

The Great Wall of Debt: Real Estate, Political Risk, and Chinese Local Government Credit Spreads

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Infrastructure Development in China



High-speed railway in Hainan

Infrastructure Development in China

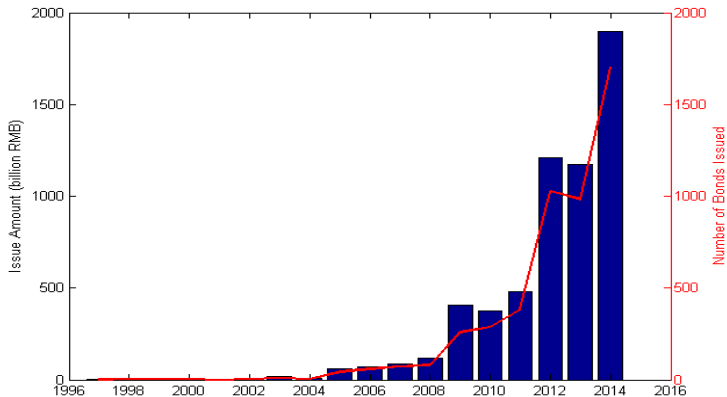


Shanghai Tower (\$2.4 billion)
the world's second-tallest building.

Most Infrastructure are Financed by Chengtou Bonds

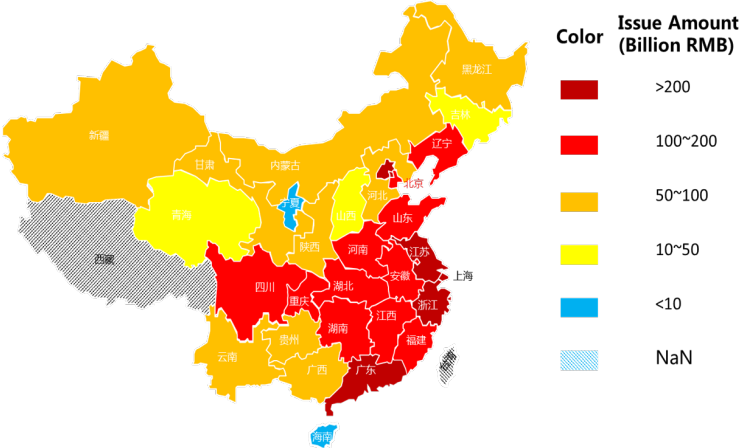
- construction
 - high-speed train
 - bridges and roads
 - public transportation
 - water supply and environment services
 - ...
 - real estate such as land development, low-income housing projects.
-
- China does not have *bona fide* municipal bonds
 - Instead, China's tremendous growth in infrastructure development is financed to a large extent through **Chengtou bonds (CTB)**, also known as urban construction and investment bonds.

Chengtou Bond Issuance



- 1992: first CTB, Pudong development bond, RMB 500 million
- By 12/31/2014: total outstanding of RMB 4.95 trillion
- The annual growth rate is 85% during 2008 - 2014

CTB: Regional Issuance



China CTB vs USA Muni

USA: Munis

- **Municipal** Bond
- Investor: individuals (50%)
- Federation: central govt bear no responsibility
- Have little systemic risk
- More transparency
- Relatively less corruption
- Debt does not have to be backed by physical collateral
- Tax-exempt

China: CTB

- **Corporate** Bond
- China's shadow banking (80%)
- Central gov't implicitly guarantees
- Affects financial stability
- More opacity
- More corruption
- Collateral is often required: the use-right of land, bridges, etc.
- Non tax-exempt

Research Question

- What market distortion does the implicit government guarantee exert on Chengtou bond pricing?
 - provincial risk exposure to the central government
 - local government solvency, in particular, the real estate market
 - provincial political risk

Related Literature

- Market distortion under government guarantee
 - Targeted limited number of securities (Husain, Mody, and Rogoff, 2005)
 - Guarantee is suddenly imposed on selective securities (Levy and Schich, 2010)
- Municipal bond and corporate bond pricing
 - Ang, et.al (2010, 2014, 2016), Landoni (2016)
 - Collin-Dufresne, et.al (2001), Bai and Wu (2015), Bai, et.al (2016)
- Real estate
 - Fang, et.al (2015), Deng, Gyourko, and Wu (2015)
- Political risk
 - Fisman and Wang (2015), Butler, et.al (2009), Griffin, Liu, and Shu (2016), Lin, et.al (2016)

