUs are always described by some key features. For example, one widely-accepted description promoted in a State Council document[6] indicates that a local government-backed investment unit is (1) a legally independent corporation or institution, with (2) a specific local government as the only or dominant owner that (3) invests in (and operates) urban infrastructure projects.

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

Using the detailed information about the bond issuers in the WIND database, we screen each bond for features that match the State Council local government-backed investment units definition. For example, we first check whether the bond issuer is owned by a provincial-, city-(prefectural), or county-level local government. Next, for all bonds linked to a governmental entity we determine whether the funds raised are designated for investment on urban infrastructure or other government projects. Thus, we identify 2,452 LGBIU bond issues, or 24.5% of all corporate bonds. As detailed in Table 1, the LGBIU issues comprise 1,956 long-term bonds (or 79.8%), 406 medium-term notes (or 16.6%), with the rest from short-term commercial paper and other types. LGBIU bonds are primarily traded in the inter-bank market (1,632 bonds, or 66.6%) and on the Shanghai Exchange (784 bonds, or 32.0%).

Table 2 reports the distribution LGBIU 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 30 provincial government units account for 533 LGBIU bonds (or 21.7%); 259 prefectural-cities issued 1,106 bonds (or 45.1%); district governments within 77 prefectural-cities issued 463 bonds (or 18.8%); and 123 county or county-level cities issued 354 bonds (or 14.4%). 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 22.6 bonds per issuer compared to the 10.1 bonds per issuer in the middle region and 14.7 bonds per issuer in the west region.

Panel A of Figure 3 shows the total volume of LGBIU bonds issued each year, while Panel B displays the bonds' outstanding balances. Prior to 2008, the total volume of LGBIU bonds was very small with less than 100 LGBIU 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 LGBIU 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 2013, the total amount outstanding had increased to 3.02 trillion yuan RMB.

Figure 4 indicates that the issuance of LGBIU bonds shifted to lower level (or more local) governments during recent years. For example, by the end of 2013, LGBIUs associated with provincial-level governments accounted for about one-fourth (25.93%) of issues while prefectural-level city governments comprised 44.82%, with the remaining from district- and county-level governments. In contrast, county level government units did not issue any LGBIU debt prior to 2007.

Corresponding to the growth in debt issuance by smaller government units, Figure 5 illustrates the rapid decline in issuers' ratings. Currently the rating is not compulsory for bonds in China, but each bond issuer (i.e., LGBIUs in our case) is required to be rated. In most cases, ratings are provided by local rating agencies in mainland China. Before 2007, all issuers were ranked AAA. However, since 2008 a significant number of higher risk issues have come to market. Thus, by the end of 2013, AAA-rated LGBIUs accounted for 14.28% of the total outstanding bond volume and 63.35% of LGBIUs were rated as AA or below.

The maturity structure of LGBIU debt has also changed substantially between 2003 and 2013. As noted in Figure 6, the average maturity of LGBIU bonds issued before 2007 was more than 10 years, but it decreased to 8.68 years in 2008 and 7.29 years in 2009, and has fluctuated between 7 and 8 years after that. At the end of 2013, the average remaining maturity for the outstanding bonds was 6.76 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 LGBIU bond with a China treasury bond having a maturity date within three months of the LGBIU bond maturity date. In general the yield spread increased from around 1% at the beginning of the sample period to about 3% after 2008.

We next merged the LGBIU bond dataset with several other sources to obtain comprehensive statistics on local government finances. As Chinese law requires each corporation 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 each LGBIU issuer. 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 LGBIUs on behalf of local governments. For each LGBIU 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, for 90 cities we also introduce the monthly constant quality housing price index discussed in Wu, Deng and Liu (2014), which provides a direct link between the LGBIU 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 LGBIU bonds is 6.5% and ranges between 3.98% and 10.5%. The majority of bonds (77%) are fixed-coupon and do not have any credit enhancements (60.8%). In terms of

intended use of funds, we see that over a quarter of the bonds (26.7%) were issued to fund local transportation infrastructure projects and 34% were used to fund public housing projects. However, it is also interesting to note that 39% of the capital raised went to the LGBIUs' "operating fund" without specific usages.

Since the WIND database also reports quarterly transaction prices for each bond, we calculate the bonds' quarterly returns 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 returns and yield spreads of all outstanding bonds. On average, the LGBIU bonds have earned a quarter return of 6.2% with relatively high volatility (ranging between 18% and -26%).

As for our major interest in this research, in Figure 8 we report the quarterly series year-on-year growth rate of the national level constant-quality housing price index by Wu, Deng and Liu (2014), and compare it with the yield spread depicted in Figure 7. The analysis provides preliminary evidences of a negative relationship between LGBIU bonds' yield spread and previous housing price growth, although we leave more conclusive discussion to the following empirical analysis.

Initial Yield Spread and Housing Risk

Our investigation of the China municipal bond market begins by recalling that most LGBIU entities rely on land sales to facilitate coupon and principal payments. Thus, our analysis begins by assuming that market participants price expectations of local housing price risk in LGBIU bonds. To analyze this risk, we follow the modeling set-up of Ambrose and Warga (1992) to supplement the standard structural models of bond yield spreads derived in the literature to include

a variable reflecting local housing market risk. Thus, we test the hypothesis that bonds issued by LGBIU 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 securities is a function of many factors including issue size, age, coupon, and general economic trends.[7]

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

$$r_{i,L} - r_{i,T} = \alpha + \beta_1 E\left(R_{i,H}\right) + \beta_2 B_i + \beta_3 L_i + \varepsilon_i$$

where $r_{i,L}$ is the return to LGBIU bond i and $r_{i,T}$ is the return to the China Treasury bond with maturity closest to the LGBIU bond i, $R_{i,H}$ is the return to the local housing market associated with bond *i*'s LGBIU during the previous 12 months, 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 (medium-term or short-term), coupon payment type (fixed, adjustable or progressive), initial bond rating, 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 LGBIU. The specific factors associated with the LGBIU's include the log of total assets, estimated earnings (EBITDA/total assets), and total debt (Liability/total assets). The differences in local governments include a set of dummy variables capturing the expected use

[7] 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 funds (i.e. transportation infrastructure, housing, etc.), the log of the population, log of the per capita GDP, and a set of dummy variables reflecting the government level (city, county, districts, or prefectural).

