

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

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Motivation

- **Major potential threats to Chinese (and perhaps global) economy:**

“Renewed run-up in China's property prices followed by sharp correction in **property market**, and financial stress related to credit exposures on **local government financing vehicles**, are two major domestic risks (of China).”

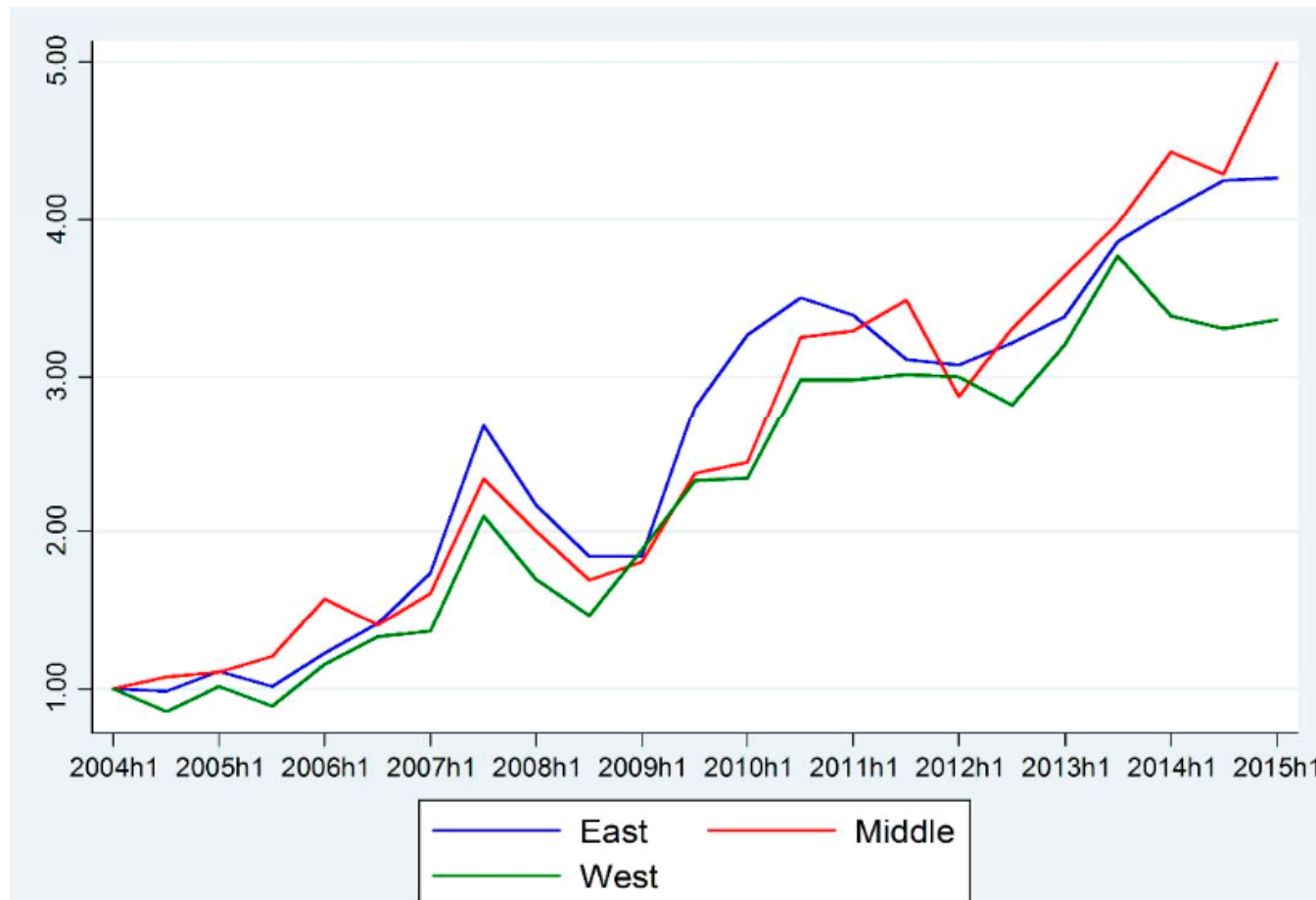
- IMF (June, 2013)

“The main channels of a possible disorderly unwinding (for China) are related to **local government financing**,, and to prospects of select sectors, particularly **real estate**, ...”

- World Bank (June, 2014)

Motivation

- Continuous land price growth during the past decade and the potential correction:



