

# The Great Wall of Debt

## Real Estate, Political Risk, and Chinese Local Government Credit Spreads



**Jennie Bai (Georgetown University)**

**Andrew Ang (BlackRock)**  
**Hao Zhou (PBC Tsinghua)**

# Literature

- China's economy and financial system
  - Brunnermeier, Sockin, and Xiong (2016), Jiang (2016), Song, Storesletten, and Zilibotti (2011), Brandt and Zhu (1995, 2000)
  - We study Chinese local gov't debt (financial cost)
- China's real estate market
  - Fang, Gu, Xiong, and Zhou (2015), Deng, Gyourko, and Wu (2015)
  - We focus on the fundamental supply, land-use rights, and show the importance role of real estate sector on local gov't financing cost
- Political risk, especially anti-corruption campaign
  - Butler, Fauver, and Mortal (2009), Griffin, Liu, and Shu (2016)
  - We create a novel data and show that the influence of political risk is through impairing the real estate channel

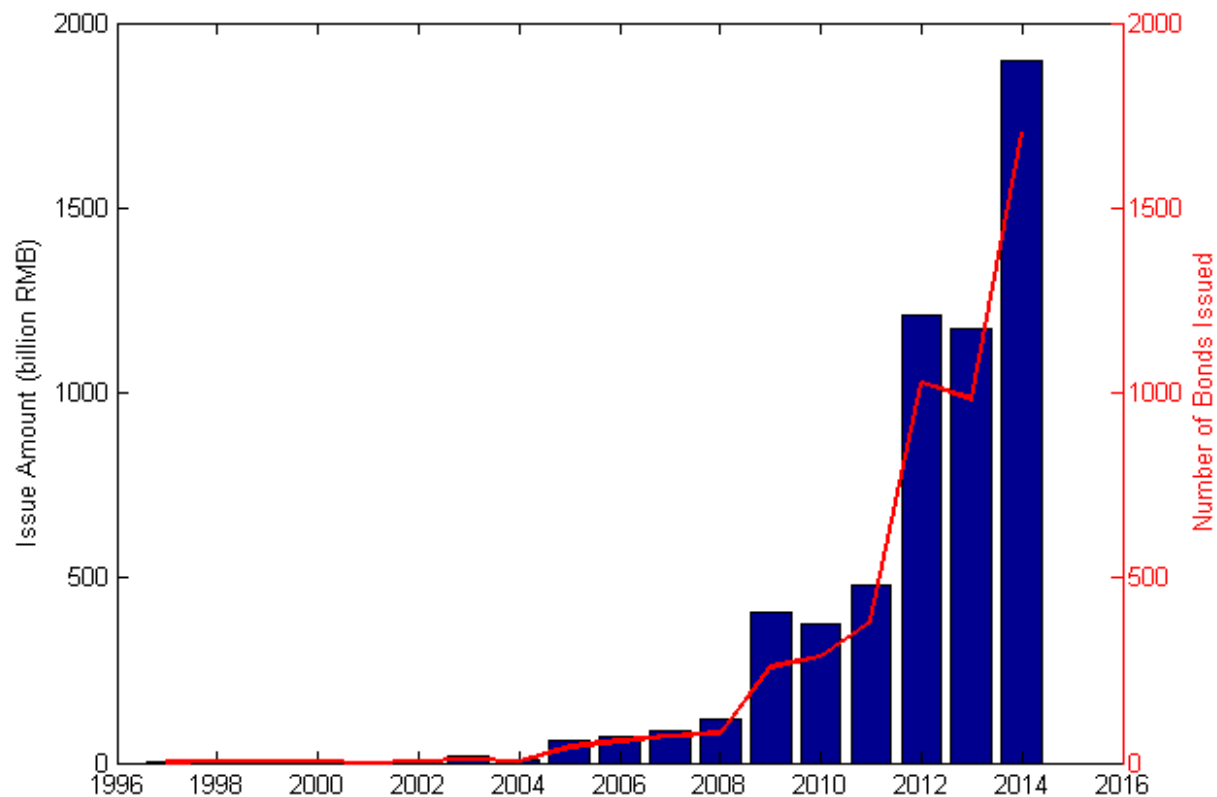
# ChengTou Bond (CTB) 城投债



Shanghai Tower (\$2.4 bil)