Table 5 presents the results for the regression of offering yield spread levels. Columns (1) and (2) present the baseline regression controlling for the bond specific factors (*B*) traditionally related to liquidity and credit risk. As expected, we find a positive and non-linear relation between offering yields and bond maturity. The significant coefficients indicate that yield spreads increase with long-term bonds. Interestingly, we see a negative relation between adjustable and progressive payment structures and offering yields. We note that including bond rating fixed effects (column 2) does not the results.

In columns (3) and (4) of Table 5, we include a set of variables to capture differences across the LGBIUs. First we note that larger LGBIUs, as reflected in total assets, have lower yield spreads. Second, we see that initial offering yields are lower for LGBIUs with higher earnings (as measured by the ratio of EBITDA to total assets.) Finally, we also find a negative coefficient for LGBIU total liabilities (scaled by total assets) indicating that LGBIUs with higher debt have lower offering yields. While at first this finding is counter-intuitive, we note that LGBIU leverage accounts include bank borrowing as well as other debt offerings. Thus, to the extent that banks provide monitoring activities, greater use of debt by LGBIU may provide a signal of credit quality allowing them to issue new debt at lower offering yields. Column (4) expands the set of LGBIU factors to include a set of fixed-effects denoting the anticipated use of the funds.

Table 5, Column (5) reports the results that introduces controls for differences across the local governments that created the LGBIUs. Interestingly, neither size (population) or GDP appear to have any impact on offering yields, however governments with higher budgetary expenses

(relative to income) have higher offering yields. This is consistent with the market anticipating that local governments that have greater claims on existing income are higher risk. We also observe that relative to prefectural level governments, bonds issued by LGBIUs back by county governments have higher offering yields while bonds issued by capital cities have lower yield spreads.

Finally, column (6) reports the results including 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 statistically significant. This is consistent with the hypothesis that areas with higher anticipated house price growth are able to borrower at lower costs. Since the majority of LGBIUs rely on land sales to cover coupon and principal payments, the results are consistent with investors pricing the housing market into the offering yields.

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 2013:

$$\Delta\left(r_{i,L,t} - r_{i,T,t}\right) = \gamma_0 + \gamma_1 \Delta R_{i,H,t} + \gamma_2 \sigma_{i,H} + \gamma_3 \Delta \left({}^{Exp}/_{Inc}\right)_{i,t}$$

$$+ \gamma_4 \Delta GDP_{i,t} + \gamma_5 \Delta Assets_{i,t} + \gamma_6 \Delta({}^{Liab}/_{Asset})_{i,t} + \gamma_7 \Delta({}^{EBITDA}/_{Asset})_{i,t} + \gamma_7 B_i + \varepsilon_{i,t}$$

where Δ represents the first difference for each variable for each bond; $R_{i,H,t}$ is the housing price growth rate for LGBIU locality i; $\sigma_{i,H}$ is the standard deviation in the monthly housing price growth

rate over the previous 24 months; GDP_i represents the local LGBIU GDP, $Assets_i$ is the LGBIU *i*'s total assets, *Liab/Asset* is the ratio of total liabilities to total assets for LGBIU *i*; *EBITDA/Asset* is the ratio of LGBIU *i*'s earnings over total assets; and B_i represents the set of individual bond fixed effects.

Table 6 reports the estimated coefficients for the change in yield spread regression. Columns (1) and (2) report the base model focusing on the risk associated with changing housing market returns. Column (2) incorporates bond fixed effects to control of differences across bonds and issuers. 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 markets real estate values (as reflected by increases in housing market returns). The negative coefficient indicates that bonds issued by LGBIUs in areas with higher housing returns have lower yields, reflecting a decline in the risk premium. The negative relation is expected since LGBIUs rely predominately on land sales to fund coupon and principal repayments.

In columns (3) and (4) of Table 6, we incorporate specific risk factors associated with LGBIUs. In these specifications, the standard deviation of the local housing market (a measure of housing risk) is now statistically significant. The positive coefficient indicates that higher housing volatility is related to higher LGBIU bond yields. Again, this is consistent with investors pricing the risk associated with local housing markets in the LGBIU bonds. In addition, we find a negative and statistically significant coefficient on the change in LGBIU liability ratio. This suggests that LGBIUs that increase their leverage have a negative impact on the changes in bond yield. While at first counter-intuitive, this result is consistent with the notion that an increase in a LGBIU's leverage ratio (which most likely occurs due to additional bank borrowing) implies greater monitoring and financial strength. Finally, and somewhat surprising we find a positive (and

statistically significant) coefficient for the change city GDP. This suggests that LGBIU yield spreads increase when the local city experiences an increase in economic activity. While somewhat counter-intuitive, the increase in yield spread corresponding to an increase in GDP is consistent with the theory that areas with positive economic growth are less likely to receive transfer payments from the central government and thus will have to rely on other revenue sources (including additional land sales) to fund required infrastructure investments. Thus, to the extent that such additional land sales compete with existing commitments by the LGBIU to sell property to fund debt coupon and principal payments, investors will view these activities as increasing the risks associated with existing LGBIU debt.

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 market 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.