Motivation

- Remarkable short term volatility in China's land market

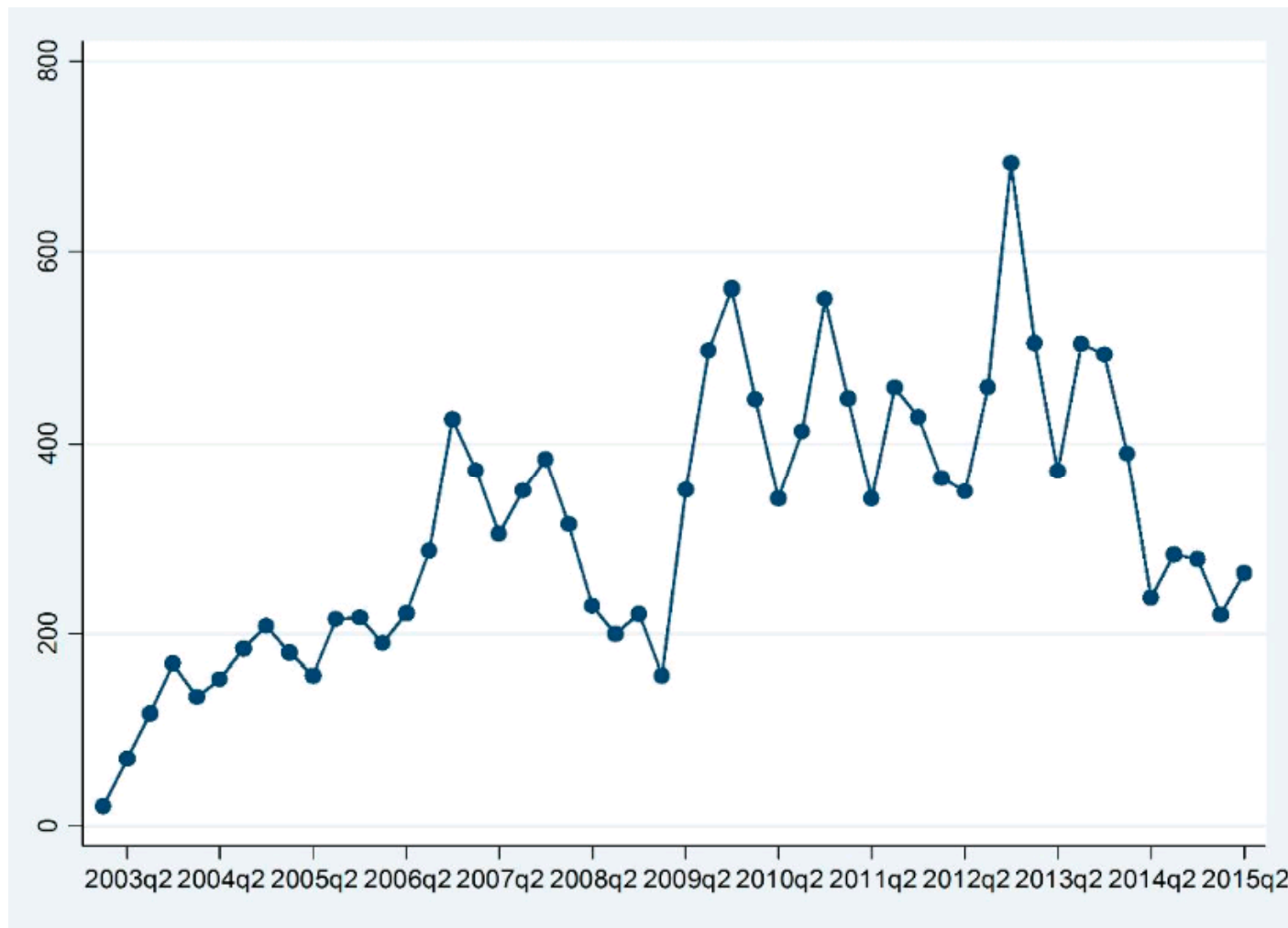
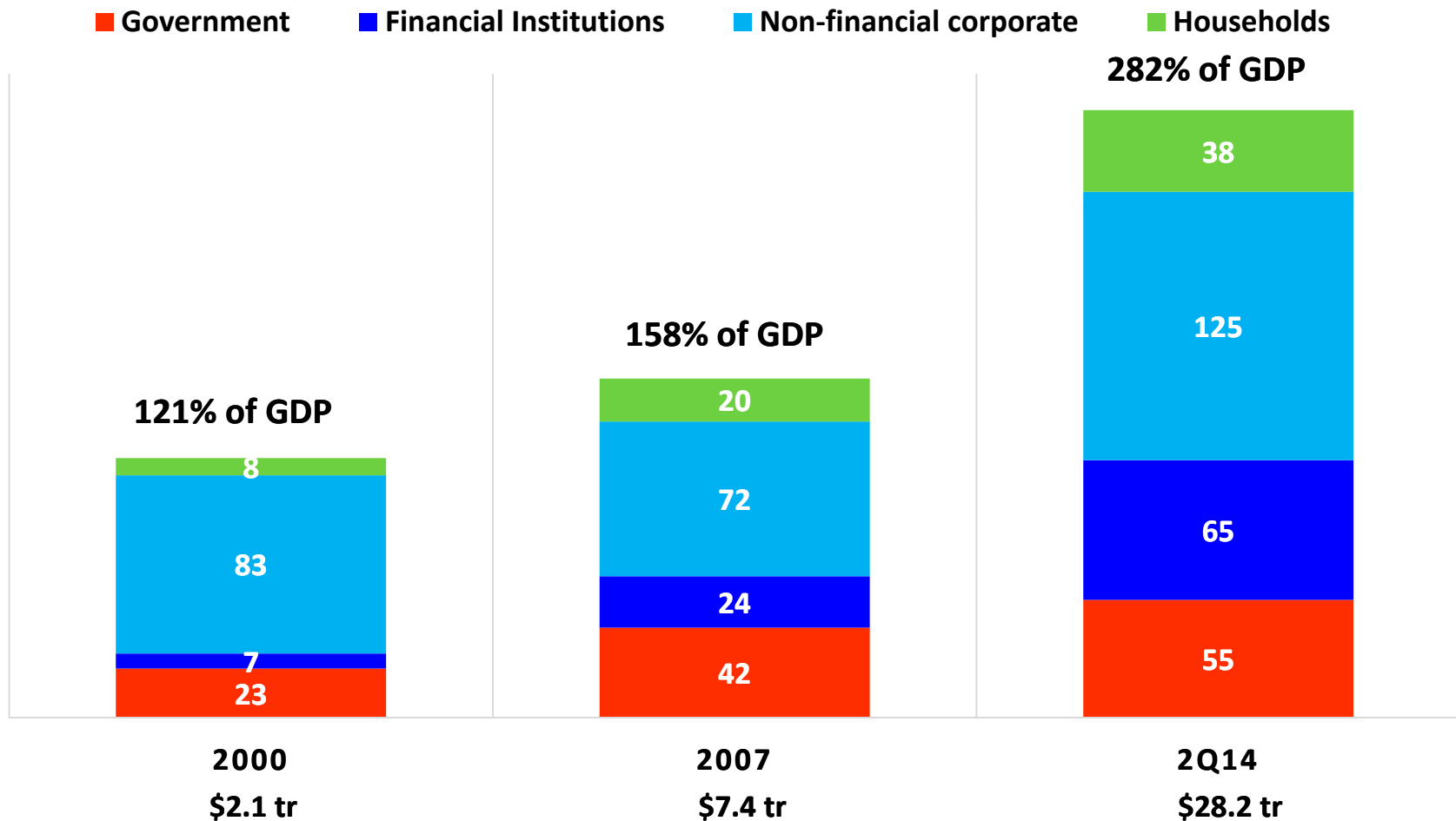


Figure 2: Number of Parcels Sold 35 Markets (Quarterly: 2003q1 – 2015q2)

