

LOCAL CROWDING OUT IN CHINA

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Outline

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- 2 Empirical approach
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- 5 Results
 - City-level
 - Industry-level
 - Firm-level
- 6 Conclusions

Motivation

- China responded to the global financial crisis with a massive fiscal stimulus:
 - In November 2008, the Chinese government announced a RMB4 trillion (USD590 billion) stimulus package
 - Implementation was immediate and mostly channeled via local governments
 - In 2009, city-level debt increased by RMB1.7 trillion
 - Central government debt increased by RMB700 billion
- Chinese local government debt almost quadrupled as a fraction of GDP between 2006 and 2013
 - From 5.8% to 22% of GDP

Motivation

- The stimulus package focused on investment
 - In 2009, the growth rate of fixed capital formation almost doubled with respect to the pre-crisis period
 - In that year, the contribution of fixed investment to GDP growth was close to 90% (Wen and Wu, 2014)
- The investment boom was mostly funded by debt in state-owned enterprises (SOEs):
 - In manufacturing SOEs, leverage rose from 57.5% in 2008Q1 to 61.5% in 2010Q1
 - In private manufacturing firms, it dropped from 59% to 57% (Wen and Wu, 2014)

Takeaways

- At first glance, the stimulus was a resounding success:
 - China escaped the great recession
 - It became one of the main drivers of world growth after the crisis (Wen and Wu, 2014)
- BUT the massive post-crisis increase in local public debt crowded out private investment (this paper)
- As private manufacturing firms have much higher productivity than SOEs (Song, Storesletten and Zilibotti, 2011), this reallocation of investment is likely to reduce China's long-run growth potential

Our Empirical Approach

Three types of evidence

- City-level regressions
 - Investment of domestic *private* manufacturing firms is lower in cities with high public debt
 - No such correlation for SOEs and foreign firms
 - IV regressions: first evidence of causality from public debt to private investment
- Industry-level regressions
 - Public debt reduces investment by *private* manufacturing firms in industries with greater external financial needs
- Firm-level regressions
 - Investment sensitivity to cash flow is higher for *private* firms in cities with high public debt
 - Joint estimation of investment sensitivity and likelihood of being a constrained firm

Why should *local* public debt affect *local* investment in China?

- Our identification strategy hinges on three features of Chinese capital markets:
 - ① **Geographic segmentation:** local public debt issuance (bonds and bank loans) does not attract capital from elsewhere \implies market imbalance remains local
 - ② **Interest rate ceilings:** local imbalance does not trigger increases in interest rates \implies no offsetting response by local saving \implies local rationing
 - ③ **Local governments (and SOEs) preferred by banks:** local rationing only affects the investment of (unconnected) local private firms
- **Overall prediction:** local public debt issuance triggers rationing of local private & domestic firms **only**
- Note: not foreign firms, which can access non-Chinese capital markets

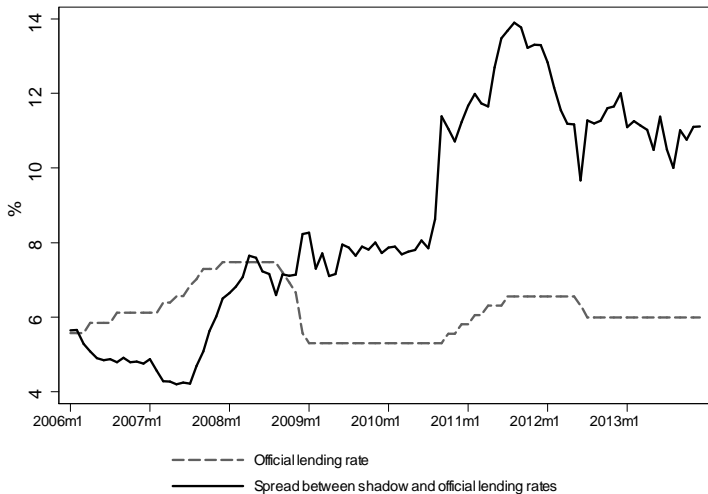
Evidence on Segmentation I

- *Large banks are holding companies with separate legacy organizations for every province. A fragmented banking system in which local branches have substantial autonomy with respect to headquarters. Local politics and the pressure to lend to local governments and local state-owned enterprises play an important role (Dobson and Kayshap, 2006, p. 132)*
- Local Communist Party officials have a bigger say in investment project approval than the head offices. Local authorities are crucial to bank managers' career advancement (Roach, 2006)
 - See also Boyreau-Debray and Wei (2004, 2005); Allen, Qian and Qian (2005); Brandt and Zhu (2007); Dollar and Wei (2007); Firth, Lin, Liu and Wong (2009).

Evidence on Segmentation II

- We find that the interest rates of LGFV bonds at issue vary significantly and persistently between cities, controlling for credit rating and other bond characteristics. Municipal bond yields are positively correlated with local government debt
- Interest rate ceilings (on both deposits and loans) and the 2009 stimulus package contributed to the growth of a shadow banking sector (from 14% of GDP in 2008 to 27% in 2010, Elliot, Kroeber, and Qiao, 2015, Chen, He, and Liu, 2016).
 - Jump in the spread between the shadow lending rate and the official lending rate
 - Entrusted loans between firms located in the same city carry a significantly lower interest rate than transactions between firms in different cities (Allen, Qian, Tu and Yu, 2016).