Road Map

- Chengtou bond
- Local government finances
- Empirical results of implicit government guarantee
 - Central government guarantee
 - Conventional bond pricing
 - Local government solvency, in particular, real estate market
 - Provincial political risk

Example 1: '09 Hu Chengtou 0982024.IB



Shanghai Tower (\$2.4 billion)

Example 1: '09 Hu Chengtou 0982024.IB

- Issue: 2/27/2009
- Size: RMB 5 BIL (USD 0.77 BIL)
- Tenor: 8-year
- Yield: 4.3%
- Rating: AAA
- Issuer: Shanghai Chengtou Corporation.
 - founded in 1992 by Shanghai Municipal Government
 - owned 100% by Shanghai State-owned Assets Supervision and Administration Commission (SASAC) since 2003
 - business: 27 subsidiaries covering roads and bridges, water supply, environment, and real estate
 - performance in 2013: total asset, 363bil RMB, net income 1.05bil RMB (0.33bil RMB returns to SASAC)

Example 2: 1180075.IB

- Issue: 4/11/2011
- Size: RMB 1 BIL (USD 0.15 BIL)
- Tenor: 7-year
- Yield: 6.99%
- Rating: AA
- Issuer: Ordors City Construction Investment Group
 - founded and owned by Ordos Municipal Government
 - business: **land sales and land development** in Kangbashi District

一、发行人概况

中文名称：鄂尔多斯市城市基础设施建设投资有限公司

注册地址：鄂尔多斯市康巴什新区

法定代表人：麻永飞

注册资本：人民币 207,388.26 万元

公司类型：国有独资公司

经营范围：**一、二级土地开发、出让、租赁**；城市基础设施配套建设投资与经营；房地产开发；产业项目开发。

鄂尔多斯市城市基础设施建设投资有限公司是由内蒙古自治区鄂尔多斯市人民政府批准，由鄂尔多斯市人民政府出资，于 2001 年 5 月 16 日成立的国有独资公司，企业法人营业执照注册号为 152702000001593。公司主营业务为城市市政基础设施建设，土地收储

“Ordos, China: A Modern Ghost Town”



Source: *Time Magazine*

Other Media: *BBC, Time, CNN, WSJ, Forbes, HuffPost, The Atlantic*, etc

- Though 80-90% of the properties have been sold and a million people were projected to be living in Kangbashi by 2010, the city awaits a population that never showed up.

Local Government Finances

- 1 Proliferation of local government debt was triggered by the 2008-2009 global financial crisis and China's QE.
 - 2.8 tril RMB in the QE is shouldered by local governments.
- 2 However, local governments
 - have limited power to levy additional sales, property, or income tax.
 - have zero access to borrow directly from banks or issue bonds.
- 3 Local officials promotion crucially depends on performance

The fiscal pressure elevates beyond normal balance.

⇒ To answer the challenge, LGFV!

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⇒ To answer the challenge, LGFV!

- What role does LG play in the CTB pricing? Does LG play any role?

Determinants of the Cross-Section of Cost of Capital

The credit spreads of corporate bonds are driven by:

- Credit risk of bonds and issuer
- Liquidity risk of bonds and issuer
- Taxation across issuers

One Pseudo Default

In April 2011, Yunnan Highway Development and Investment Co. Ltd. made one-sided announcement that they will only pay interest but not principal of its debt.

- Reason: cash-flow pressure
- Solution: Yunnan Provincial Government immediately asked the firm to withdraw the claim, then coordinated the payment
- Impact: panic in the debt market, more attention to local government implicit guarantee

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Other signals of government intervention:

- National Development and Reform Commission (NDRC) subsequently relaxed the approval process for bond issuance
⇒ CTB issuance doubled in 2012 compared to 2011
- The Ministry of Finance and the NDRC encourage SWAP from riskier LGFV debt to safer low-yield long-term municipal bonds.