Motivation

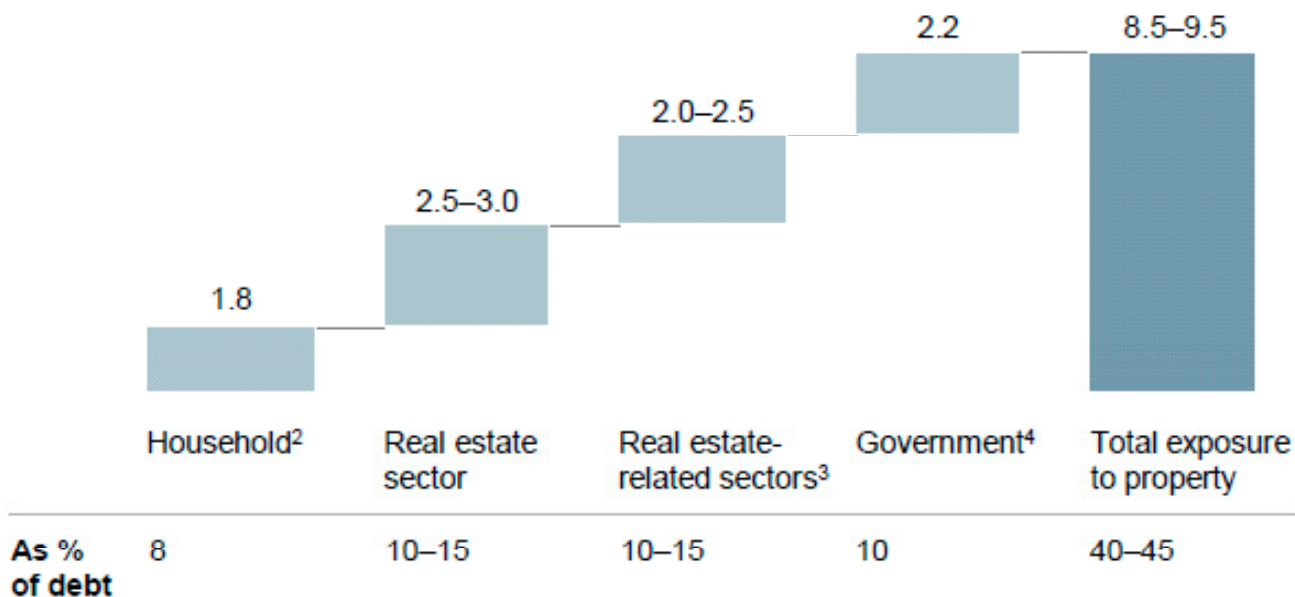
GROWTH OF CHINA'S DEBT AS % OF GDP



Motivation

Nearly half of the debts are real estate related

Debt exposure to property, real economy 2Q14¹
\$ trillion



1 Real economy debt excludes financial-sector debt.

2 Mortgages in household debt.

3 Including basic materials, mining, and other highly correlated sectors.

4 Local government financing vehicles, spending for social housing, and other construction projects.

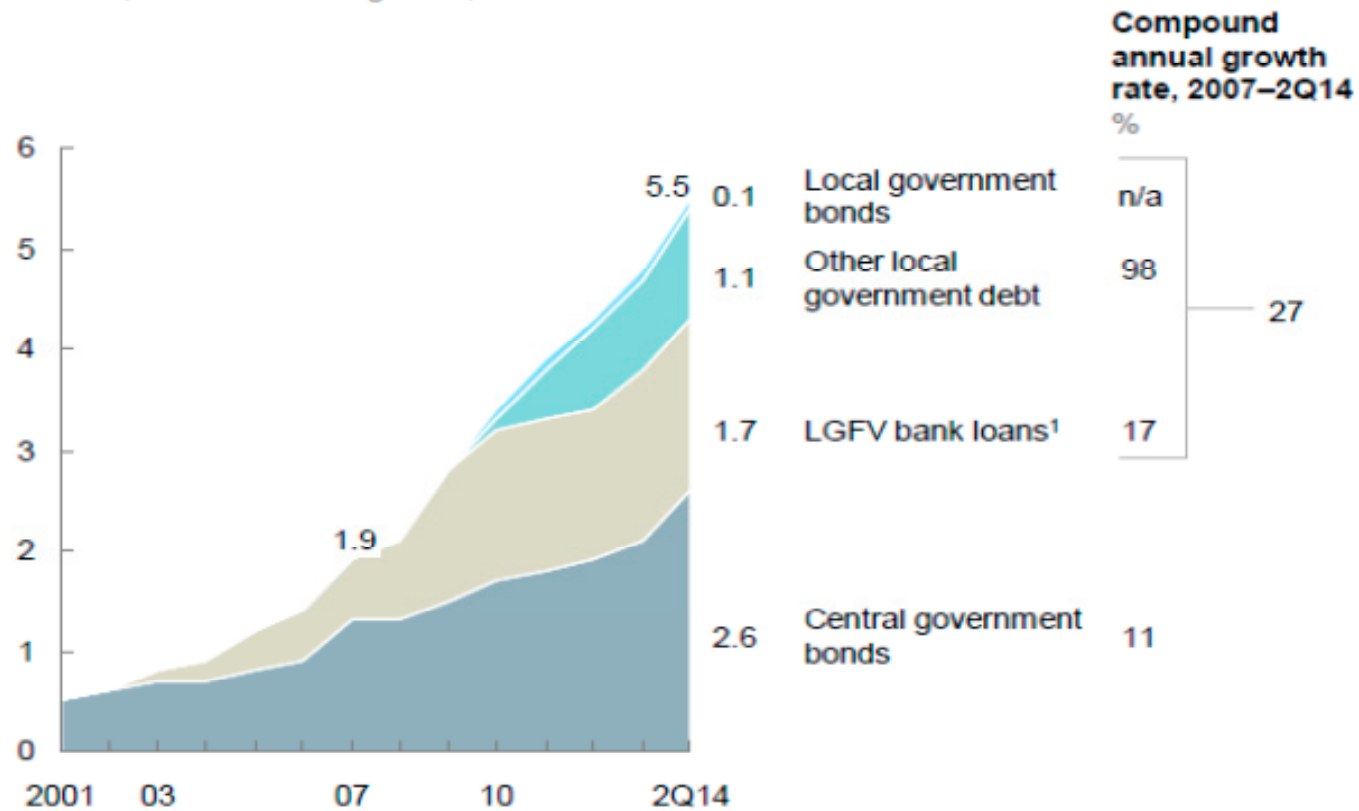
NOTE: Numbers may not sum due to rounding.

SOURCE: People's Bank of China; National Audit Office; McKinsey Global Institute analysis

Motivation

- Increasing local government debt

Outstanding balance of China's government debt by source
\$ trillion, constant exchange rate, 2013



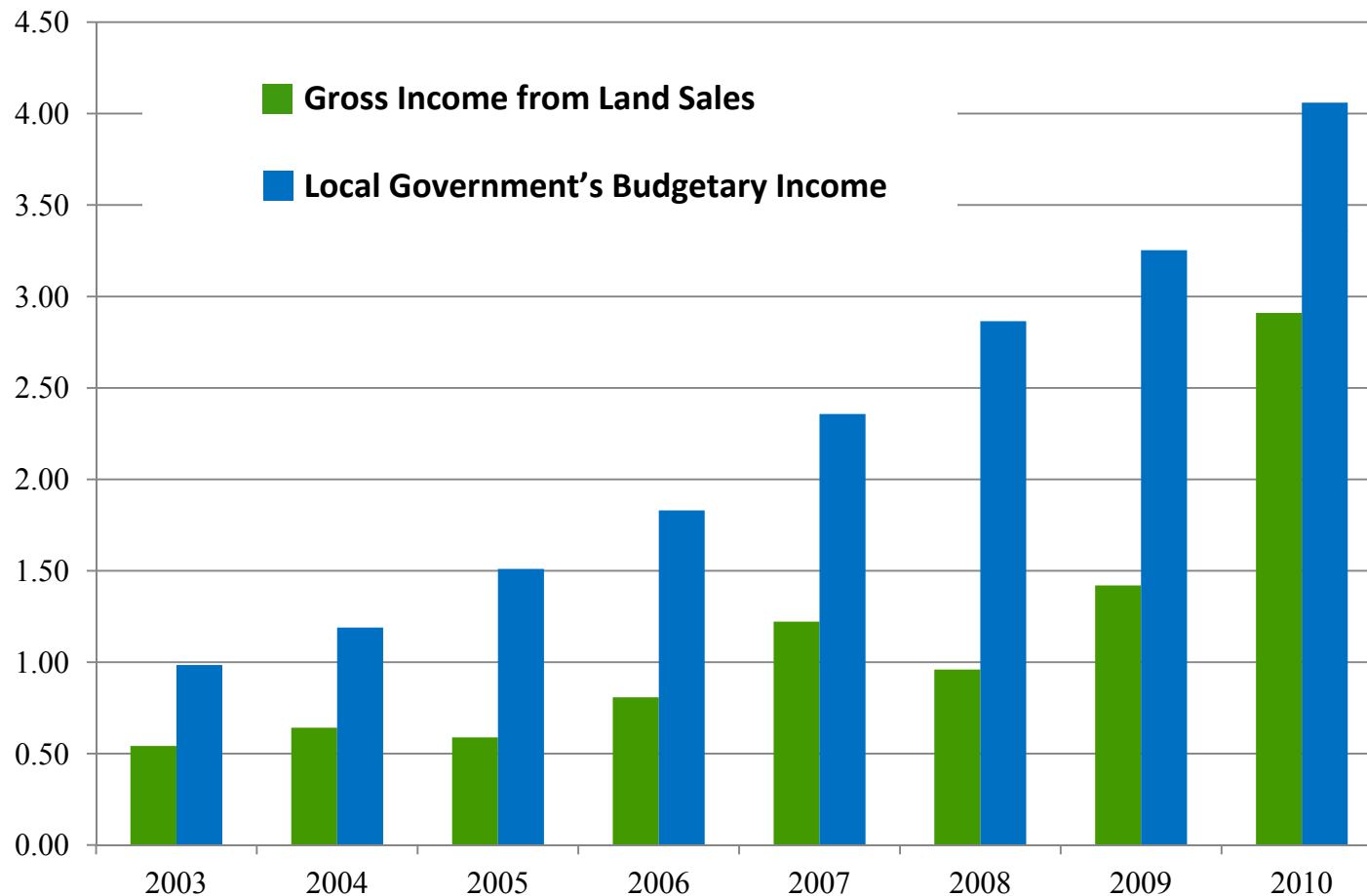
1 Local government financing vehicles.

SOURCE: People's Bank of China; National Audit Office; IMF; McKinsey Global Institute analysis

Motivation

Increasing dependence of Land sales revenue for local government

Trillion Yuan RMB



Sources: Wu, Gyourko, Deng (2012), *Regional Science and Urban Economics*.

Key Question

- Are the solvency of local government debt and local housing market risk (perceived to be) related?