Official and Shadow Lending Rates



Related Literature

- Public debt and growth:

- Reinhart and Rogoff (2011), Cecchetti, Mohanty and Zampolli (2011)

- Effect of credit constraints on investment:

- Fazzari, Hubbard and Pertersen (1998), Love (2003), Kaplan and Zingales (2000), Hu and Schiantarelli (1998), Almeida and Campello (2007)

- China:

- Fiscal stimulus

- Deng, Morck, Wu, and Yeung (2015), Ouyang and Peng (2015), Wen and Wu (2014), Cong and Ponticelli (2016), Bai, Hsieh, and Song (2016)

- Capital misallocation

- Song and Wu (2015), Hshei and Song (2016), Song, Storesletten, and Wu (2015)

- Local government debt

- Zhang and Barnett (2014), Wu (2015), Ang, Bai, and Zhou (2015), Ambrose, Deng and Wu (2015), Gao, Ru, and Tang (2016)

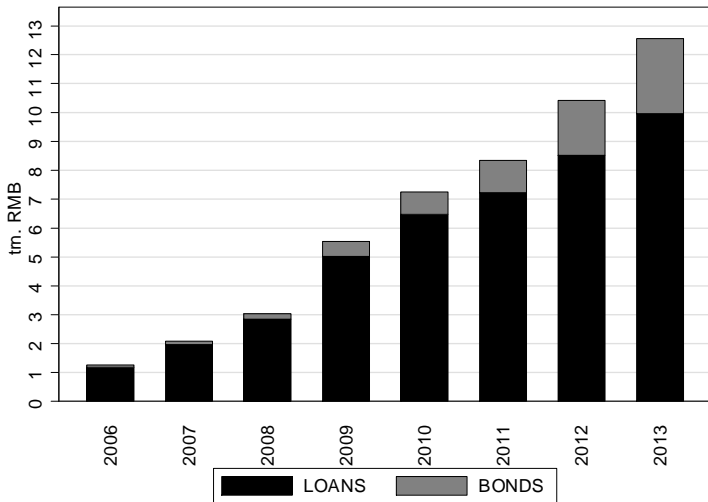
Data

- 387,781 firms in 261 prefectural-level cities over 2007-13
- Sample covers 91% of Chinese population
 - City size ranges between 200,000 and 33 million
 - Median size: 3.8 million
 - 100 cities with a population greater than 5 million
 - 25 cities with a population greater than 8 million.
- Sources:
 - Firm level data
 - Annual Survey of Industrial Firms (ASIF) and Annual Tax Survey (ATS)
 - City-level data (excluding local government debt)
 - China City Statistical Yearbook
 - Local government debt
 - Part of our contribution: see next

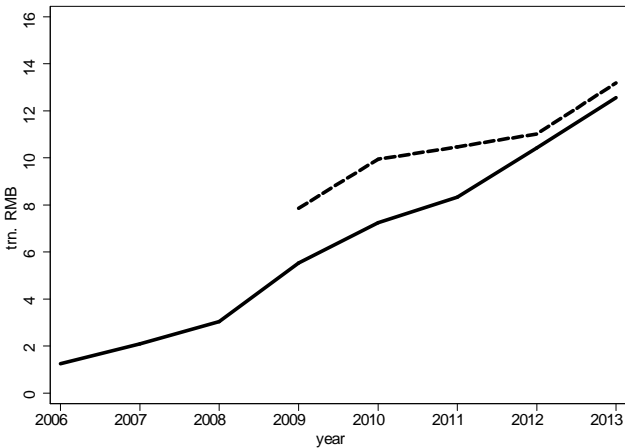
Local Government Debt

- We compute the *total* debt of Local Government Financing Vehicles (LGFV) by exploiting their reporting requirements
 - LGFVs that wish to issue a bond are required to disclose their current and previous balance sheets, at least for the previous 3 years
- We aggregate at city-year level and obtain a *lower bound* for total city-level public debt
 - But lower bound is much more accurate than data based on bond issuance only: see figures
 - Wide cross-sectional and time-series variation in city-level public debt/GDP