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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 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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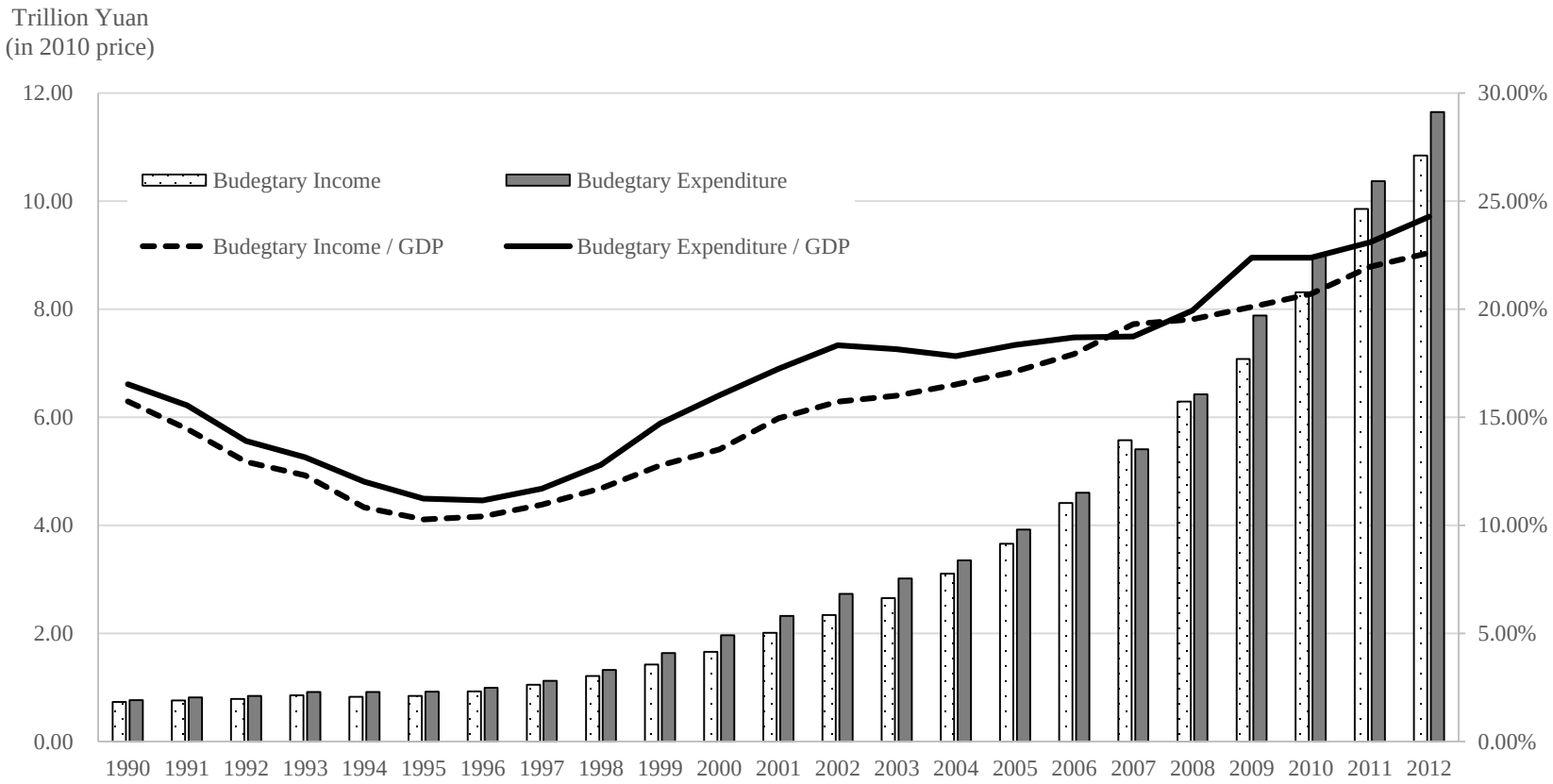