Research Strategy

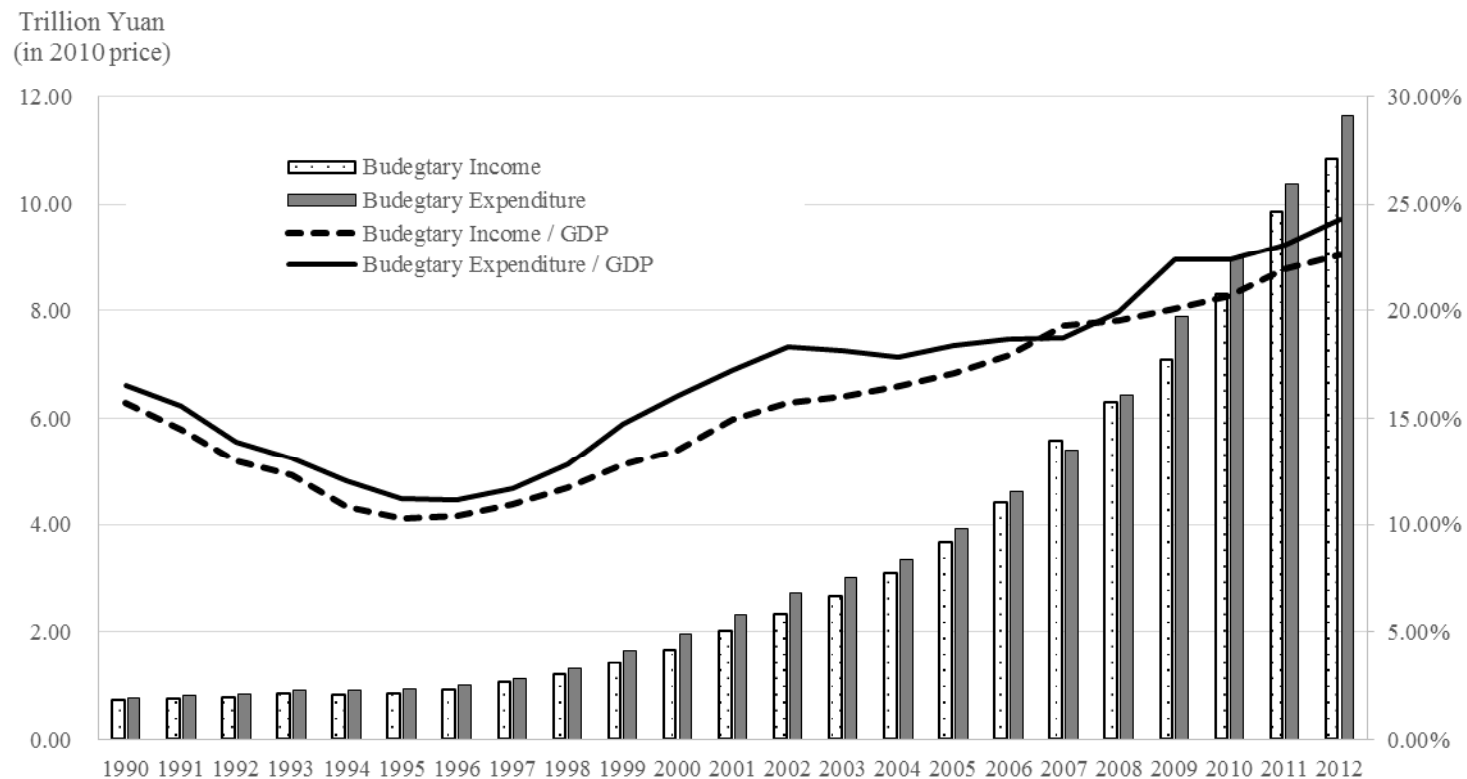
- Empirical analysis builds on standard models of yield spreads of bonds issued by LGFVs.
- Focusing on the effect of anticipated house price growths.

Main Findings

- Areas with higher expected house price growth are able to issue debts with lower risk premiums.
- The bond market also reacts to changes in local housing conditions.
- No evidence that local governments or LGFVs have taken advantage of such pattern.

Institutional Background

- Between 1995 and 2012 Chinese government budgetary expenditures increased at an average real annual growth rate of 16.1%.
- To fund these projects, the Chinese government enacted new tax provisions such that the government's budgetary income increased substantially since the mid-1990s.

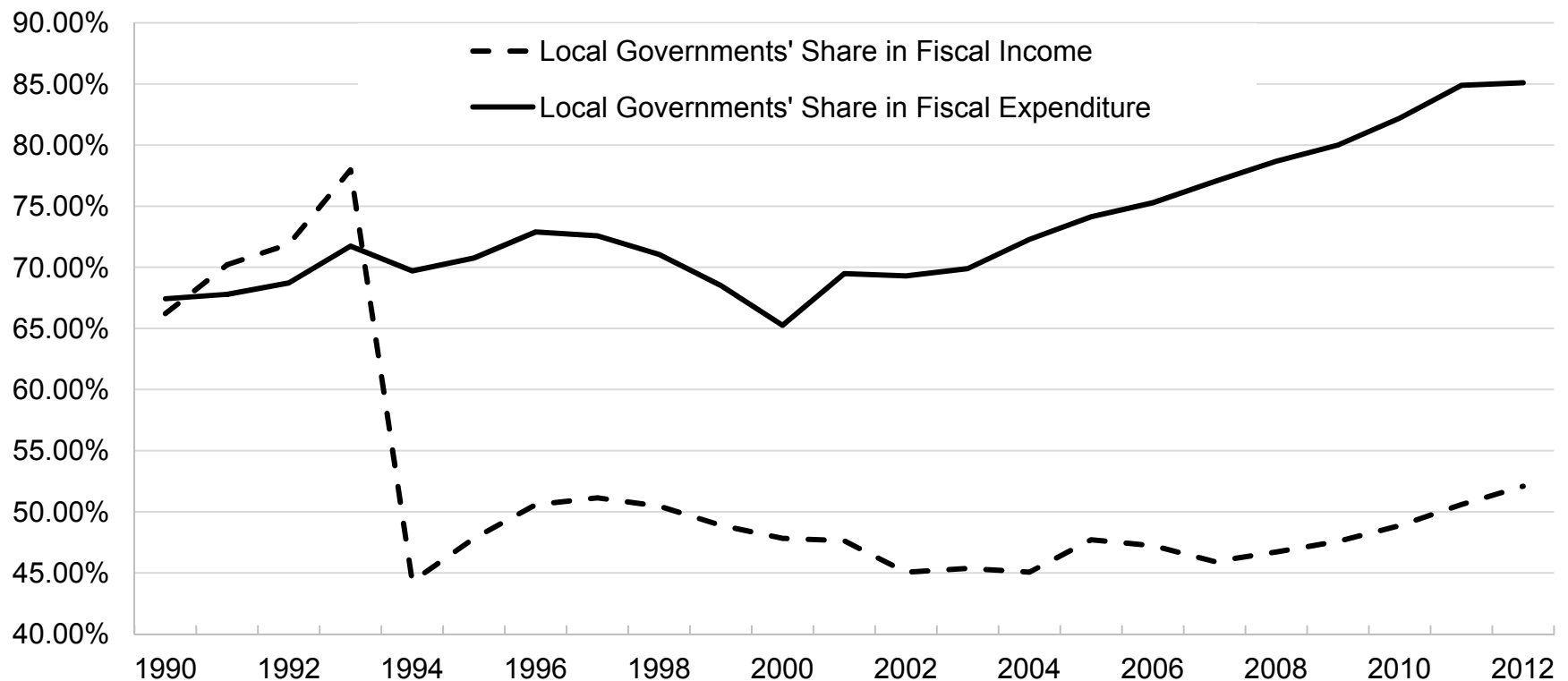


Institutional Background

- **The budgetary financial system in China:**
 - In 1994 China established a “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.
 - Central gov’t receives 75% of the VAT, local gov’t keeps 25%
 - Central gov’t: corporate income tax from financial institutions and central SOE; local gov’t: corporate income tax from other firms
 - All consumption tax goes to central gov’t
 - Personal income tax distribution: Central gov’t (60%), local (40%) from 2003

Institutional Background

- **The budgetary financial system in China:**
 - It creates substantial budgetary gap for local governments since the tax reform of 1994.



Institutional Background

- **The budgetary financial system in China:**
 - The local governments are not authorized to levy sales tax, property tax, and in general cannot directly borrow from banks or issue bonds.
 - The central government transfers a large portion of budgetary income back to local governments.
 - But the transfer payments are generally concentrated in less developed areas, and the central government also places significant restrictions on the uses of most of these funds (e.g., cannot be used for infrastructure).
 - 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.
 - Until very recently, local Chinese governments are prevented from directly issuing debt to fund mandated capital projects.