Composition of LGFV's Debt

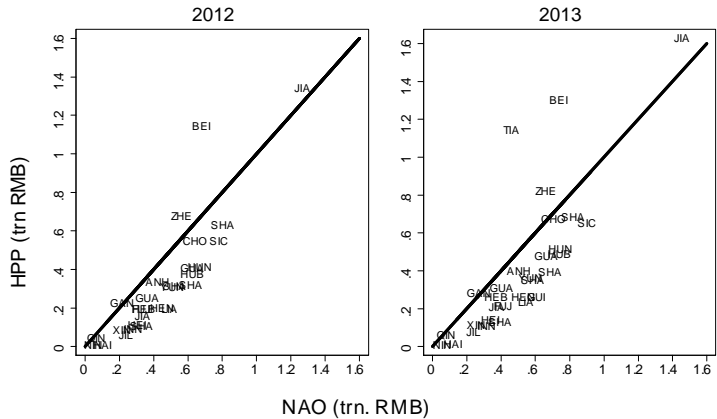


Local Government Debt: Comparison with Official Data



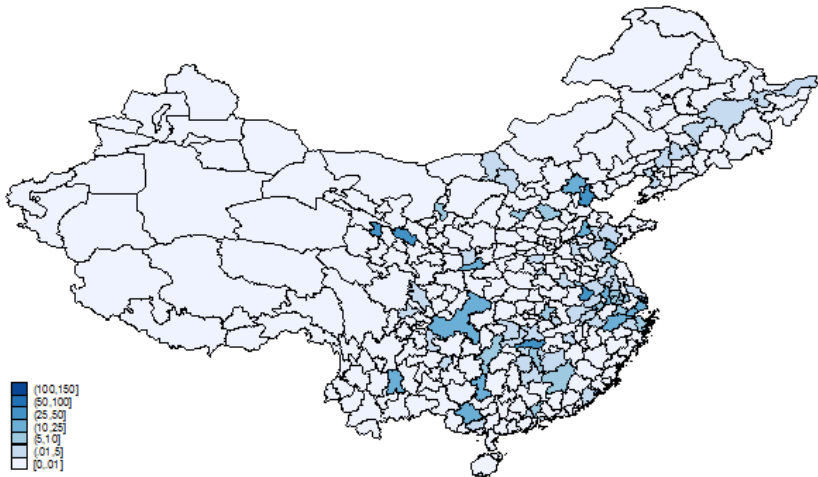
Solid line: our data; dashed line: official (CICC) data