Figure 1: Budgetary Income and Expenditure of Chinese Government

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

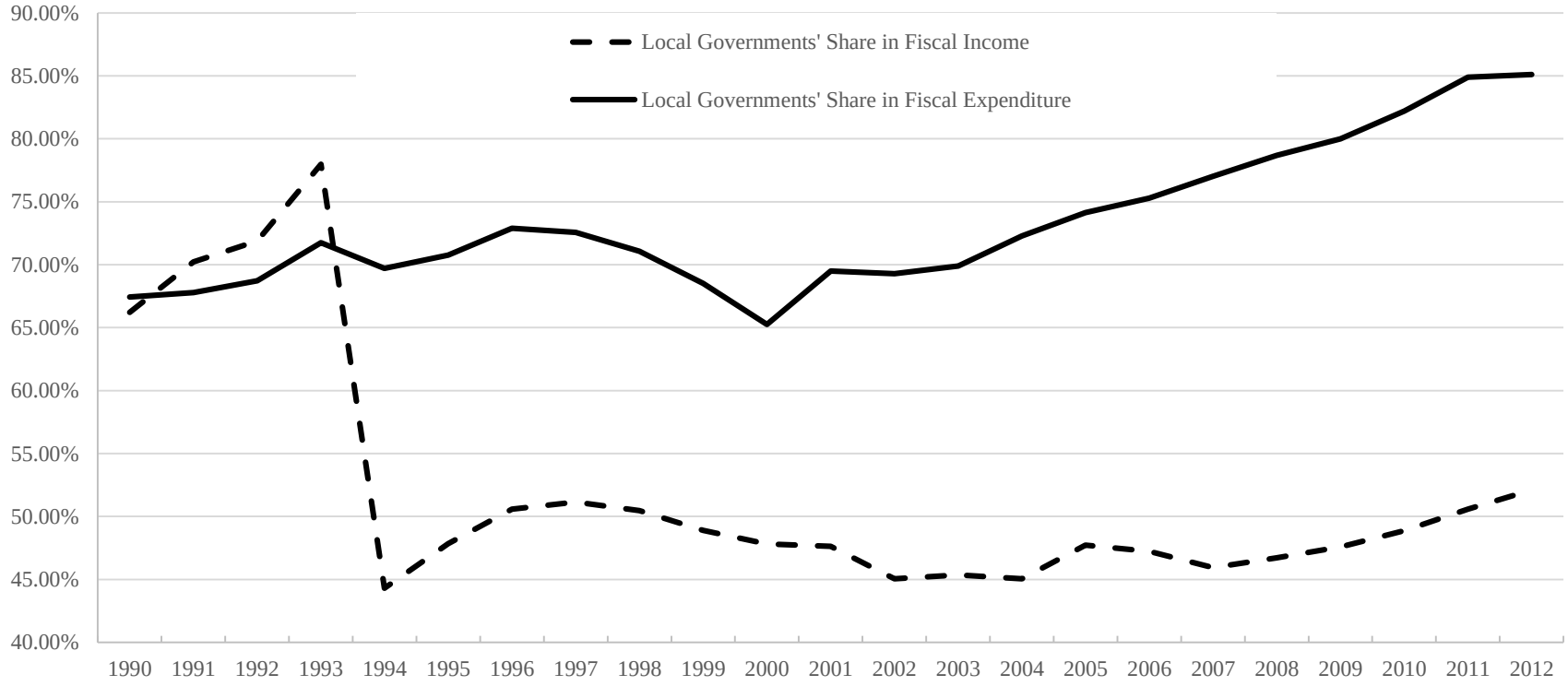
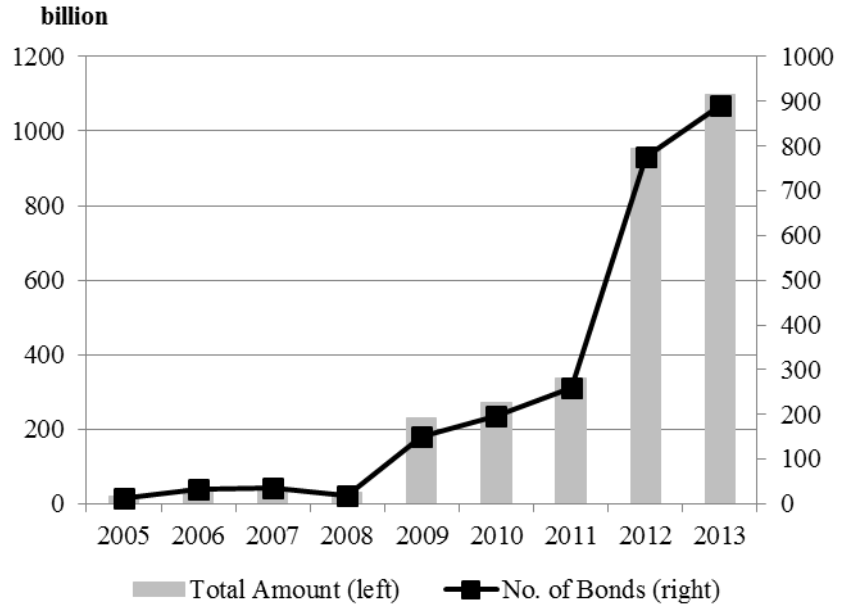
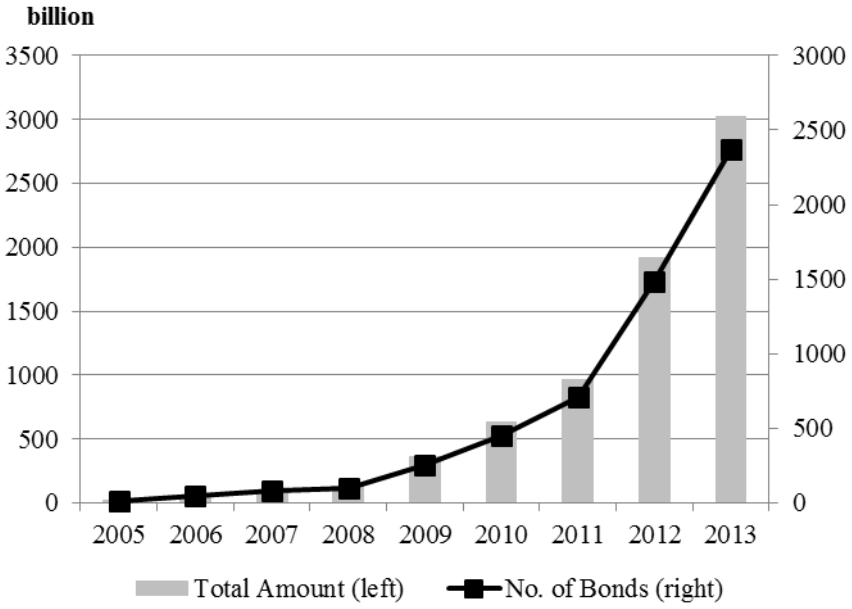