Determinants of the Cross-Section of Cost of Capital

The credit spreads of Chengtou bonds are potentially driven by:

- Credit risk of bonds and issuer
- Liquidity risk of bonds and issuer
- **Implicit government guarantee**

Hypotheses and Main Findings

1. Given the central government implicit guarantee, there still exists a large heterogeneity in chengtou bond yields
2. Conventional risk factors:
 - Credit risk matters, but in a less degree compared to similar corporate bonds
 - Illiquidity matters in an opposite way, most liquid CTB are those with higher yield, indicating investors' intention to reach-for-yield while taking advantage of gov't guarantee
 - Issuer (LGFV) solvency does not matter much after including issuer dummies

Hypotheses and Main Findings (Cont'd)

3. Implicit government guarantee

- Provincial-level **real estate** performance is the most important driving factor – One standard deviation increase in local RE GDP, contributes to 8.6% decrease in CTB yields, supporting the “growth engine” story
- Provincial-level **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

Data

- Chengtou bonds
 - Issuance data from 1992 – 2016
 - Transaction data, daily from Aug2007 – Dec2016
- Corporate bonds issued by SOEs as control group
- National economic barometers
 - CDS, FDI, FX, RF, CA, RET
- Province-level economic barometers
 - Various components of local GDP, RE, service, retail, etc
 - Local real GDP growth, fiscal surplus ratio, leverage, volatility
- Source: WIND, Ministry of Finance, Provincial Finance Bureaus

CTB Excess Yield

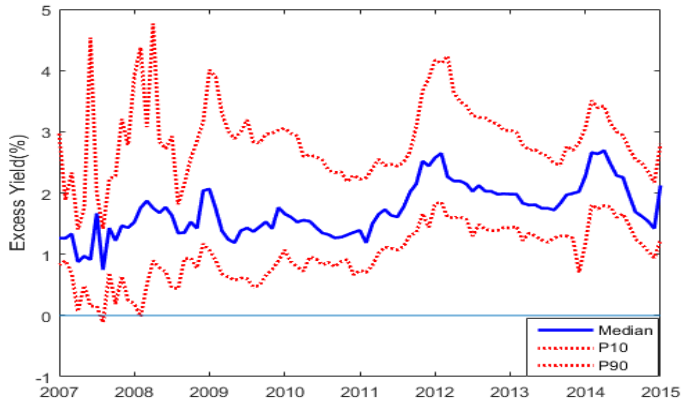
$$Y_{ijt} = y_{ijt}^{CTB} - y_{it}^{CGB}$$

- 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)

H1: Central Government Guarantee

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

Heterogeneity of CTB Excess Yields



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

Heterogeneity of CTB Excess Yields

	Excess Yields (%)					Characteristics	
	Mean	Median	SD	P10	P90	Mean	SD
WHOLE SAMPLE	1.98	1.90	0.81	1.11	2.98		
<i>GEOGRAPHY</i>							
	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	
<i>FISCAL SURPLUS</i>							
	High	2.37	2.35	0.76	1.43	3.29	Fiscal Surplus (%)
	Mid	2.13	2.07	0.79	1.24	3.09	20.73 9.94
	Low	1.85	1.76	0.80	1.03	2.81	10.44 3.13
<i>GDP GROWTH</i>							
	High	2.09	2.00	0.80	1.25	3.05	3.18 3.04
	Mid	2.10	2.06	0.81	1.20	3.07	GDP Growth (%)
	Low	1.79	1.69	0.79	0.97	2.79	19.08 7.34
<i>REAL ESTATE PRICE</i>							
	High	1.92	1.81	0.81	1.08	2.90	16.51 5.02
	Mid	2.08	2.03	0.81	1.14	3.11	13.93 5.73
	Low	2.17	2.18	0.76	1.26	3.07	RE Price (¥/m ²)
							7659 3629
							3687 267
							3145 144

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

Research Design

- We examine the pricing power of risk factors to the cross-section of CTB excess yields:

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

- $m_{j,[t]}$, is a vector of provincial macro variables, esp. RE
- f_j , is a vector of political risk, measured by corruption
- Z_{ijt} , is a vector of control variables including
 - province risk exposures
 - bond size, rating, liquidity, time-to-maturity, collateral dummy
 - LGFV leverage, profitability, issuer dummy

H2: Conventional Risk Factors

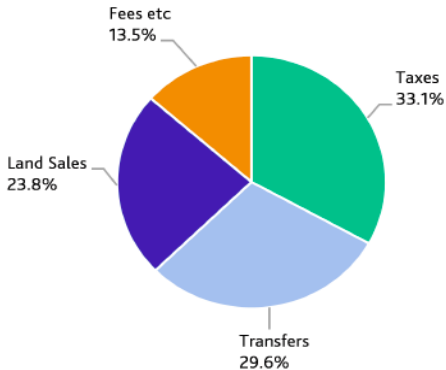
	(1)	(2)	(3)	(4)	(5)
<i>RATING</i>	-0.33*** (-15.17)				-0.35*** (-14.32)
<i>TURNOVER</i>		0.07*** (4.10)			0.04** (2.59)
<i>SIZE</i>			-0.13*** (-5.58)		0.03 (0.90)
<i>TTM</i>				0.06 (1.56)	0.08*** (2.96)
Month Dummy	Y	Y	Y	Y	Y
Cluster (Province)	Y	Y	Y	Y	Y
Obs	20357	20357	20357	20357	20357
Adj R^2	0.348	0.192	0.211	0.188	0.362

- Credit risk matters
- Illiquidity matters in an opposite way, most liquid CTB are those with higher yield, indicating investors try to take advantage of gov't guarantee
- To-do-list: formal test of the pricing power of conventional risk factors on CTB and comparative corporate bonds.

H3: Proxy of Implicit Government Guarantee

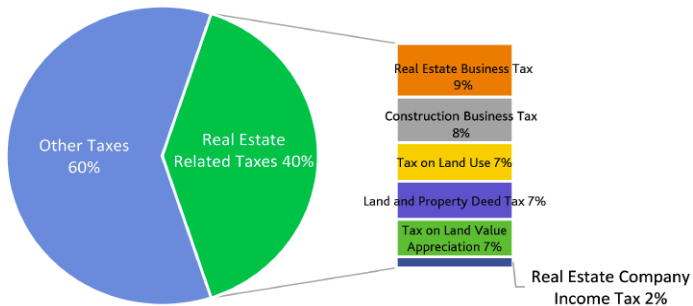
- A. Provincial risk exposure to the central government
- B. Local government solvency and performance
- C. Provincial political risk

Fact 1: Land Sales are a Key Revenue Source for LG



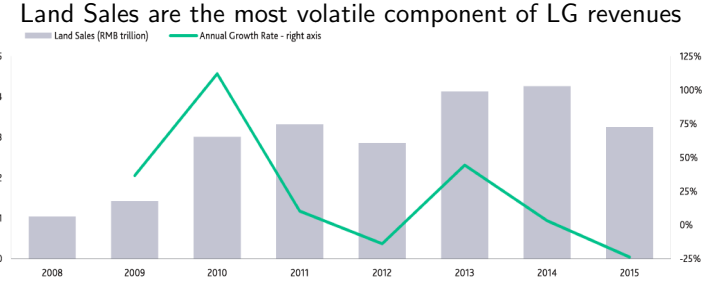
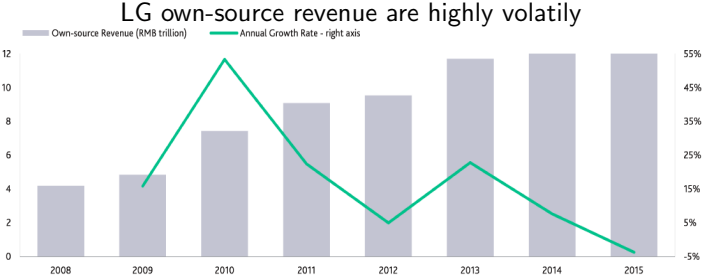
Source: Ministry of Finance, 2014