Local Government Debt: Comparison with Province-Level NAO Data



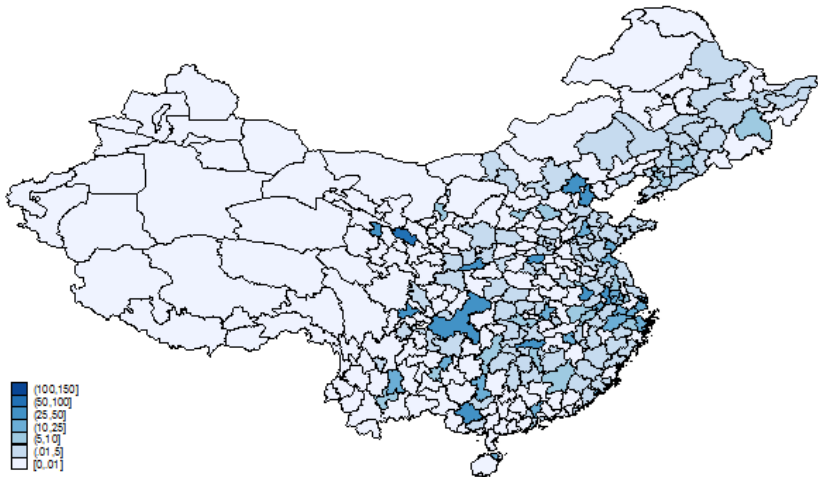
City-level Debt-to-GDP Ratio: 2006

Debt/GDP (%), 2006



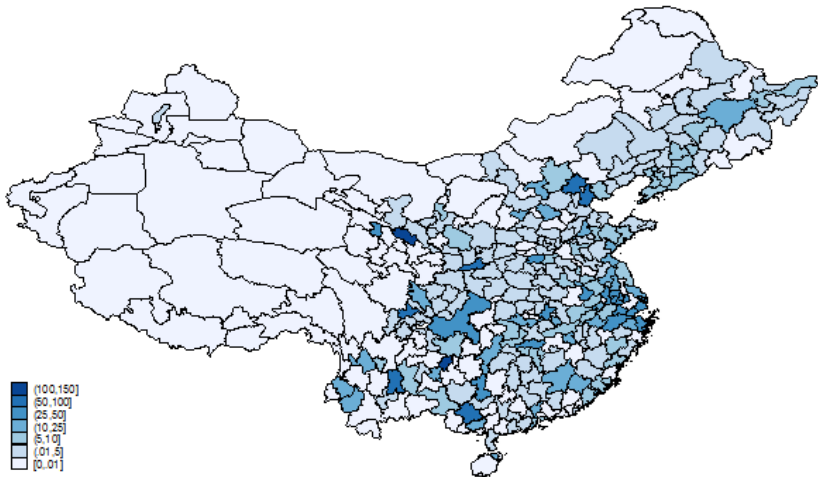
City-level Debt-to-GDP Ratio: 2008

Debt/GDP (%), 2008



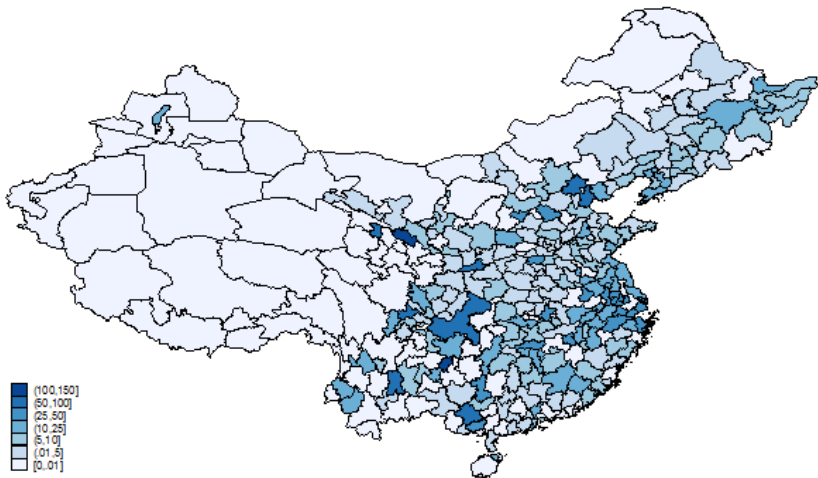
City-level Debt-to-GDP Ratio: 2010

Debt/GDP (%), 2010



City-level Debt-to-GDP Ratio: 2013

Debt/GDP (%), 2013



Local Government Debt

Year	μ	σ Bill. RMB	Min.	Max.	Total China		N. Cities	
					Bill. RMB	(% GDP)	All	D>0
2006	4.3	18.1	0.0	173	1,255	5.8	293	92
2007	7.1	27.6	0.0	268	2,087	7.9	293	144
2008	10.4	38.4	0.0	383	3,036	9.7	293	189
2009	18.9	62.8	0.0	589	5,535	16.2	293	248
2010	24.7	80.5	0.0	789	7,249	18.1	293	281
2011	28.5	93.7	0.0	951	8,336	17.6	293	291
2012	35.6	113.0	0.0	1,145	10,425	20.1	293	292
2013	42.9	132.1	0.0	1,303	12,556	22.1	293	292

City-level Regressions

- We aggregate data at the city-year level and estimate the following regression:

$$I_{c,t} = \beta LGD_{c,t} + X_{c,t}\Gamma + \alpha_c + \tau_t + \varepsilon_{c,t},$$

- $I_{c,t}$ is the ratio of investment to the assets of manufacturing firms in city c and year t
- $LGD_{c,t}$ is the ratio of local government debt to GDP in city c and year t ,
- $X_{c,t}$ are city-level controls
 - bank loans over GDP, local government balance over GDP, GDP growth, log of GDP per capita, log of population, and average land price
- α_c and τ_t are city and year fixed effects

City-level Regressions

	(1)	(2)	(3)	(4)	(5)
<i>LGD</i>	-0.083***	-0.089***	-0.017	0.017	
	(0.026)	(0.0289)	(0.029)	(0.052)	
<i>LGD</i> × <i>PRI</i>					-0.090***
					(0.031)
<i>LGD</i> × <i>SOE</i>					-0.029
					(0.028)
<i>LGD</i> × <i>FOR</i>					0.0154
					(0.033)
N. Obs.	1,861	1,859	1,658	1,146	4580
N. Cities	261	261	261	245	261
Year FE	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES
Sample	All	Private	State	Foreign	All
<i>LGD</i> × <i>PRI</i> – <i>LGD</i> × <i>SOE</i> (p-value=0.01)					-0.060
<i>LGD</i> × <i>PRI</i> – <i>LGD</i> × <i>FOR</i> (p-value=0.01)					-0.105
<i>LGD</i> × <i>SOE</i> – <i>LGD</i> × <i>FOR</i> (p-value=0.13)					-0.045

City-level Regressions: Additional Controls

	(1)	(2)	(3)	(4)
<i>LGD</i>	-0.093*** (0.028)	-0.104*** (0.030)	-0.029 (0.040)	0.032 (0.053)
<i>BL</i>	-0.012 (0.014)	-0.002 (0.014)	-0.027 (0.024)	0.012 (0.033)
<i>GB</i>	0.020 (0.153)	0.028 (0.168)	-0.139 (0.209)	-0.484* (0.252)
<i>GR</i>	0.409*** (0.127)	0.332** (0.135)	0.632*** (0.164)	-0.206 (0.190)
<i>ln(GDP PC)</i>	4.506 (3.283)	6.394* (3.752)	-5.851 (4.408)	14.93** (5.875)
<i>ln(POP)</i>	7.506* (3.821)	9.374** (4.295)	-5.674 (5.511)	15.32** (6.371)
<i>ln(LP)</i>	0.598 (0.629)	0.505 (0.694)	-0.411 (0.979)	2.005* (1.124)
N. Obs.	1,805	1,803	1,658	1,109
N. Cities	261	261	261	242
Firms	All	Private	State	Foreign