Figure 2: Local Governments' Share in Total Budgetary Income and Expenditure

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

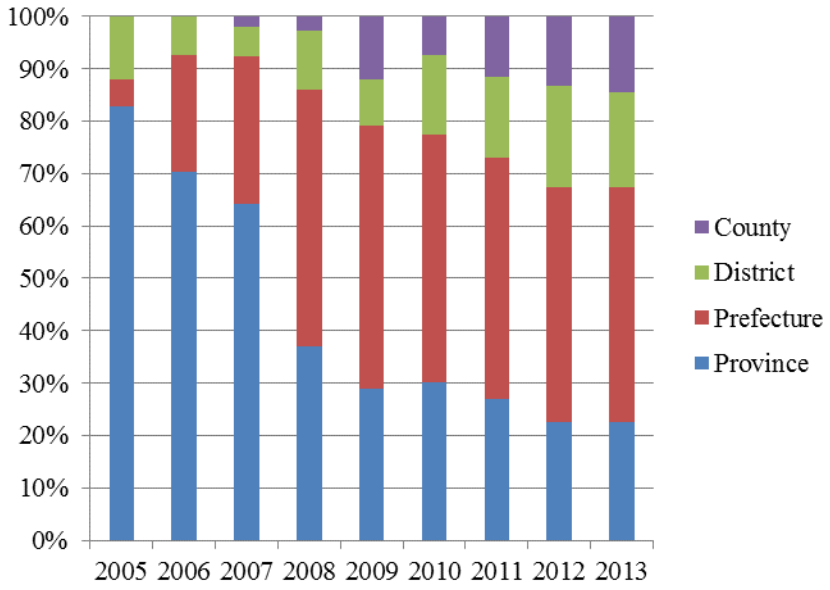


(A) Bonds Issued during the Year

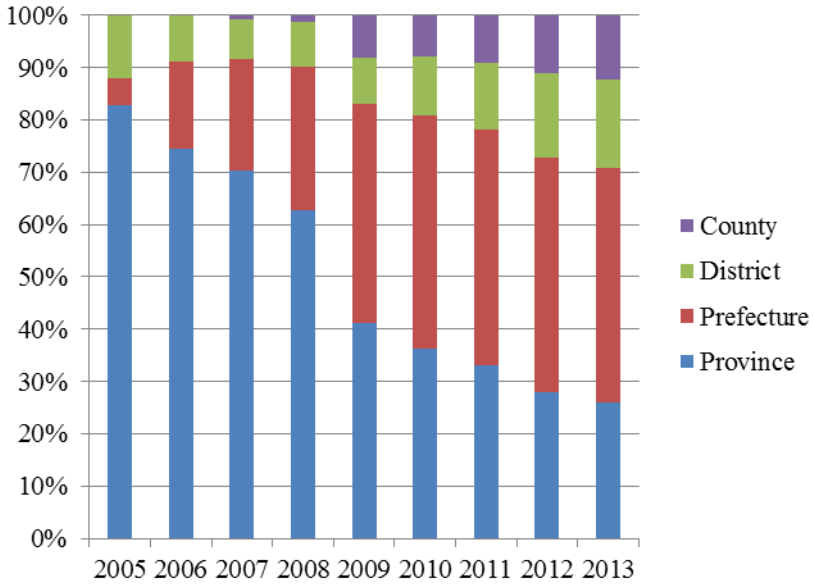


(B) Outstanding Bonds at the End of the Year

Figure 3: Total Volume of LGBIU Bonds

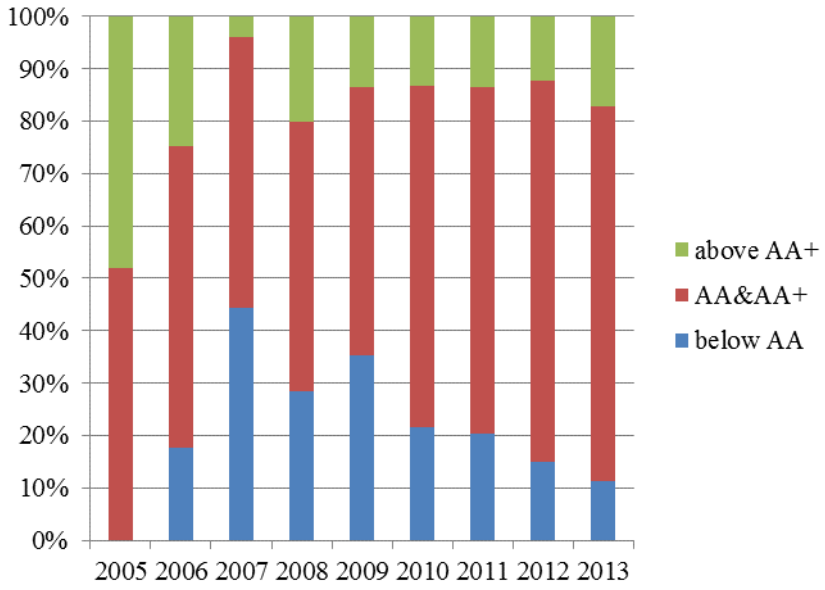


(A) Bonds Issued during the Year