Institutional Background

- **Local Government Financing Vehicles (LGFVs):**

- A unique funding source for local governments (LGs) to supplement the direct transfers received from the central government.
- A LGFV is a state-owned enterprise (SOE) with a corresponding local government as the only or dominant share holder.
- The LGFV raises capital (via bank loans, corporate bonds, or other securities) to finance LG's investment projects.
- In return, the LG transfers land use rights, or existing assets such as highways or bridges as collateral to the LGFV in exchange for equity ownership.
- Typically the profits from the projects are not enough to repay the service of the loans/bonds, and thus LGFVs highly rely on supports from corresponding local governments (which are mainly related to land sales revenue).

Institutional Background

- **Example: Fushun Development Investment Corporation (FSDIC)**
 - Created in June 2002 by the Fushun city government with an initial capital infusion of RMB150 million.
 - In 2006, Fushun city government transferred to FSDIC a land usage right as additional paid-in capital.
 - In 2009, FSDIC acquired three solely stated-owned companies as subsidiaries.
 - 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.
 - The majority of revenue comes from the sale of land, which is used as collateral to support its bond issues.

Data

- **Detailed information on all 10,872 bonds issued by corporates in mainland China between 2003 and 2014:**
 - 8,090 bonds in inter-bank market, 2,173 on Shanghai exchange, and 496 on Shenzhen exchange
- **LGFV bonds are identified according to the list released by China Bank Regulation Commission (CBRC).**
 - Whether the bond issuer is owned by a provincial-, city- (prefectural), or county-level local government.
 - Whether the funds raised are designated for investment on urban infrastructure or other government projects.
 - Whether the LGs provide implicit guarantee to the SOEs.
- **1,983 LGFV bond are identified, or about 18.2% of all corporate bonds.**

Data

		All Bonds Issued by Corporates	LGFV Bonds
Total		10,872	1,983
Market	Inter-Bank Market	8,090	1,240
	Shanghai Exchange	2,173	696
	Shenzhen Exchange	496	30
	Others	113	17
Bond Type	Corporate Bonds	4,590	1,688
	Medium-Term Notes	2,000	129
	Short-Term Commercial Paper	3,892	140
	Others	390	26

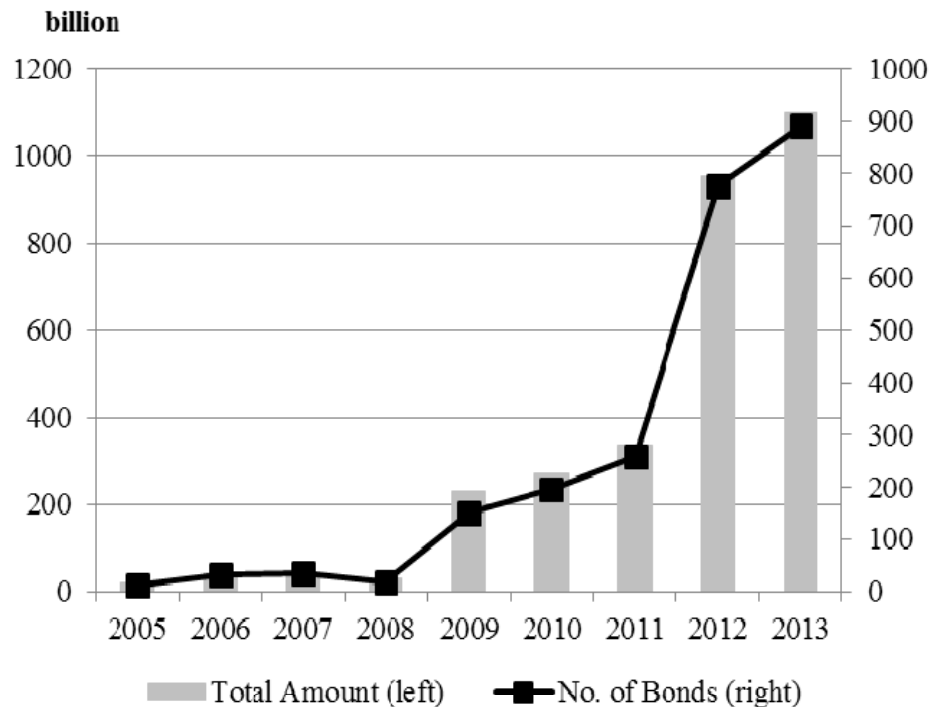
Data

	Number of Bonds	Average of Total Amount Issued by each Gov. (in million yuan)	Average Interval between Two Issuing by each Gov. (in days)
Provincial Level Governments	297(15%)	18,541.15	146.52
Prefectural-Level City Governments	933 (47%)	5,273.49	244.64
District Governments in Cities	399 (20%)	5,726.81	154.46
County/County-Level City Governments	335 (17%)	5,641.97	132.20

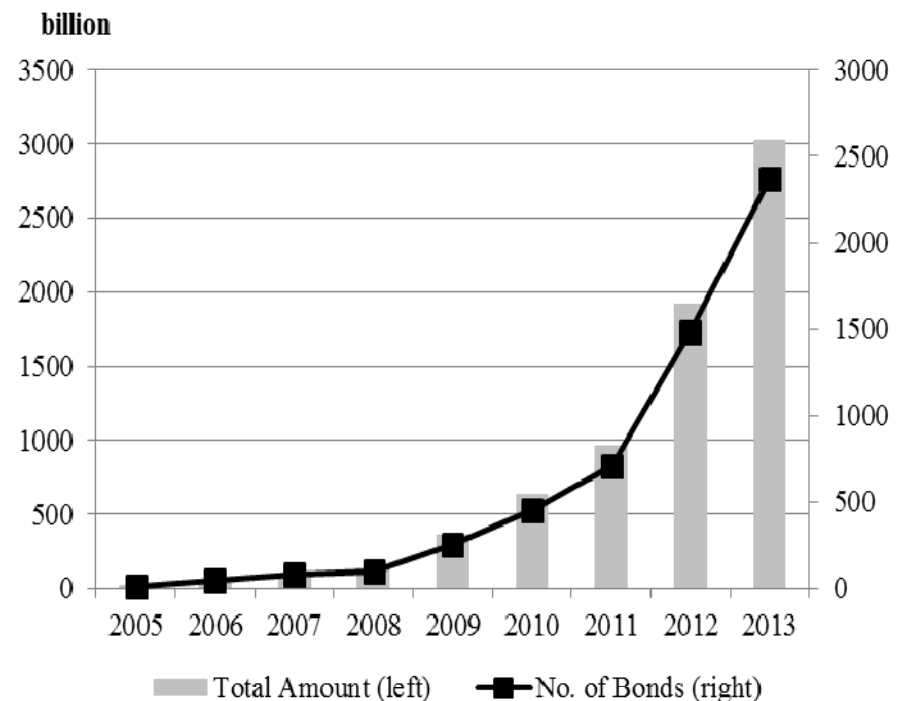
Data

- Rapid surge of bond volume since the stimulus period:

Bonds Issued



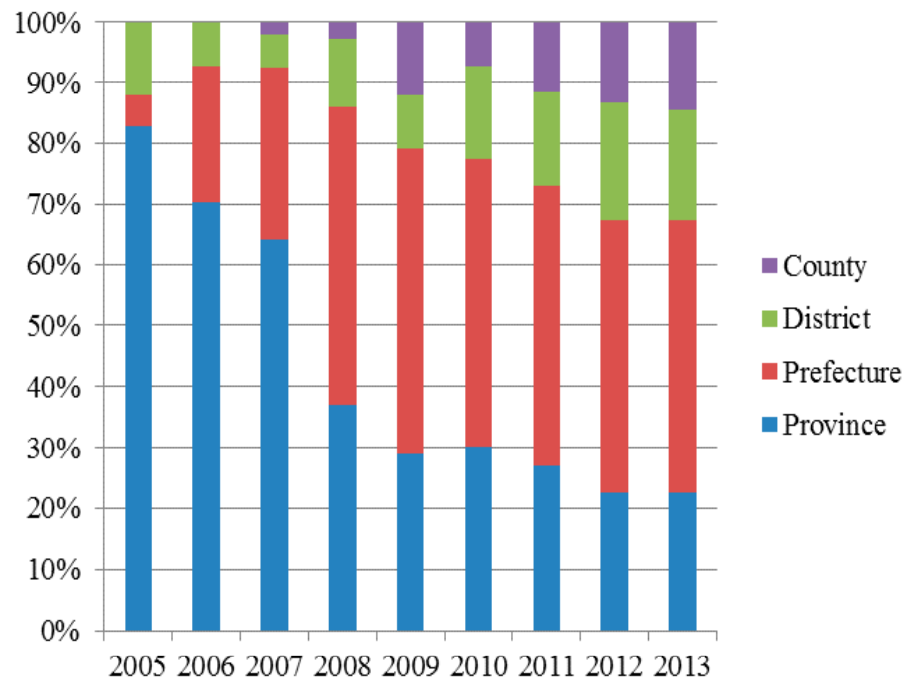
Outstanding Bonds



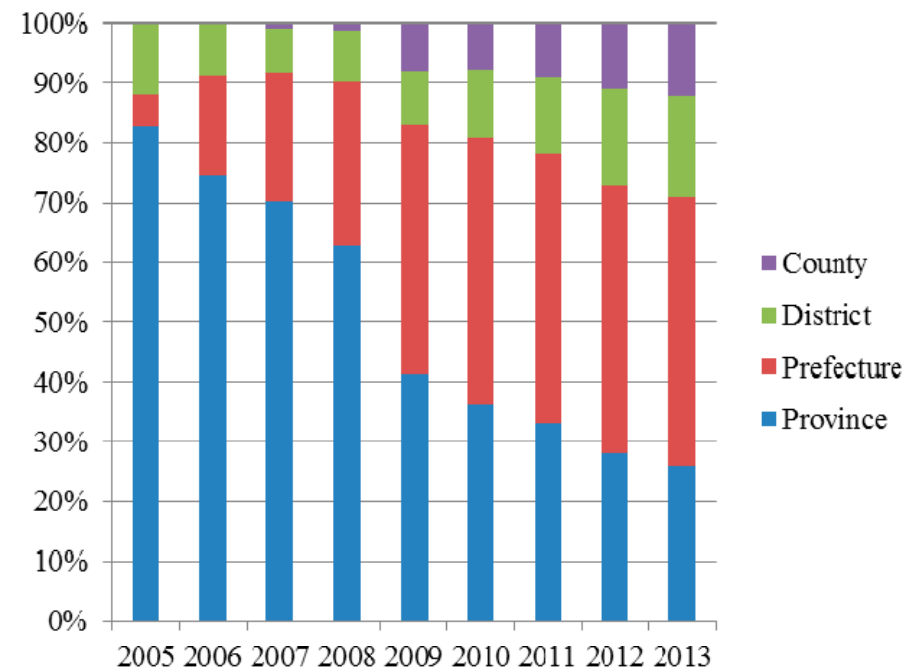
Data

- More LGFVs affiliated to lower-level local governments are issuing bonds:

Bonds Issued



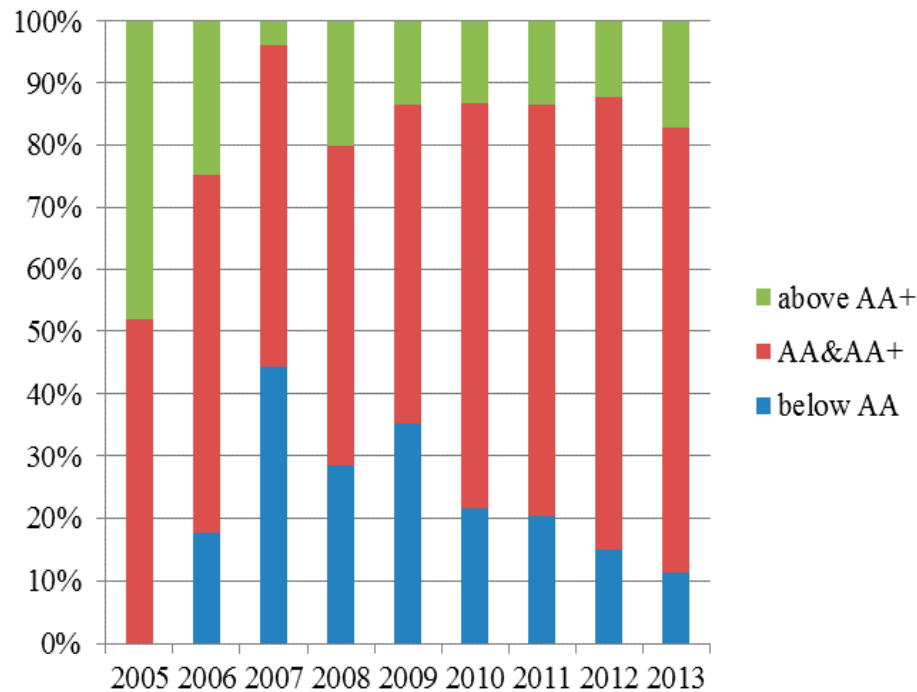
Outstanding Bonds



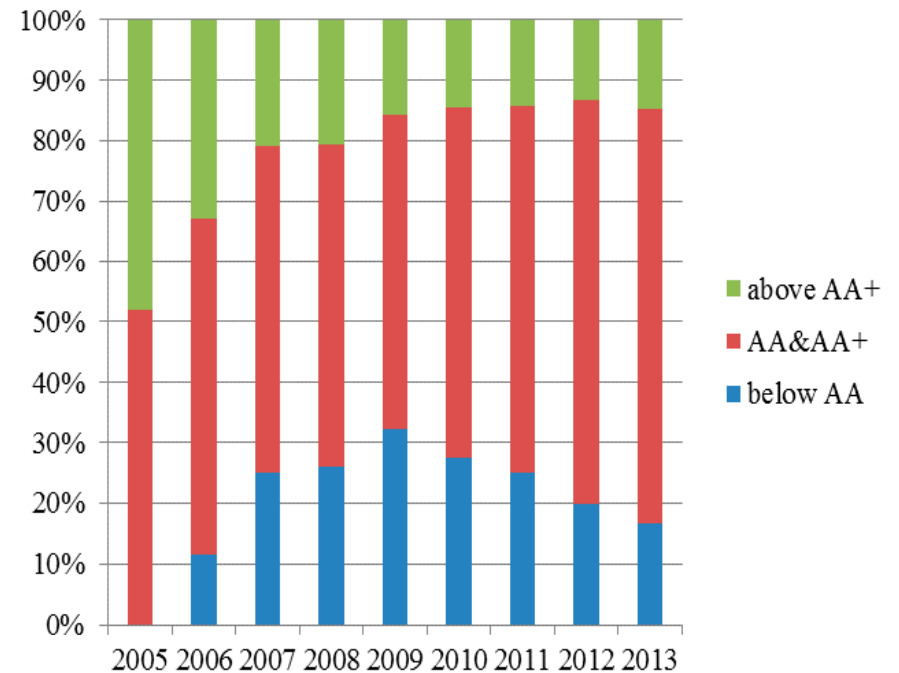
Data

- Deteriorating in rating of LGFVs:

Bonds Issued



Outstanding Bonds



Data

- In this paper we focused on LGFV bonds issued by local governments in 90 major cities since 2010, where high-quality city-level housing price indexes are available

		All Bonds Issued by Corporates	All LGFV Bonds	LGFV Bonds in 90 Major Cities
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