All regressions include city and year FE

Endogeneity

- So far, these are just correlations
 - Local public debt may be endogenous, and the direction of the bias is not obvious
- Instrument local government debt with number of top national politicians born in a given city
 - "Connected cities" have more leeway to issue debt (Shih, Adolph and Liu, 2012, and Zhu, 2014)
 - They may also be deemed to be safer borrowers (more likely to be bailed out)
- But "connected cities" may also receive more transfers
 - We augment the regression with transfers, but also transfers are endogenous
 - We use a simulated instrument for transfers

$$STR_{C,t} = \frac{TR_{C,2005}}{TT_{2005}} TT_t$$

City-level IV Regressions

		Second Stage							
		(1)	(2)	(3)	(4)				
LGD		-0.789** (0.368)	-0.779** (0.383)	-0.446 (0.310)	-0.210 (0.277)				
TRI		0.454* (0.258)	0.467* (0.272)	0.0883 (0.258)	-0.131 (0.244)				
		First Stage							
		(1.1)	(1.2)	(2.1)	(2.2)	(3.1)	(3.2)	(4.1)	(4.2)
		LGD	TRI	LGD	TRI	LGD	TRI	LGD	TRI
TOP		0.13 (0.41)	2.48*** (0.81)	0.12 (0.4)	2.49*** (0.82)	0.03 (0.44)	2.75*** (0.89)	-0.23 (0.43)	3.11*** (1.02)
STRI		0.39*** (0.07)	0.27 (0.25)	0.39*** (0.07)	0.28 (0.24)	0.40*** (0.08)	0.27 (0.26)	0.40*** (0.08)	0.23 (0.27)
N. Obs.		1,861		1,859		1,575		1,127	
N. Cities		261		261		261		226	
CD F test		11.44		11.93		11.92		12.66	
Sample		All		Private		State		Foreign	

All regressions include city and year FE

Identification through Heteroskedasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LGD	-0.775** (0.363)	-0.537** (0.249)	-0.764** (0.378)	-0.517* (0.265)	-0.445 (0.309)	-0.445 (0.273)	-0.208 (0.275)	-0.0738 (0.205)
TRI	0.453* (0.257)	0.337* (0.196)	0.466* (0.271)	0.349 (0.214)	0.0888 (0.258)	0.183 (0.227)	-0.133 (0.243)	-0.0586 (0.266)
EXT	2.488* (1.353)	2.130* (1.249)	2.581* (1.428)	2.224* (1.326)	0.406 (2.200)	0.0984 (2.261)	1.088 (2.786)	-0.304 (2.295)
N. Obs	1,861	1,861	1,859	1,859	1,575	1,575	1,127	1,127
N. Cities	261	261	261	261	237	237	226	226
F test	11.6	10.4	11.7	10.5	11.99	11.05	13.04	11.68
Sargan test (p value)		0.51		0.54		0.81		0.69
Est.	IV	IV IH	IV	IV IH	IV	IV IH	IV	IV IH
City FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sample	All		Private		State		Foreign	

Firms with Low Exposure to Government Expenditure

	(1)	(2)	(3)	(4)	(5)
<i>LGD</i>	-0.089*** (0.034)	-0.103*** (0.0378)	-0.938* (0.502)	-0.932* (0.498)	-0.653** (0.304)
<i>BL</i>		-0.011 (0.018)			
<i>GB</i>		0.048 (0.205)			
<i>GR</i>		0.292* (0.154)			
<i>ln(GDP PC)</i>		7.857* (4.645)			
<i>ln(POP)</i>		7.571* (4.381)			
<i>LP</i>		1.712* (0.929)			
<i>TR</i>			0.700** (0.342)	0.699** (0.342)	0.563** (0.239)
<i>EXT</i>				0.879 (1.725)	0.284 (1.453)
N. Obs.	1,820	1,764	1,820	1,820	1,820
N. Cities	261	261	261	261	261
F test			11.4	11.6	10.9
J test (p value)					0.47
Est.	LSDV	LSDV	IV	IV	IV IH

All regressions include city and year FE

Industry-level Regressions

- We use an approach akin to Rajan and Zingales (1998) to assess whether government debt affects more investment in industries that need more external funds:

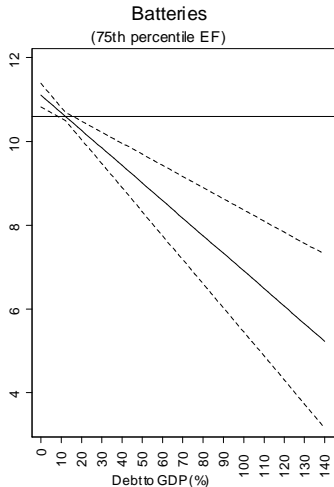
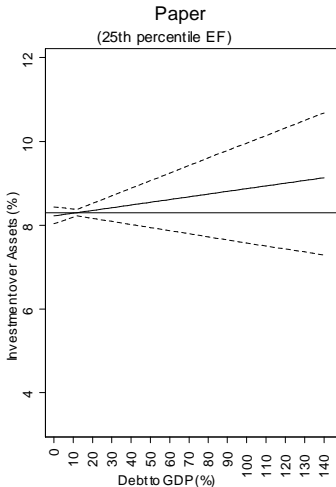
$$I_{j,c,t} = \beta I_{j,c,t-1} + \delta (EF_j \times LGD_{c,t}) + \alpha_{j,t} + \theta_{c,t} + \varepsilon_{j,c,t},$$

- $I_{j,c,t}$: investment-asset ratio in industry j , city c and year t
- $LGD_{c,t}$: local government debt scaled by GDP in city c and year t
- EF_j : time-invariant measure of the external fund dependence of industry j
 - We build EF using data from the 4 Chinese cities with the most developed credit markets (Beijing, Shanghai, Hangzhou, and Wenzhou) and drop these 4 cities from the sample
- $\alpha_{j,t}$ and $\theta_{c,t}$ are industry-year and city-year fixed effects.