- Name: '09沪城投
- Issue: 4/10/2009
- Size: RMB 5 bil  
(USD .77 bil)
- Tenor: 5-year
- Yield: 3.5%
- Issuer: Shanghai Chengtou Corp.
- Rating: AAA

# ChengTou Bond Issuance



- 1992: first CTB, Pudong development bond, RMB 500 million
- By 12/31/2014: total outstanding of RMB 4.95 trillion

# Local Government Finances

1. Traditionally, local gov'ts rely on central gov't transfer
2. Local governments have increasing demand on financing since the 2008-2009 global financial crisis and China's QE.
3. However, local governments
  - Can NOT levy sales, property, or income tax
  - Can NOT borrow directly from banks or issue bonds
4. Local officials promotion crucially depends on performance

The fiscal pressure elevates beyond normal balance.

To answer the challenge, **LGFV!**

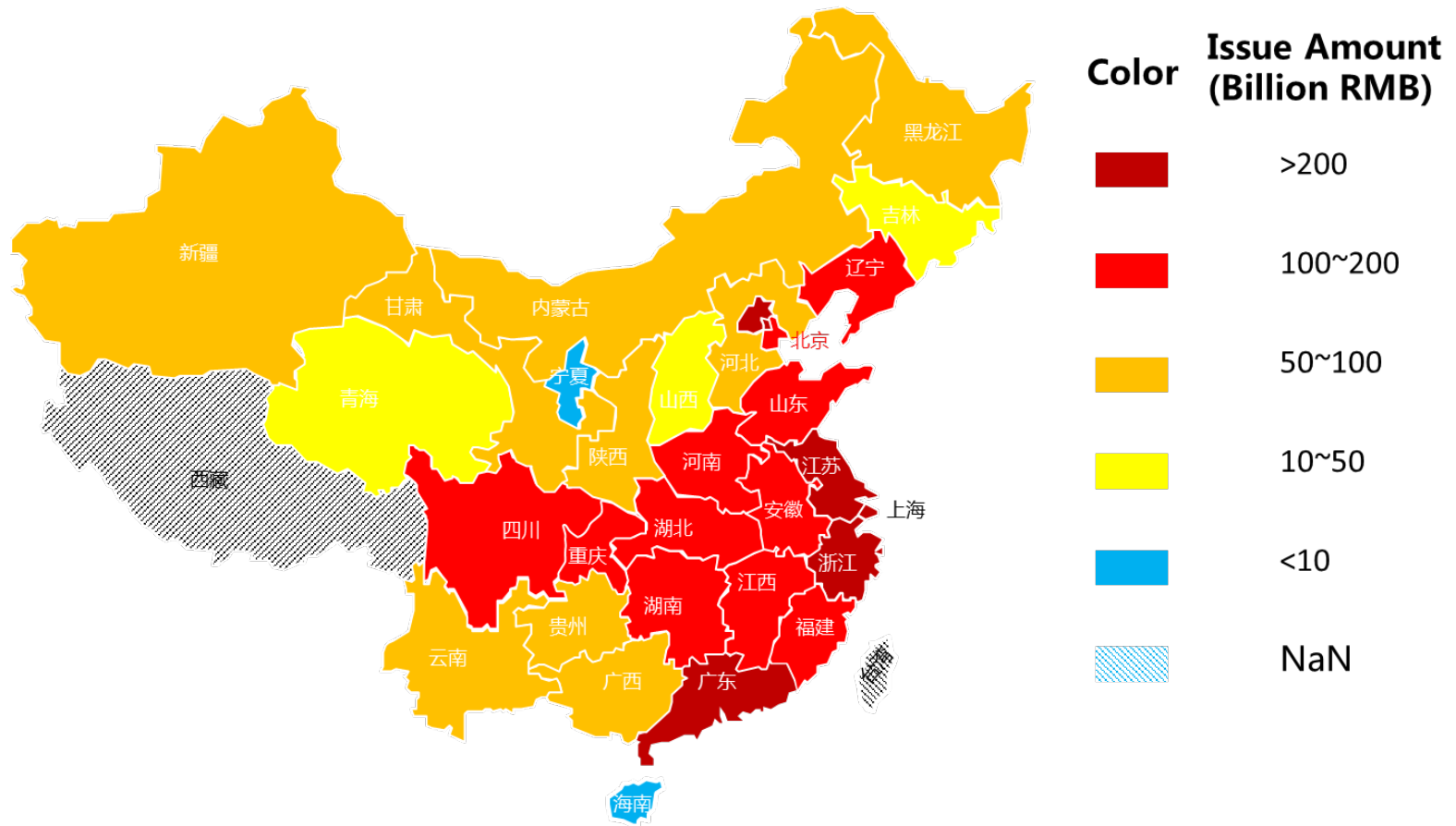
# Local Government Financing Vehicle (LGFV)