Fact 2: Real Estate Related Taxes accounted for 40% of LG's Total Tax Receipts



Source: Ministry of Finance, 2014

Fact 3: LG's Reliance on Real Estate Leads to Revenue Instability



H3B: Real Estate and Other Measures of LG Solvency

- Hypothesis: **growth engine**
 - high real estate GDP ratio helps boost local governments revenue, generate 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 economies hence increase CTB yields

Overall, Real Estate is the Growth Engine

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>REAL ESTATE GDP</i>	-0.09*** (-3.44)				-0.13*** (-3.75)		-0.12*** (-3.11)
<i>SERVICE GDP</i>		-0.03 (-1.32)			-0.05 (-1.70)		-0.05* (-1.71)
<i>RETAIL GDP</i>			-0.04 (-1.63)		0.04 (1.22)		0.04 (1.24)
<i>HOTEL GDP</i>				0.03 (1.37)	-0.04 (-1.19)		-0.05 (-1.23)
<i>GDP GROWTH</i>						0.03 (1.01)	0.02 (0.42)
<i>FISCAL SURPLUS</i>						0.04 (1.44)	0.00 (0.13)
<i>RATING</i>	-0.33*** (-9.79)	-0.35*** (-12.56)	-0.34*** (-11.66)	-0.34*** (-12.10)	-0.33*** (-9.87)	-0.33*** (-11.19)	-0.33*** (-9.80)
<i>TURNOVER</i>	0.03 (1.65)	0.04** (2.19)	0.04** (2.05)	0.04** (2.08)	0.03* (1.77)	0.04* (1.98)	0.03* (1.76)
<i>SIZE</i>	0.03 (0.87)	0.02 (0.72)	0.03 (0.85)	0.02 (0.78)	0.02 (0.72)	0.02 (0.76)	0.02 (0.64)
<i>TTM</i>	0.10*** (3.31)	0.10*** (4.30)	0.09*** (3.72)	0.10*** (3.92)	0.10*** (3.74)	0.10*** (3.84)	0.10*** (3.88)

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

Alternative Real Estate Measures

<i>LAND COST</i>	-0.04 (-1.05)				
<i>RE TAX</i>		-0.06* (-1.92)			
<i>RE PRICE</i>			-0.09*** (-4.18)		
<i>RE LOAN</i>				-0.09*** (-3.47)	
<i>RE INVEST</i>					-0.00 (-0.01)
<i>RATING</i>	-0.34*** (-11.50)	-0.34*** (-10.83)	-0.33*** (-10.41)	-0.33*** (-10.36)	-0.35*** (-12.53)
<i>TURNOVER</i>	0.04** (2.63)	0.03** (2.28)	0.03** (2.46)	0.03** (2.59)	0.04** (2.63)
<i>SIZE</i>	0.04 (1.15)	0.04 (1.06)	0.04 (1.31)	0.04 (1.33)	0.04 (1.16)
<i>TTM</i>	0.09*** (3.47)	0.09*** (3.10)	0.08*** (3.00)	0.08*** (3.00)	0.09*** (3.51)
Observations	20342	18234	20342	20342	20342
Adj R^2	0.374	0.368	0.382	0.381	0.372