Industry-level Regressions: Baseline

	(1)	(2)	(3)	(4)
I_{t-1}	-0.273*** (0.006)	-0.271*** (0.006)	-0.426*** (0.034)	-0.396** (0.16)
$EF \times LGD$	-0.015*** (0.005)	-0.019*** (0.006)	0.016 (0.017)	0.007 (0.042)
N. Obs	57,054	53,262	6,249	2,550
N. Cities	15,768	14,906	3,252	1,121
City-Year FE	YES	YES	YES	YES
Ind.-Year FE	YES	YES	YES	YES
Sample	All	Private	State	Foreign

Local Government Debt and Investment Ratios in Different Industries



Industry-level Regressions: Additional Interactions

	(1)	(2)	(3)	(4)
I_{t-1}	-0.272*** (0.006)	-0.271*** (0.006)	-0.427*** (0.03)	-0.398*** (0.164)
$EF \times LGD$	-0.018*** (0.005)	-0.023*** (0.006)	0.018 (0.011)	0.008 (0.04)
$EF \times BL$	0.001 (0.001)	0.001 (0.001)	-0.003 (0.003)	-0.003 (0.016)
$EF \times \ln(GDP\ PC)$	0.227 (0.19)	0.186 (0.196)	0.679 (0.942)	-0.382 (3.08)
$EF \times GR$	0.0286* (0.016)	0.0338 (0.019)	0.0646 (0.09)	0.0191 (0.312)
$EF \times LP$	-0.129 (0.107)	-0.131 (0.114)	-0.230 (0.528)	0.018 (1.443)
N. Obs	56,209	52,503	6,065	2,520
N. Cities	15,693	14,839	3,194	1,115
City-Year FE	YES	YES	YES	YES
Ind.-Year FE	YES	YES	YES	YES
Sample	All	Private	State	Foreign

Firm-level Regressions

- We follow Fazzari et al. (1988) and Love (2003) and test whether local public debt affects the sensitivity of investment to internal cash flow:

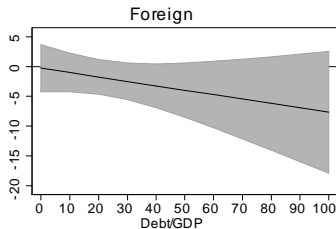
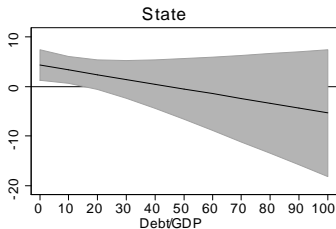
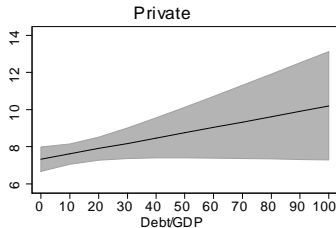
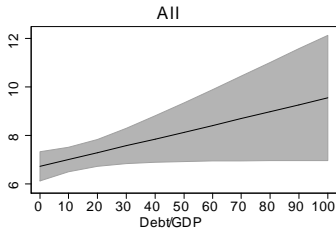
$$I_{i,c,t} = \beta I_{i,c,t-1} + \delta REV_{i,c,t-1} + (\gamma_1 + \gamma_2 LGD_{c,t}) CF_{i,c,t-1} + \alpha_i + \theta_{ct} + \varepsilon_{i,c,t},$$

- I , REV , and CF are investment in fixed capital, revenue growth and cash flow of firm i , in city c and year t (all scaled by beginning-of-year total assets)
- LGD is local government debt scaled by GDP in city c and year t .
- α_i are firm fixed effects and θ_{ct} are city-year effects

Firm-level Regressions: Baseline

	(1)	(2)	(3)	(4)	(5)
I_{t-1}	-0.273*** (0.002)	-0.280*** (0.002)	-0.371*** (0.008)	-0.282*** (0.011)	-0.273*** (0.002)
REV_{t-1}	3.773*** (0.031)	3.799*** (0.034)	2.398*** (0.167)	2.942*** (0.220)	3.77*** (0.031)
CF_{t-1}	6.725*** (0.231)	7.334*** (0.256)	4.328*** (1.190)	-0.253 (1.534)	6.70*** (0.231)
$CF_{t-1} \times LGD$	0.028** (0.011)	0.029** (0.013)	-0.097 (0.055)	-0.07 (0.05)	0.038*** (0.012)
$CF_{t-1} \times LGD \times State$					-0.080** (0.036)
$CF_{t-1} \times LGD \times Foreign$					-0.091*** (0.024)
N. Obs.	1,150,340	975,454	61,755	33,784	1,150,340
N. Firms	387,781	353,434	32,103	15,950	387,781
N. Cities	261	261	261	261	261
Firm FE	YES	YES	YES	YES	YES
City-Year FE	YES	YES	YES	YES	YES
Sample	All	Private	State	Foreign	All
$CF_{t-1} \times LGD + CF_{t-1} \times LGD \times State$					-0.042
p-value					0.26
$CF_{t-1} \times LGD + CF_{t-1} \times LGD \times Foreign$					-0.053
p-value					0.11