- LGFVs are established by local gov'ts for public welfare projects such as affordable housing, infrastructure, etc.
- LGFVs issue bonds, called CTB, using land-use rights or other assets as collateral, meanwhile transfer cash to local gov'ts
- CTB is guaranteed implicitly by local government revenue. Under China's fiscal and tax system, all CTBs are ultimately backed by the central government.

# Data

- CTB
  - Issuance (1992 – 2014), and transaction (daily, 2007-2014)
  - Excess yield:  $Y_{ijt} = y_{ijt}^{CTB} - y_{it}^{CGB}$
- National economic barometers,
  - CDS, FDI, FX, RF, CA, RET
- Province-level economic barometers
  - Various components of local GDP
  - Various measures on real estate such as price, loan, land cost
  - Local real GDP growth, fiscal surplus ratio
- Source: WIND, GFD, NBS

# CTB: Regional Issuance

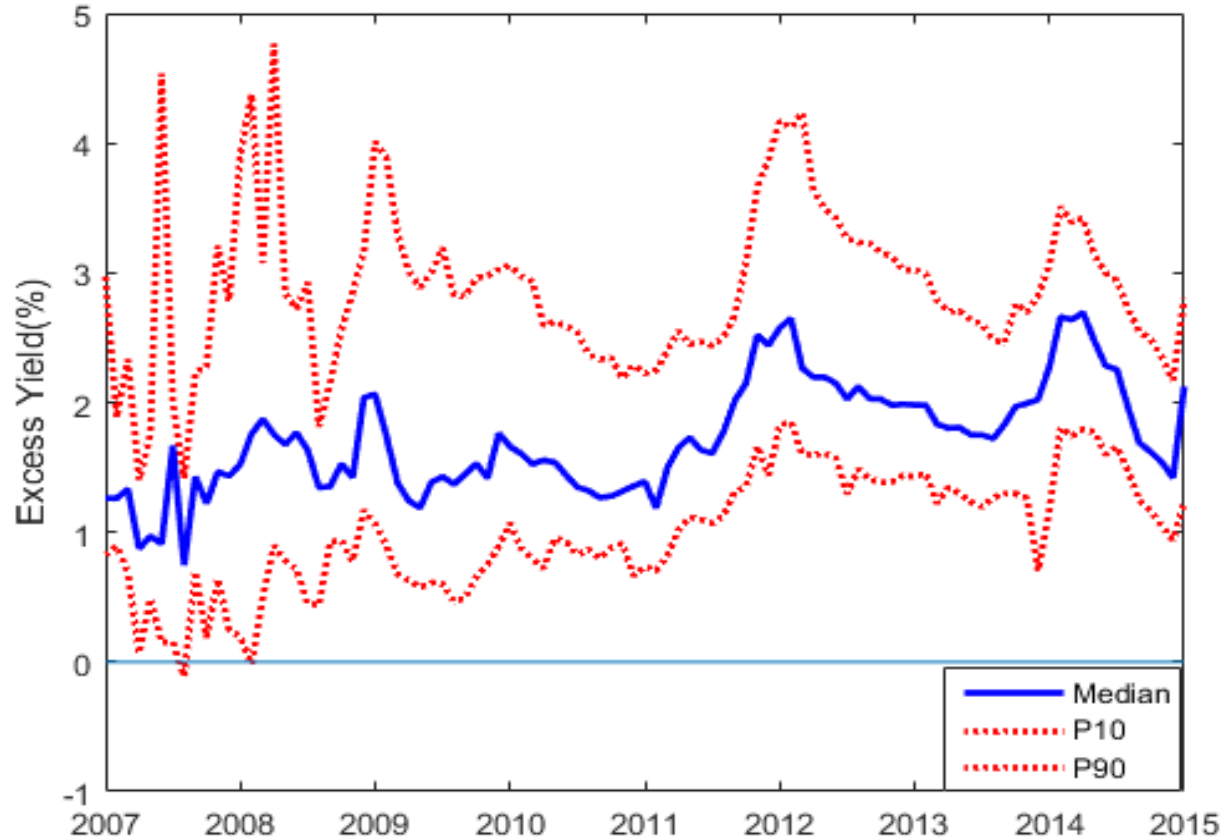




# Central Government Guarantee?

- The implicit central government guarantee suggests that all CTBs have similar yields, regardless of issue province