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

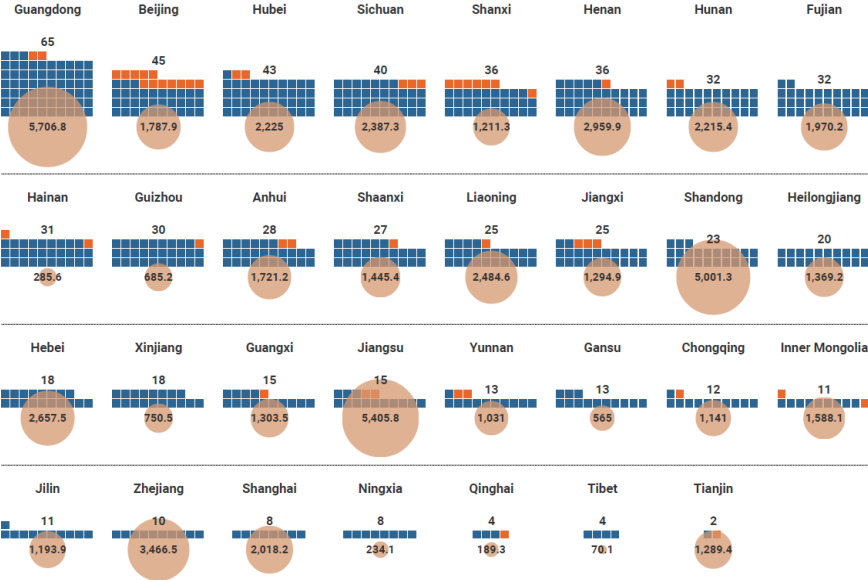
H3C: Political Risk

- CTB yields reflect the local governments backing income stream and their willingness to bail-out, which is 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 CCDIs 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



H3C: Provincial Political Risk

<i>GRAFT-TIGERS</i>	0.09*** (3.71)		0.09*** (4.04)
<i>GRAFT-FLIES</i>		0.03 (0.87)	0.01 (0.43)
<i>RATING</i>	-0.34*** (-12.33)	-0.35*** (-12.18)	-0.34*** (-12.23)
<i>TURNOVER</i>	0.03** (2.68)	0.04** (2.62)	0.03** (2.67)
<i>SIZE</i>	0.03 (1.03)	0.04 (1.20)	0.03 (1.06)
<i>TTM</i>	0.09*** (3.46)	0.09*** (3.47)	0.09*** (3.44)
Observations	20342	20342	20342
Adj R^2	0.381	0.373	0.381

- 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)
A: First corruption in each province	0.168	-0.204
B: Tiger graft in each province	-0.187	0.027
in Top 5 provinces with highest corruption index	-0.392***	-0.265***
in Bottom 5 provinces with lowest corruption index	-0.230	0.09
in Top 5 provinces with largest corruption cases	0.143	-0.139
in Bottom 5 provinces with smallest corruption cases	-0.241	-0.206

- Announcement of TIGER events have significant impact for provinces with highest corruption index
- Provinces with more severe corruption have lower CTB yields

Real Estate, Political Risk, and their Interaction

<i>REAL ESTATE GDP</i>		-0.07*** (-2.78)	-0.06** (-2.72)	-0.10*** (-4.30)	-0.08*** (-3.46)
<i>GRAFT-TIGERS</i>	0.09*** (4.04)	0.07** (2.74)	0.06* (1.96)		0.04* (1.78)
<i>GRAFT-FLIES</i>	0.01 (0.43)	-0.04 (-1.22)		-0.02 (-0.54)	-0.01 (-0.24)
<i>RE GDP * TIGERS</i>			-0.02 (-0.83)		-0.04* (-2.05)
<i>RE GDP * FLIES</i>				0.05*** (3.01)	0.06*** (3.15)
<i>RATING</i>	-0.34*** (-12.23)	-0.33*** (-9.88)	-0.33*** (-9.89)	-0.32*** (-9.50)	-0.32*** (-9.64)
<i>TURNOVER</i>	0.03** (2.67)	0.04** (2.40)	0.04** (2.42)	0.04** (2.39)	0.04** (2.41)
<i>SIZE</i>	0.03 (1.06)	0.03 (0.91)	0.03 (1.00)	0.04 (1.09)	0.03 (1.03)
<i>TTM</i>	0.09*** (3.44)	0.09*** (3.20)	0.09*** (3.20)	0.09*** (3.13)	0.09*** (3.26)
Observations	20342	17524	17524	17524	17524
Adj R^2	0.381	0.374	0.374	0.374	0.378

- Conditional on political risk, provinces with higher RE GDP have higher financing cost, ie., higher CTB yields.

Conclusion

- Given the central government implicit guarantee, there still exists a large heterogeneity in chengtou bond yields
- Conventional bond pricing factors such as credit and liquidity risk has weaker or opposite impact for CTB, due to implicit government guarantee
- Implicit gov't guarantee is the most important pricing factor of CTB
 - Provincial-level **real estate** performance is the dominating driver – One standard deviation increase in local RE GDP, contributes to 8.6% decrease in CTB yields
 - Provincial-level **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!
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