Local Government Debt and Investment Sensitivity to Cash-Flow



Firm-level Regressions: Controlling for Bank Loans

	(1)	(2)	(3)	(4)
I_{t-1}	-0.274*** (0.002)	-0.281*** (0.002)	-0.371*** (0.008)	-0.281*** (0.011)
REV_{t-1}	3.770*** (0.031)	3.796*** (0.033)	2.393*** (0.168)	2.933*** (0.220)
CF_{t-1}	8.343*** (0.374)	9.141*** (0.411)	6.020*** (1.893)	-2.973 (2.665)
$CF_{t-1} \times LGD$	0.075*** (0.014)	0.083*** (0.016)	-0.045 (0.068)	-0.110* (0.058)
$CF_{t-1} \times BL$	-0.022*** (0.004)	-0.025*** (0.004)	-0.023 (0.019)	0.028 (0.019)
N. Obs.	1,150,340	975,454	61,755	33,784
N. Firms	387,781	353,434	32,103	15,950
N. Cities	261	261	261	261
Firm FE	YES	YES	YES	YES
City-Year FE	YES	YES	YES	YES
Sample	All	Private	State	Foreign

Firm-level Regressions: Additional Controls

	(1)	(2)	(3)	(4)	(5)
I_{t-1}	-0.274*** (0.002)	-0.274*** (0.002)	-0.274*** (0.002)	-0.273*** (0.002)	-0.274*** (0.002)
REV_{t-1}	3.771*** (0.031)	3.771*** (0.031)	3.796*** (0.032)	3.763*** (0.032)	3.787*** (0.032)
CF_{t-1}	8.137*** (0.426)	9.150*** (0.492)	18.60*** (0.799)	2.039 (1.482)	19.15*** (2.399)
$CF_{t-1} \times LGD$	0.075*** (0.014)	0.072*** (0.014)	0.052*** (0.014)	0.055*** (0.014)	0.051*** (0.015)
$CF_{t-1} \times BL$	-0.021*** (0.004)	-0.024*** (0.004)	-0.026*** (0.004)	-0.025*** (0.004)	-0.021*** (0.004)
$CF_{t-1} \times GB$	-0.038 (0.042)				0.093* (0.052)
$CF_{t-1} \times \ln(GDP\ PC)$		0.539** (0.237)			-0.794** (0.332)
$CF_{t-1} \times GR$			-0.739*** (0.051)		-0.802*** (0.056)
$CF_{t-1} \times LP$				1.047*** (0.247)	-0.105 (0.316)
N. Obs.	1,150,340	1,150,340	1,123,318	1,142,536	1,115,514
N. Firms	387,781	387,781	385,540	387,037	384,720
N. Cities	261	261	261	261	261
Firm FE	YES	YES	YES	YES	YES
City-Year FE	YES	YES	YES	YES	YES
Sample	All	All	All	All	All

Firm-level Regressions: Exposure to Gov't Expenditure

	(1)	(2)	(3)	(4)	(5)	(6)
I_{t-1}	-0.277*** (0.002)	-0.278*** (0.002)	-0.283*** (0.002)	-0.375*** (0.009)	-0.304*** (0.01)	-0.278*** (0.002)
REV_{t-1}	3.757*** (0.035)	3.756*** (0.035)	3.786*** (0.038)	2.368*** (0.192)	2.738*** (0.259)	3.756*** (0.035)
CF_{t-1}	9.049*** (0.442)	8.455*** (0.421)	9.515*** (0.487)	7.913*** (2.360)	2.994 (3.410)	8.553*** (0.477)
$CF_{t-1} \times LGD$	0.0895*** (0.0172)	0.0785*** (0.0156)	0.106*** (0.020)	0.029 (0.079)	-0.109 (0.086)	0.083*** (0.020)
$CF_{t-1} \times BL$	-0.021*** (0.004)	-0.021*** (0.004)	-0.024*** (0.005)	-0.031 (0.022)	0.006 (0.024)	-0.021*** (0.004)
$CF_{t-1} \times EXP$	-4.632*** (1.009)		-2.065* (1.236)	-6.877*** (2.128)	-16.94 (11.24)	
$CF_{t-1} \times EXP \times LGD$	-0.064 (0.046)		-0.125** (0.052)	-0.111 (0.105)	0.166 (0.481)	
$HEXP \times LGD$	-0.034** (0.0136)		-0.039** (0.0159)	-0.056 (0.0384)	-0.071 (0.0680)	
$CF_{t-1} \times HEXP$						-0.197 (0.451)
$CF_{t-1} \times HEXP \times LGD$						-0.009 (0.024)
$HEXP \times LGD$						0.003 (0.004)
N. Obs.	935,255	935,255	796,947	50,192	24,087	935,255
N. Firms	323,914	323,914	295,448	26,065	11,790	323,914
N. Cities	261	261	261	261	261	261
Sample	All	All	Private	State	Foreign	All