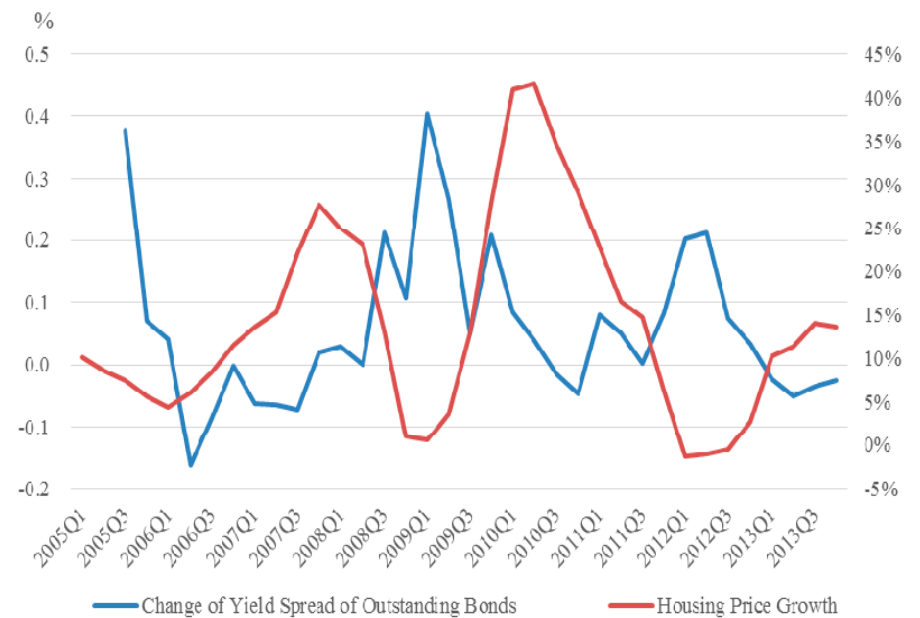
Data

- Preliminary evidence on the linkage with house price

Bonds Issued



Outstanding Bonds



Empirical Results I – Offering Yield Spread

- **Empirical analysis builds on standard models of bond yield spreads:**
 - $y_i = \alpha + \beta_1 E(R_{i,H}) + \beta_2 B_i + \beta_3 L_i + \varepsilon_i$
 - Sarig and Warga (1989); Warga (1992); Ambrose and Warga (1992); Ambrose and King (2002); Chen, Lesmond and Wei (2007); Ang, Bai and Zhou (2015)
 - y_i is the yield spread on LGFV bond i ,
 - $E(R_{i,H})$ is the expected return to the local housing market associated with bond i 's LGFV,
 - cumulative housing price growth in the 12 months prior to the issue date (Wu, Deng, Liu, 2014)
 - B_i represents a vector of bond characteristics,
 - maturity, bond type, coupon payment type, bond rating, credit enhancements, and the market where the bond is expected to trade
 - L_i represents a vector of local market factors.
 - expected usage of the fund, population size, per capita GDP, and the government level (city, county, district, or prefectural)

Empirical Results I – offering yield premiums

	(1) Yield Premium (All Bond)	(2) Yield Premium (All Bond)	(3) Yield Premium (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

Performance of the issuer of LGFV is not important

Rank of the corresponding LG and its economic strength are perceived to be important

Significant effect of housing market condition on long-term bonds

Empirical Results I – offering yield premiums

- Similar pattern does not apply to private firms or non-LGFV SOEs.

	(1) LGFVs	(2) Non-LGFV SOEs	(3) Private Firms
log(total asset)	-0.124*** (-2.95)	-0.253*** (-4.38)	-0.097** (-2.17)
Return on Asset	-0.007 (-0.63)	-0.043*** (-4.35)	-0.043*** (-5.46)
Liability/Total Asset	0.002 (1.09)	0.006** (2.28)	0.004* (1.70)
First Bond Issued of the Firm	-0.024 (-0.41)	0.166** (1.97)	0.121* (1.67)
<i>Government Level</i>			
- Prefectural	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Districts	0.197*** (3.57)	-0.084 (-0.96)	-
- Counties	0.227*** (3.41)	0.108 (1.12)	-
- Capital Cities	-0.253 (-1.64)	0.010 (0.12)	-
log(per capita GDP)	-0.299*** (-5.83)	-0.128* (-1.72)	-0.141** (-2.25)
Budgetary Expense /Budgetary Income	-0.010 (-0.24)	0.017 (0.18)	-0.002 (-0.03)
Accumulative housing price growth during the previous 12 months	-0.504** (-2.28)	0.052 (0.16)	-0.144 (-0.56)
Bond Ratings	Yes	Yes	Yes
Bond Attributes	Yes	Yes	Yes
Quarterly Fixed Effect	Yes	Yes	Yes
<i>N</i>	659	407	597
<i>R</i> ²	0.72	0.66	0.61

Issuers' own performance is more important for non-LGFV SOEs and private firms

The effect of the rank of local government only exists for LGFVs

The linkage between housing market conditions and perceived risks only exists for LGFVs

Empirical Results I – offering yield premiums

- A better housing market condition can also help LGFVs from other aspects
 - more likely to issue bonds on exchanges or with progressive interest rate

	(1) With Warrant or Collateral	(2) Issued on Exchanges	(3) With Adjustable or Progressive Interest Rate
log(total asset)	-0.007 (-0.04)	1.038*** (4.88)	-0.094 (-0.41)
Return on Asset	0.050 (0.92)	0.079 (1.55)	0.089 (1.58)
Liability/Total Asset	0.010 (1.22)	0.003 (0.36)	0.032*** (3.65)
First Bond Issued of the Firm	0.091 (0.41)	6.935*** (6.75)	0.409* (1.65)
<i>Government Level</i>			
- Prefectural	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Districts	0.569** (1.97)	-0.294 (-1.05)	-1.240*** (-3.91)
- Counties	1.175*** (3.48)	0.316 (0.88)	-1.189*** (-3.02)
- Capital Cities	1.144 (1.63)	1.434* (1.69)	0.860 (1.20)
log(per capita GDP)	-0.219 (-0.84)	0.085 (0.31)	-0.533* (-1.87)
Budgetary Expense /Budgetary Income	0.133 (0.64)	0.121 (0.56)	-0.398* (-1.73)
Accumulative housing price growth during the previous 12 months	-0.497 (-0.50)	1.896* (1.84)	3.455*** (3.31)
Issuer Ratings	Yes	Yes	Yes
Quarterly Fixed Effect	Yes	Yes	Yes
<i>N</i>	761	761	761
<i>R</i> ²	0.32	0.43	0.28

Empirical Results II – Changes in Yield Spread

- **Do bond prices react to changes in local housing market conditions?**

- Collin-Dufresne, Goldstein and Martin (*JF*, 2001)
- Ambrose and King (*REE*, 2002)
- Chen, Lesmond and Wei (*JF*, 2007)

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

- $R_{i,H,t}$ is the housing price growth rate for LGFV 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 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 ;
- $EBITDA/Asset$ is the ratio of LGFV i 's earnings over total assets; and
- B_i represents the set of individual bond fixed effects.

Empirical Results II – Changes in Yield Spread

- The booming housing market can significantly reduce the yield spread.

	(1) Yield Premium	(2) Yield Premium
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

Empirical Results III – LGFVs' ratings

- However, the rating agencies do not take the housing market conditions into considerations.

	(1) Rating of LGFVs	(2) Rating of LGFVs	(3) Rating of LGFVs
log(total asset)	1.135*** (13.96)	0.826*** (8.62)	0.827*** (8.62)
Return on Asset	0.005 (1.52)	-0.004 (-1.24)	-0.004 (-1.23)
Liability/Total Asset	-0.011 (-0.50)	-0.030 (-1.22)	-0.030 (-1.23)
First Bond Issued of the Firm	-0.046 (-0.46)	-0.177* (-1.66)	-0.178* (-1.67)
<i>Government Level</i>			
- Prefectural		<i>Default</i>	<i>Default</i>
- Districts		-0.848*** (-6.28)	-0.845*** (-6.25)
- Counties		-1.695*** (-9.64)	-1.693*** (-9.63)
- Capital Cities		1.502*** (5.76)	1.520*** (5.65)
log(per capita GDP)		1.139*** (8.73)	1.136*** (8.67)
Budgetary Expense /Budgetary Income		0.104 (0.91)	0.104 (0.91)
Accumulative housing price growth during the previous 12 months			-0.126 (-0.27)

Empirical Results III – bond ratings

- The rating agencies do not take the housing market conditions into considerations when evaluating the rating levels of the bonds either.