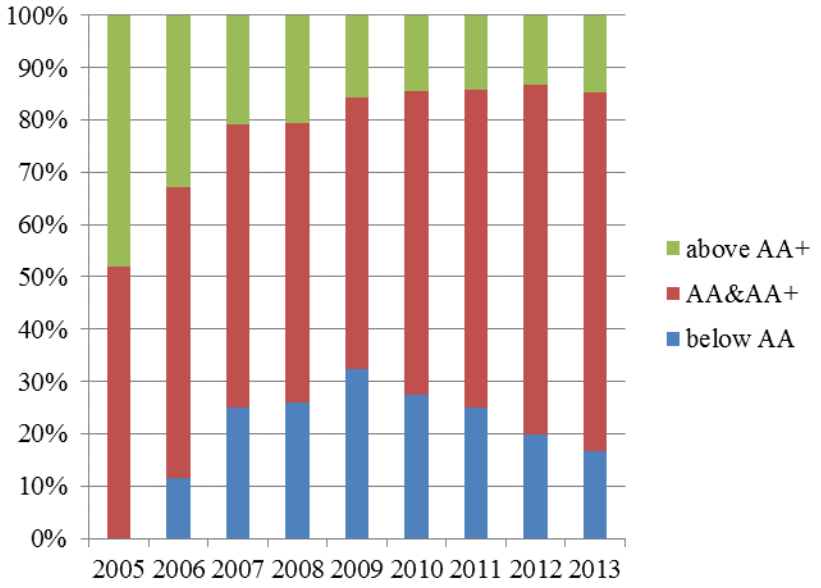


(B) Outstanding Bonds at the End of the Year

Figure 4: Structure of Corresbonding Governmnt Levels



(A) Bonds Issued during the Year



(B) Outstanding Bonds at the End of the Year

Figure 5: Structure of Bond Issure Ratings

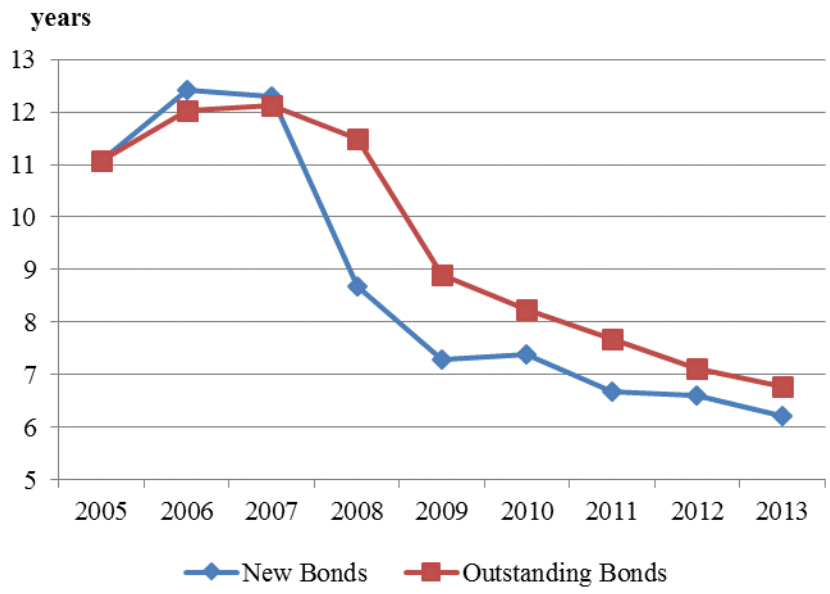
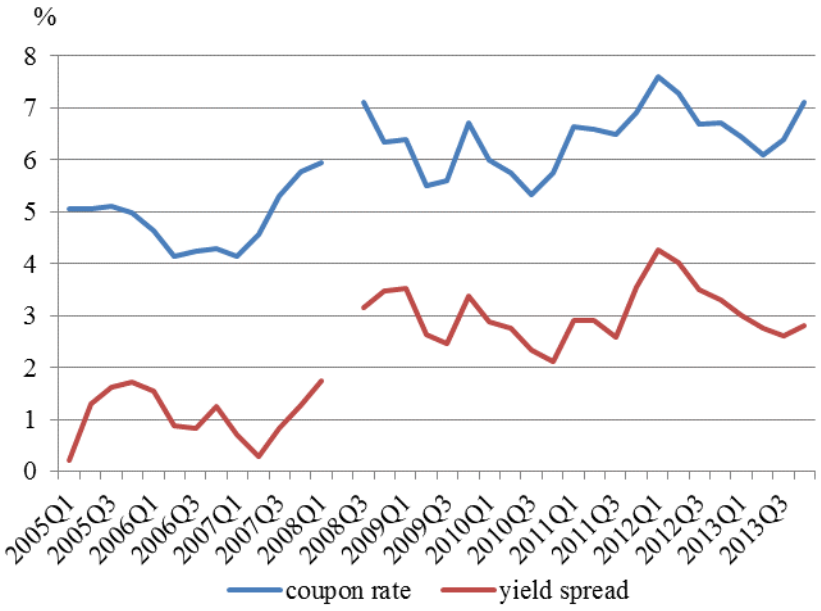
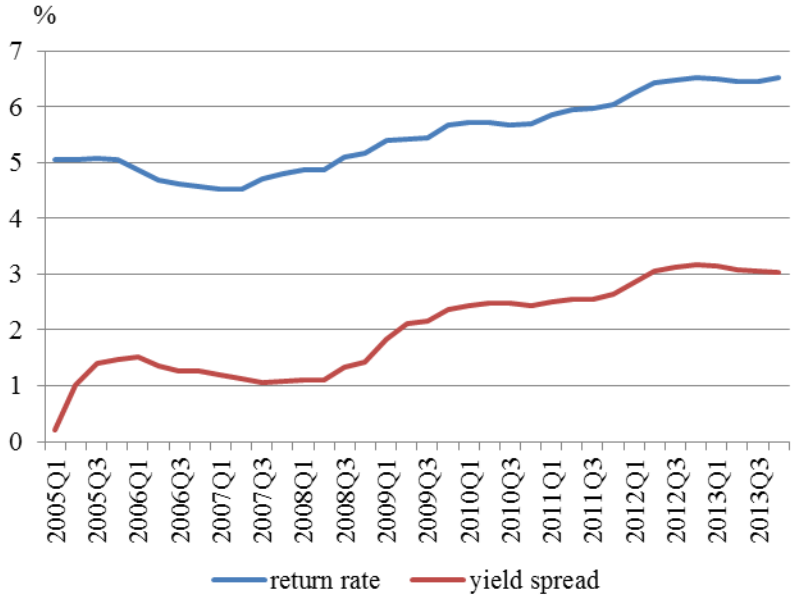