# Dispersion of CTB Excess Yields



- Dispersion varies over time, even wider when the median level is high

# Distribution of Excess Yields

	Mean	Median	SD	P10	P90	Mean	SD
All Bonds	1.98	1.90	0.81	1.11	2.98		
Geography							
Coastal	1.87	1.77	0.81	1.04	2.83		
Middle	2.15	2.11	0.83	1.19	3.19		
West	2.21	2.16	0.75	1.34	3.10		
Fiscal Surplus						Fiscal Surplus (%)	
High	2.37	2.35	0.76	1.43	3.29	20.73	9.94
Mid	2.13	2.07	0.79	1.24	3.09	10.44	3.13
Low	1.85	1.76	0.80	1.03	2.81	3.18	3.04
GDP Growth						GDP Growth (%)	
High	2.09	2.00	0.80	1.25	3.05	19.08	7.34
Mid	2.10	2.06	0.81	1.20	3.07	16.51	5.02
Low	1.79	1.69	0.79	0.97	2.79	13.93	5.73
Real Estate Price						RE Price (¥/m <sup>2</sup> )	
High	1.92	1.81	0.81	1.08	2.90	7659	3629
Mid	2.08	2.03	0.81	1.14	3.11	3687	267
Low	2.17	2.18	0.76	1.26	3.07	3145	144

- Given the central government guarantee, CTB yields still exists significant *economic* heterogeneity across provinces!

# Research Design

- We examine the economic factors that determines the cross section of local gov'ts financing cost measured by excess CTB yields:

$$Y_{ijt} = \alpha_0 + \eta_t + \xi' \mathbf{m}_{j,[t]} + \lambda' \mathbf{f}_j + \beta' \mathbf{m}_{j,[t]} \times \mathbf{f}_j + \gamma' \mathbf{Z}_{ijt} + \varepsilon_{ijt}$$

- $Y_{ijt}$  is CTB yield in excess of central gov't bond yield
- $\mathbf{m}_{j,[t]}$  is a vector of provincial macro variables, esp. RE
- $\mathbf{f}_j$  is a vector of political risk, measured by corruption
- $\mathbf{Z}_{ijt}$  is a vector of control variables including
  - province risk exposures
  - bond characteristics such as bond liquidity, size, maturity

# H1: Real Estate

- CTB issuance mostly requires collateral, often the land-use right, which links CTB market to the real estate market
- Hypothesis: **growth engine**
  - high real estate GDP ratio helps boost local government's revenue, thus better cash flow to support CTB hence **decrease** CTB yields
- Hypothesis: **ghost town**
  - high real estate GDP ratio may create an oversupply problem, thus negative shock in RE market will dampen local economy hence **increase** CTB yields

# H1: Real Estate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>REAL ESTATE GDP</i>	-0.17*** [-5.48]				-0.21*** [-5.13]		-0.18*** [-3.76]
<i>SERVICE GDP</i>		-0.01 [-0.41]			-0.04 [-1.15]		-0.04 [-1.25]
<i>RETAIL GDP</i>			-0.11*** [-3.30]		0.04 [0.87]		0.06 [1.36]
<i>HOTEL GDP</i>				0.08** [1.98]	-0.03 [-0.48]		-0.04 [-0.66]
<i>GDP GROWTH</i>						0.04 [1.09]	0.03 [0.50]
<i>FISCAL SURPLUS</i>						0.11** [2.62]	0.05 [1.41]

- Control for province risk exposure and bond characteristics
- Control for time dummies and cluster at province level
- Results support the “growth engine” effect.