	(1) Rating of Bonds	(2) Rating of Bonds	(3) Rating of Bonds
<i>Rate Type</i>			
- Fixed	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Adjustable	0.362 (1.24)	0.367 (1.23)	0.388 (1.29)
- Progressive	0.231 (1.64)	0.285* (1.89)	0.297* (1.96)
<i>Market</i>			
- Inter-Bank	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Exchanges	-0.219** (-2.27)	-0.339*** (-2.70)	-0.332*** (-2.64)
<i>Credit Enhancement</i>			
- No	<i>Default</i>	<i>Default</i>	<i>Default</i>
- Collateral	2.157*** (14.80)	2.249*** (14.93)	2.247*** (14.91)
- Warrant	1.591*** (8.36)	1.525*** (7.83)	1.524*** (7.82)
Infrastructure Investment	0.042 (0.44)	0.008 (0.08)	0.006 (0.06)
log(total asset)		0.102 (1.10)	0.102 (1.10)
Budgetary Expense /Budgetary Income		-0.007 (-0.07)	-0.005 (-0.05)
Accumulative housing price growth during the previous 12 months			-0.309 (-0.68)
LGFV Ratings	Yes	Yes	Yes
Quarterly Fixed Effect	Yes	Yes	Yes
N	761	761	761

Empirical Results IV – decisions on bond issuance

- No evidence to indicate that the local governments or LGFVs are more likely to issue bonds during the housing boom

	(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

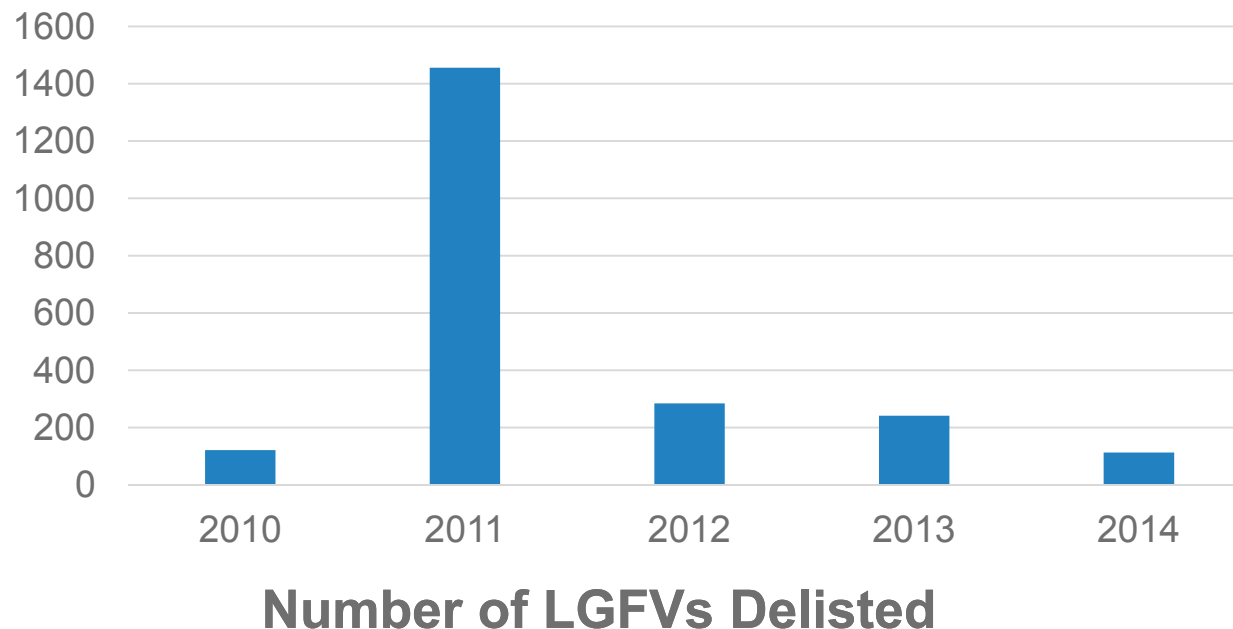
Empirical Results IV – decisions on bond issuance

- With a better housing market condition, the LGFV is even more likely to issue a bond with shorter period (column 1), smaller size (column 2),

	(1) ln(Maturity)	(2) ln(Amount)
log(total asset)	0.007 (0.24)	0.257*** (8.69)
Return on Asset	-0.012 (-1.57)	-0.002 (-0.27)
Liability/Total Asset	-0.001 (-0.49)	-0.006*** (-5.06)
First Bond Issued of the Firm	0.080** (2.38)	0.140*** (4.18)
<i>Government Level</i>		
- Prefectural	<i>Default</i>	<i>Default</i>
- Districts	0.091** (2.22)	0.050 (1.21)
- Counties	0.111** (2.17)	0.032 (0.62)
- Capital Cities	-0.244*** (-2.66)	0.092 (0.99)
log(per capita GDP)	-0.199*** (-4.95)	-0.090** (-2.22)
Budgetary Expense /Budgetary Income	-0.046 (-1.36)	0.005 (0.15)
Accumulative housing price growth during the previous 12 months	-0.586*** (-3.52)	-0.427** (-2.55)
Issuer Ratings	Yes	Yes
Quarterly Fixed Effect	Yes	Yes
<i>N</i>	761	761
<i>R</i> ²	0.25	0.31

Empirical Results V – delisted LGFVs

- CBRC regularly updated the list of LGFVs, and LGFVs would be delisted when they are perceived to be profitable enough to survive without local governments' financial supports.
 - According to the CBRC document No. 2011-34, if a LGFV's operating income can reasonably cover its debt service, it would be delisted from the LGFV list and treated as a normal SOE in their borrowing.



Empirical Results V – delisted LGFVs

- Comparison between yield spread of bonds issued by delisted firms and LGFVs.

	(1) LGFVs	(2) Delisted LGFVs
log(total asset)	-0.124*** (-2.95)	-0.068 (-1.51)
Return on Asset	-0.007 (-0.63)	-0.006 (-0.50)
Liability/Total Asset	0.002 (1.09)	0.000 (0.16)
First Bond Issued of the Firm	-0.024 (-0.41)	0.154** (2.44)
<i>Government Level</i>		
- Prefectural	<i>Default</i>	<i>Default</i>
- Districts	0.197*** (3.57)	0.041 (0.71)
- Counties	0.227*** (3.41)	0.207*** (2.90)
- Capital Cities	-0.253 (-1.64)	-0.192* (-1.90)
log(per capita GDP)	-0.299*** (-5.83)	-0.115* (-1.83)
Budgetary Expense /Budgetary Income	-0.010 (-0.24)	0.135* (1.72)
Accumulative housing price growth during the previous 12 months	-0.504** (-2.28)	0.109 (0.38)
Bond Ratings	Yes	Yes
Bond Attributes	Yes	Yes
Quarterly Fixed Effect	Yes	Yes
<i>N</i>	659	540
<i>R</i> ²	0.72	0.69

The linkage between housing market conditions and perceived risks disappear for delisted LGFVs.

Empirical Results V – delisted LGFVs

- Difference-in-difference model on delisting:

	(1)
Delisting	-0.343*** (-2.95)
Accumulative housing price growth during the previous 12 months	-2.969*** (-5.63)
Accumulative housing price growth during the previous 12 months * Delisting	4.209*** (5.77)
Bond Attributes	Yes
Bond Ratings	Yes
Issuer Fixed Effect	Yes
Issuer Performance	Yes
Local Government Performance	Yes
Quarterly Fixed Effect	Yes
<i>N</i>	719
<i>R</i> ²	0.89

Narrowing yield spread

The linkage between housing market conditions and perceived risks no longer exists

Conclusions

- 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.
- China has developed a unique funding source for local governments to obtain capital necessary to fund required large-scale infrastructure investments.
- 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.
 - The bond market reacts to changes in local housing conditions, as expected.
 - The results suggest that investors do price local housing risk into Chinese municipal bond risk premiums.
 - However, we find no evidence that local governments tend to issue more bonds during the housing market booming period.