Figure 6: Average Maturity of LGBIU Bonds

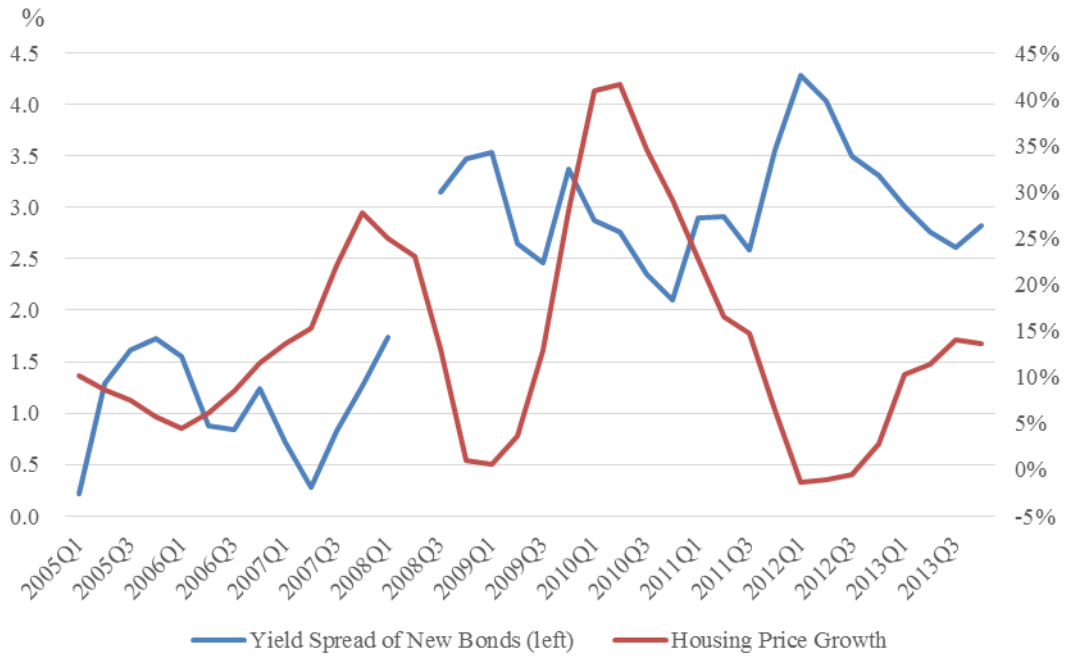


(A) Bonds Issued during the Quarter



(B) Outstanding Bonds at the End of the Quarter

Figure 7: Structure of Corresbonding Governmnt Levels



(A) Comparison with New Bonds



(B) Comparison with Change of Outstanding Bonds

Figure 8: Structure of Corresbonding Governmnt Levels

Table 1: Number of Bonds in the Sample

		All Bonds Issued by Corporates	LGBIU Bonds
	Total	10,015	2,452
Market	Inter-Bank Market	8,055	1,632
	Shanghai Exchange	1,462	784
	Shenzhen Exchange	427	33
	Others	71	3
Bond Type	Corporate Bonds	3,421	1,956
	Medium-Term Notes	2,040	406
	Short-Term Commercial Paper	4,210	56
	Others	344	34

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 Internval between Two Issuing by each Gov. (in days)
Provincial Level Governments	17.767	26415.333	219.385
Prefectural-Level City Governments	4.254	5205.500	263.384
District Governments in Cities	6.013	6625.195	157.535
County/County-Level City Governments	2.878	3028.618	242.456
East Region	22.625	6788.251	235.207
Middle Region	10.177	4961.667	250.714
West Region	14.679	6173.723	192.148

Table 3: Major Summary Statistics at Bond Issuing

	Average	Std. Dev.	Max.	Min.
A. Bond Information				
Amount (in million yuan RMB)	1273.323	778.849	10000	50
Coupon Rate (in %)	6.513	1.024	10.500	2.980
Yield Spread (in %; see text for more details)	3.026	1.005	6.713	-3.825
Maturity (in months)	81.166	25.665	240	12
Rate Type				
- Fixed Rate (dummy)	0.771	0.420	1	0
- Adjustable (dummy)	0.017	0.130	1	0
- Progressive (dummy)	0.212	0.408	1	0
Credit Enhancement Arrangement				
- With Collateral (dummy)	0.161	0.368	1	0
- With Warrant (dummy)	0.231	0.421	1	0
- Without Any Enhancement (dummy)	0.608	0.488	1	0
Usage				
- Others	0.024	0.152	1	0
- Transportation Infrastructure (within city)	0.267	0.442	1	0
- Transportation Infrastructure (between cities)	0.177	0.382	1	0
- Electricity Supply	0.037	0.188	1	0
- Gas Supply	0.020	0.140	1	0
- Heating Supply	0.008	0.091	1	0
- Telecom Infrastructure	0.002	0.041	1	0
- Water Supply	0.088	0.283	1	0
- Sewage	0.098	0.297	1	0
- Disaster Protection	0.033	0.178	1	0
- Waste Treatment	0.075	0.264	1	0
- Flood Control	0.063	0.242	1	0
- Public Housing	0.343	0.475	1	0
- Culture, Education, Health	0.023	0.150	1	0
- Industrial Parks	0.094	0.292	1	0
- Operating Fund	0.390	0.488	1	0
- Industrial	0.060	0.238	1	0
- Urban Redevelopment	0.061	0.240	1	0
B. Issuer Information				
Total Asset (in million yuan RMB)	33531.8	66072.1	1112306	608.7
Liablity / Asset (in %)	0.036	0.025	0.275	0.000
EBITDA / Asset (in %)	48.247	17.594	90.803	0.314
Rateing				
- AAA	0.085	0.279	1	0
- AAA-	0.002	0.045	1	0
- AA+	0.166	0.372	1	0
- AA	0.528	0.499	1	0

- AA-	0.200	0.400	1	0
- A+	0.016	0.126	1	0
- A	0.001	0.035	1	0
- A-	0.000	0.020	1	0
- BBB	0.000	0.020	1	0
- BBB-	0.001	0.029	1	0
C. City Attribute				
Population (in million)	7.983	7.089	29.712	0.069
GDP per capital (in thousand yuan RMB)	60.977	29.837	191.911	8.477
Ratio between local fiscal expenditure and local fiscal revenue	1.697	1.009	14.577	0.650
Accumulative housing price growth during the previous 12 months (in %)	7.692	13.440	80.342	-51.966
Standard deviation of monthly housing price growth during the previous 24 months	0.030	0.030	0.350	0.005

Table 4: Major Summary Statistics of the Quarterly Panel Data

	Average	Std. Dev.	Max.	Min.
A. Bond Information				
Return Rate (in %)	6.219	1.198	18.004	-26.691
Yield Spread (in %; see text for more details)	2.688	1.229	14.230	-31.029
Maturity (in months)	69.339	25.620	220.700	7.867
B. Bond Information				
Total Asset (in million yuan RMB)	46080.19	89406.76	1247680	608.69
Liablity / Asset (in %)	5.788	12.028	170.585	-0.743
EBITDA / Asset (in %)	52.168	15.966	92.148	0.314
C. City Attribute				
Population (in million)	8.310	7.632	29.450	0.068
GDP per capital (in thousand yuan RMB)	57.595	28.709	182.680	6.475
Ratio between local fiscal expenditure and local fiscal revenue	1.715	1.046	14.577	0.188
Accumulative housing price growth during the previous 12 months (in %)	9.040	12.688	81.165	-59.740
Standard deviation of monthly housing price growth during the previous 24 months	0.029	0.026	0.405	0.005