# Alternative Real Estate Measures

	(1)	(2)	(3)	(4)	(5)
<i>LAND COST</i>	-0.09* [-1.74]				
<i>RE TAX</i>		-0.11** [-2.78]			
<i>RE PRICE</i>			-0.16*** [-6.01]		
<i>RE LOAN</i>				-0.16*** [-4.62]	
<i>RE INVEST</i>					-0.01 [-0.16]
Observations	20342	18234	20342	20342	20342
Adjusted R2	0.241	0.238	0.264	0.263	0.231

- Control for province risk exposure and bond characteristics
- Control for time dummies and cluster at province level

## H2: Political Risk

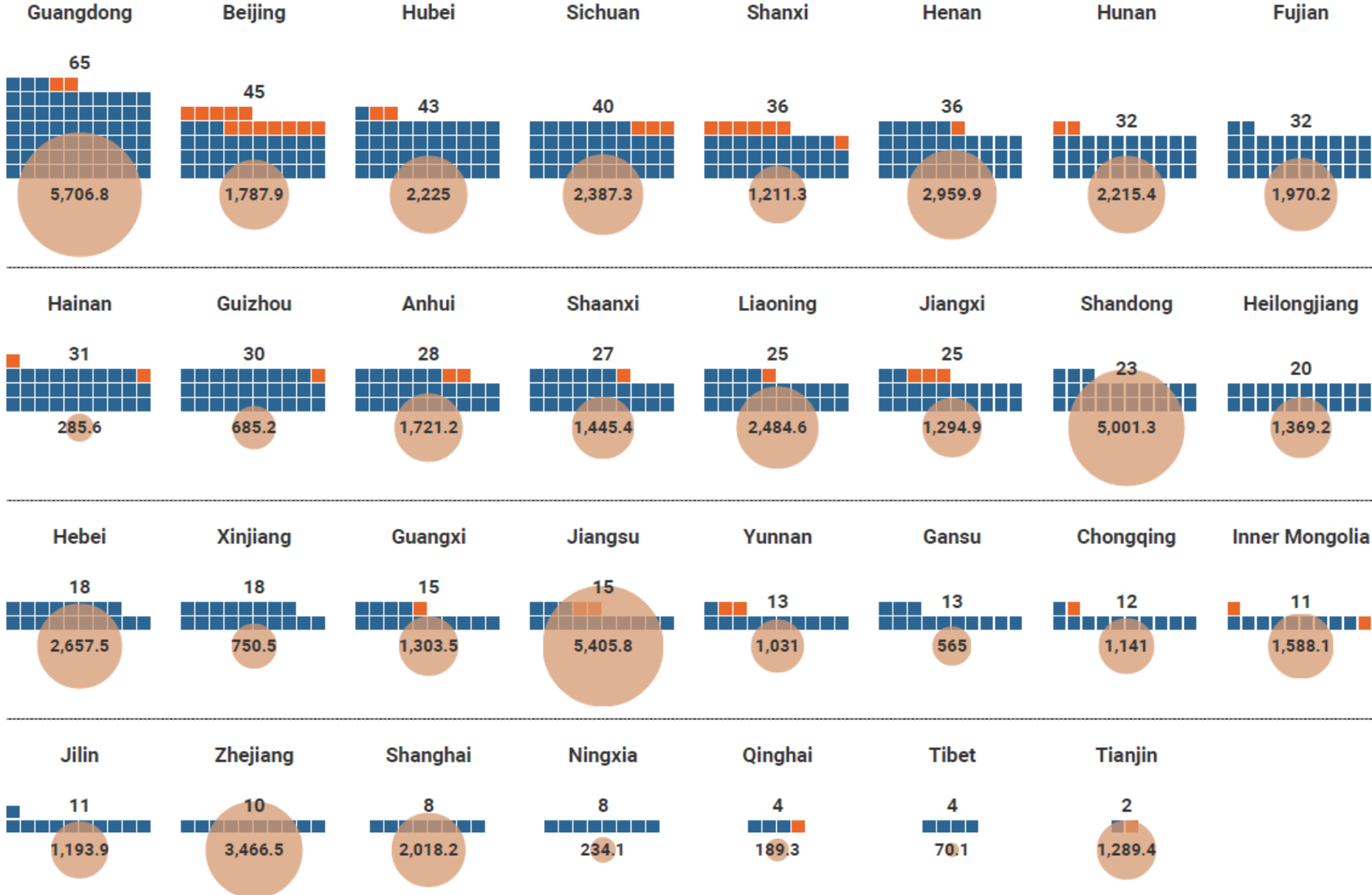
- CTB yields reflect the local government's backing income stream and their willingness to 'bail-out', which can be affected by local political risk
- Political risk **increases** the CTB excess yields --- **value destruction**
  - provinces with higher political risk is unlikely to have stable future revenue income and hence should have higher cost of financing
  - Butler, Fauver, and Mortal (2009), Mauro (1995)
- Political risk **decreases** the CTB excess yields --- **greasing the wheels**
  - provinces with more officials involved in graft probes, especially high-ranking ones, are typically the provinces with good economic development and aggressive political leaders.
  - Amore and Bennedson (2013), Dreher and Gassebner (2013)



# Political Risk Measures

- Compile a list of individual officials in graft investigations published on the CCDI's website during 2012 to 2014, the anti-corruption campaign period.
- Collect information on corrupt officials' titles and rankings, and categorize individuals into five rankings
- *GRAFT--TIGERS*, the rank-weighted index;
- *GRAFT--FLIES*, the number of graft cases.

# Corruption: Officials named in CCDI Graft Reports



# CTB Yields by Political Risk

		Mean	Median	SD	P10	P90	Mean	SD
All Bonds		1.98	1.90	0.81	1.11	2.98		
<i>GRAFT--TIGERS</i>							<i>TIGERS</i>	
	High	2.20	2.13	0.82	1.26	3.18	2.47	0.23
	Mid	1.89	1.80	0.79	1.07	2.87	2.13	0.13
	Low	1.91	1.84	0.80	1.04	2.87	1.75	0.09
<i>GRAFT--FLIES</i>							<i>FLIES</i>	
	High	2.01	1.95	0.78	1.17	2.97	39	9
	Mid	2.04	1.98	0.83	1.12	3.05	23	3
	Low	1.92	1.82	0.82	1.08	2.94	9	4

- Provinces with higher corruption, either depth or width, tend to have higher CTB yield spreads.

## H2: Political Risk

	(1)	(2)	(3)
<i>GRAFT-TIGERS</i>	0.15*** [3.74]		0.14*** [3.99]
<i>GRAFT-FLIES</i>		0.05 [0.94]	0.03 [0.67]
Observations	20342	20342	20342
Adjusted R2	0.252	0.233	0.252

- Control for province risk exposure and bond characteristics
- Control for time dummies and cluster at province level
- We confirm the “value destruction” hypothesis.
- There is a significant and economically meaningful positive relationship b/w risk-adjusted CTB yields and political risk proxies

# Event Study on Corruption Announcement

Event	AR(-1)	AR(0)	AR(1)	CAR[0,1]	CAR[-1,1]
A: First corruption in each province	0.168	-0.204	-0.066	-0.245	-0.085
B: TIGER graft in each province	-0.187	0.027	-0.100	-0.061	-0.221
in Top 5 provinces with highest corruption index	-0.392***	-0.265***	-0.312**	-0.558***	-0.861***
in Bottom 5 provinces with lowest corruption index	-0.230	0.09	-0.170	-0.04	-0.253
in Top 5 provinces with largest corruption cases	0.143	-0.139	0.174	0.019	0.141
in Bottom 5 provinces with smallest corruption cases	-0.241	-0.206	-0.119	-0.305	-0.497

- Announcement of TIGER events have significant impact for provinces with highest corruption index
- Provinces with more severe corruption respond positively on the announcement days with CTB yields going down.

# H3: Interaction of RE and Political Risk

- In China, real estate is a hotbed for corruption.
  - “the completion of a real estate project on average needs approval from 166 government departments, involving about 180 officials.” – *China Daily*, January 23, 2013
  - Among 753 graft probes in the anti-corruption campaign, more than half of the officials had malpractices related to RE
  - *For example:* Ni Fake, once the deputy governor of Anhui, was in charge of land resources when in office. Since 2008, he helped 9 RE companies illegally acquire land in return for gifts.

Table A.1: Examples of High-Rank Local Officials involved in Real Estate Corruption