Table 5: Offering Yield Spread Determinates

	(1) Offering Yield Spread	(2) Offering Yield Spread	(3) Offering Yield Spread	(4) Offering Yield Spread	(5) Offering Yield Spread	(6) Offering Yield Spread
log(Maturity)	2.4556	3.3953	2.9370	3.5319	3.9919	0.9999
	(0.3878)***	(0.3632)***	(0.3792)***	(0.4353)***	(0.5805)***	(0.6676)
log(Maturity)^2	-0.8846	-0.8969	-0.7593	-0.8790	-0.9972	-0.0294
	(0.1013)***	(0.0935)***	(0.0981)***	(0.1108)***	(0.1509)***	(0.1832)
Bond Type						
- Corporate Bond	*default*	*default*	*default*	*default*	*default*	*default*
- Medium-term Note	-1.2008	-0.5223	-0.3969	-0.3560	-0.4035	-0.3531
	(0.0595)***	(0.0541)***	(0.0555)***	(0.0609)***	(0.0726)***	(0.0801)***
- Short-Term	0.8605	2.9752	2.7442	3.4630	3.7888	1.7116
Commercial Paper	(0.3993)**	(0.3737)***	(0.3858)***	(0.4418)***	(0.5782)***	(0.6293)***
Rate Type						
- Fixed	*default*	*default*	*default*	*default*	*default*	*default*
- Adjustable	-0.2878	-0.2373	-0.1009	-0.0758	-0.0075	0.0968
	(0.1311)**	(0.1050)**	(0.1067)	(0.1077)	(0.1138)	(0.1369)
- Progressive	-0.0830	-0.1658	-0.1099	-0.1055	-0.1085	-0.2261
	(0.0430)*	(0.0351)***	(0.0368)***	(0.0388)***	(0.0426)**	(0.0592)***
Market						
- Inter-Bank	*default*	*default*	*default*	*default*	*default*	*default*
- Exchanges	-0.0693	-0.0406	-0.0347	-0.0334	-0.0366	-0.0182
	(0.0390)*	(0.0314)	(0.0319)	(0.0316)	(0.0325)	(0.0407)
Credit Enhancement						
- No		*default*	*default*	*default*	*default*	*default*
- Collateral		-0.0018	-0.0019	-0.0042	-0.0287	-0.0818
		(0.0478)	(0.0493)	(0.0495)	(0.0513)	(0.0802)
- Warrant		-0.5137	-0.4872	-0.4840	-0.4076	-0.2471
		(0.0389)***	(0.0397)***	(0.0398)***	(0.0424)***	(0.0538)***
log(total asset)			-0.1750	-0.1969	-0.1880	-0.2198
			(0.0545)***	(0.0551)***	(0.0624)***	(0.0750)***

EBITDA/Total Asset			-3.5430	-3.1566	-2.8001	-3.9607
			(0.5965)***	(0.6064)***	(0.7126)***	(0.9558)***
Liability/Total Asset			-0.0048	-0.0045	-0.0035	-0.0015
			(0.0010)***	(0.0010)***	(0.0011)***	(0.0014)
Government Level						
- Prefectural					*default*	*default*
- Districts					0.0547	0.0566
					(0.0472)	(0.0553)
- Counties					0.1952	0.1339
					(0.0522)***	(0.0673)**
- Capital Cities					-0.2257	-0.1373
					(0.0758)***	(0.0827)*
log(population)					-0.0713	-0.0513
					(0.0564)	(0.0763)
log(per capita GDP)					0.0168	-0.2339
					(0.1029)	(0.1600)
Budgetary Expense /Budgetary Income					0.0788	0.0231
					(0.0192)***	(0.0498)
Accumulative housing price growth during the previous 12 months						-0.7973
						(0.1443)***
Constant	-0.6156	-3.3993	-2.1443	-2.9358	-3.3920	0.0271
	(0.3815)	(0.3645)***	(0.4098)***	(0.4611)***	(0.8597)***	(1.1665)
Fund Usage Fixed Effects	No	No	No	Yes	Yes	Yes
Firm Rating Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
N	2452	2416	2258	2236	1878	1005
R^2	0.231	0.483	0.497	0.514	0.496	0.605

Table 6: Changes in Yield Spread and Local Housing Risk

	(1) Quarterly	(2) Quarterly	(3) Annual	(4) Annual
dlog(Maturity; in days)	0.0383	3.4260***	-0.7886***	0.2042
	(0.3078)	(0.6014)	(0.2919)	(0.6564)
d(Y-o-Y Housing Price Growth Rate)	-0.9685***	-0.7783***	-2.3136***	-2.1298***
	(0.1150)	(0.1237)	(0.1866)	(0.2537)
Standard Deviation of Monthly Housing Price Growth	0.5260	-0.1404	5.6652**	13.7742**
Rate in the Past 24 Months	(0.4041)	(0.7188)	(2.2137)	(5.9739)
d(Local Government Expenditure / Local Government			0.0559	0.2073
Income)			(0.1074)	(0.1654)
dlog(City GDP)			7.2169***	10.3106***
			(1.4018)	(2.3872)
dlog(Firm's Total Asset)			-0.9568***	-0.8106
			(0.3536)	(0.5676)
d(Liability / Asset)			-0.0088**	-0.0203***
			(0.0045)	(0.0067)
d(EBITDA / Asset)			0.0065	0.0038
			(0.0078)	(0.0162)
constant	-0.1437***	0.0606	-1.1580***	-1.3010***
	(0.0228)	(0.0427)	(0.1266)	(0.2839)
Bond Fixed Effect	No	Yes	No	Yes
N	7555	7555	1455	1455
R^2	0.01	0.11	0.13	0.48

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$