Name	Province	Rank	Date Investigated	Real Estate Corruption
NiFake	Anhui	Vice Governor	Jun2013	Illegal land transaction
ZhouZhenhong	Guangdong	Vice Governor	Fed2013	Related to his relatives' speculation in RE market
WanQingliang	Guangdong	Vice Governor	Jun2014	Illegally changing the volume ratio and taking bribes
LiDaqiu	Guangxi	Vice Governor	Jul2013	Illegal land transaction
LiaoShaohua	Guizhou	Vice Governor	Jan2013	Bank loans, taking bribes and seeking interests for RE develop
GuoYouming	Hubei	Vice Governor	Nov2013	Related to some RE projects in Yichang City and Sanxia proj
ChenBohuai	Hubei	Vice Governor	Nov2013	Illegal land transaction
JiJianye	Jiangsu	Vice Governor	Jan2013	Related to Wuzhong RE Company's bribe
ChenAnzhong	Jiangxi	Vice Governor	Dec2013	Taking bribes and seeking interests for RE developers
YaoMugen	Jiangxi	Vice Governor	Mar2014	Taking bribes and seeking interests for RE developers
ZhaoShaolin	Jiangxi	Vice Governor	Aug2015	Helping his son to make illegal profit in RE market
ChenTiexin	Liaoning	Vice Governor	Jul2014	Taking bribes and seeking interests for RE developers
HuangSheng	Shandong	Vice Governor	May2013	Related to several RE developers' bribe
JinDaoming	Shanxi	Vice Governor	Fed2014	Related to speculations in RE market
ShenWeichen	Shanxi	Vice Governor	Apr2014	Taking bribes and seeking interests for RE developers
LiChuncheng	Sichuan	Vice Governor	Dec2012	Illegal land transaction

# Real Estate, Political Risk, and their Interaction

	(1)	(2)	(3)	(4)	(5)
<i>REAL ESTATE GDP</i>		-0.16*** [-5.15]	-0.14*** [-5.10]	-0.18*** [-6.66]	-0.16*** [-6.69]
<i>GRAFT-TIGERS</i>	0.14*** [3.99]	0.08*** [2.89]	0.07* [2.07]		0.05* [1.91]
<i>GRAFT-FLIES</i>	0.03 [0.67]	-0.06 [-1.58]		-0.03 [-0.84]	-0.02 [-0.64]
<i>RE GDP * TIGERS</i>			-0.02 [-0.49]		-0.04 [-1.61]
<i>RE GDP * FLIES</i>				0.07*** [3.24]	0.07*** [3.34]
Observations	20342	17524	17524	17524	17524
Adjusted R2	0.252	0.263	0.261	0.264	0.268

- Control for province risk exposure and bond characteristics
- Control for time dummies and cluster at province level
- Conditional on political risk, provinces with higher RE GDP have higher financing cost, i.e., higher CTB yields.



# Conclusion

- Given the central government implicit guarantee, there still exists a large heterogeneity in CTB yields
- One standard deviation increase in local RE GDP, contributes to 8.6% decrease in CTB yields.
- Political risk, a novel measure based on anti-corruption campaign in China, significantly elevate CTB yields
- Conditional on high political risk, RE GDP actually elevate CTB yields; only low corruption provinces enjoy low financing costs with high real estate GDP

THANK YOU!

Jennie.bai@georgetown.edu

# CTB Excess Yield

$$Y_{ijt} = y_{ijt}^{CTB} - y_{it}^{CGB}$$

- $y_{ijt}^{CTB}$ , chengtou bond yield which is calculated from bond features and transaction prices
- $y_{it}^{CGB}$ , matching central government bond yield which is calculated from (i) CTB cash flows, and (ii) zero-coupon curve of Chinese central government bonds (Svensson, 1994)

## USA: Munis

- Federation: central gov't bear no responsibility
- Munis have little systemic risk
- Relatively little corruption and transparency
- Debt does not have to be backed by physical collateral
- Tax-exempt

## China: CTB

- Central government implicitly guarantees CTBs
- CTB mkt affects systematic risk and financial stability
- Relatively more corruption and opacity
- Collateral is often required; linked to *real estate* market
- Non tax-exempt

# Province Risk Exposure

- Province betas to national macro and financial conditions

$$\Delta Y_{jt} = \alpha_j + \beta_{j,F} \Delta F_t + \varepsilon_{jt}$$

- CTB excess yields sorted by province betas

	$\beta_{CDS}$	$\beta_{FDI}$	$\beta_{CA}$	$\beta_{FX}$	$\beta_{RF}$	$\beta_{RET}$
Low	1.91	1.89	1.98	2.05	2.15	2.11
High	2.15	2.10	2.13	1.97	1.94	2.01
Low-High	-0.24	-0.21	-0.16	0.07	0.21	0.09
t-stat	-5.52	-5.51	-3.82	1.81	5.15	2.49

- In the cross-sectional test, macro betas on CDS and FX are priced in CTB excess yields.