All regressions control for firm and city-year FE

Firm-level System GMM Regressions

	(1)	(2)	(3)	(4)
SYS GMM				
I_{t-1}	0.018 (0.024)	0.002 (0.026)	0.372 (0.216)	-0.404* (0.244)
REV_{t-1}	9.709*** (0.365)	9.756*** (0.407)	3.977 (3.882)	-0.607 (3.494)
CF_{t-1}	9.69*** (2.41)	11.04*** (2.69)	36.15** (17.48)	46.93* (22.80)
$CF_{t-1} \times LGD$	0.052*** (0.011)	0.037*** (0.012)	-0.044 (0.046)	0.056 (0.123)
$CF_{t-1} \times BL$	-0.065*** (0.020)	-0.035 (0.023)	-0.066 (0.106)	-0.187* (0.170)
AR1 (p-value)	0.00	0.00	0.03	0.04
AR2 (p-value)	0.07	0.03	0.15	0.30
Sargan (p-value)	0.15	0.07	0.00	0.00
Standard FE on same sample				
I_{t-1}	-0.242*** (0.002)	-0.251*** (0.003)	-0.339*** (0.015)	-0.206*** (0.018)
REV_{t-1}	4.18*** (0.04)	4.24*** (0.04)	2.82*** (0.31)	1.07*** (0.33)
CF_{t-1}	12.93*** (0.49)	12.87*** (0.56)	7.55** (3.11)	15.32*** (3.56)
$CF_{t-1} \times LGD$	0.018*** (0.002)	0.018*** (0.002)	0.005 (0.013)	0.021 (0.013)
$CF_{t-1} \times BL$	-0.066*** (0.005)	-0.063*** (0.006)	-0.085*** (0.030)	-0.110*** (0.027)
N. Obs.	797,314	623,837	53,657	18,848
N. Firms	261,451	190,525	19,136	6,028
Sample	All	Private	State	Foreign

All regressions control for firm and city-year FE

Firm-Level Regressions: Different Samples

	(1)	(2)
I_{t-1}	-0.282*** (0.0018)	-0.278*** (0.0016)
REV_{t-1}	3.955*** (0.037)	3.793*** (0.033)
CF_{t-1}	7.928*** (0.416)	8.352*** (0.420)
$CF_{t-1} \times LGD$	0.057*** (0.019)	0.076*** (0.017)
$CF_{t-1} \times BL$	-0.015*** (0.004)	-0.020*** (0.004)
N. Obs.	781,670	1,003,337
N. Firms	264,914	340,510
N. Cities	235	212
Firm FE	YES	YES
City-Year FE	YES	YES
Sample	Excluding 4 provinces where $HPP > Off.$	$1m < POP < 10m$

Local Government Debt and Investment: Firm-Level IV Regressions

	(1)	(2)	(3)	(4)
I_{t-1}	-0.291*** (0.002)	-0.296*** (0.002)	-0.370*** (0.009)	-0.291*** (0.024)
REV_{t-1}	3.659*** (0.032)	3.682*** (0.035)	2.358*** (0.180)	3.073*** (0.464)
CF_{t-1}	23.65*** (1.647)	28.07*** (2.314)	20.08 (14.09)	2.736 (5.895)
$CF_{t-1} \times LGD$	2.638*** (0.286)	3.188*** (0.392)	2.176 (2.232)	1.829 (1.310)
$CF_{t-1} \times BL$	-0.342*** (0.035)	-0.427*** (0.050)	-0.310 (0.289)	-0.154 (0.115)
$CF_{t-1} \times TR$	-0.637*** (0.076)	-0.720*** (0.097)	-0.594 (0.614)	-0.824 (0.619)
N. Obs.	928,772	775,250	43,617	19,130
N. Cities	261	261	256	2243
N. of firms	258,338	223,566	15,739	6,807
CD F test	415.1	242.2	22.2	29.1
City FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Sample	All	Private	State	Foreign

Firm-Level Regressions: Switching Regression Model

- Two problems with an exogenous partition of firms across financing regimes (constrained or unconstrained):
 - 1 Cannot jointly control for the various factors affecting how firms substitute internal with external funds
 - 2 Do not allow firms to switch across regimes over time
- As in Hu-Schiantarelli (1998) and Almeida-Campello (2007), we assume that at each date a firm operates in one of two regimes: a constrained regime where investment is very sensitive to internal funds, and an unconstrained regime where it is not
 - The regime probability is determined by a switching function that depends on firm characteristics that capture the severity of the agency problems faced by the firm at a specific date

Firm-Level Regressions: Switching Regression Model

- The regimes are not observable but endogenously determined by the system of equations:

$$W_{i,c,t}^* = M_{i,c,t}\psi + u_{i,c,t}$$

$$l_{1,i,c,t} = X_{i,c,t}\alpha_1 + \epsilon_{1,i,c,t}$$

$$l_{2,i,c,t} = X_{i,c,t}\alpha_2 + \epsilon_{2,i,c,t}$$

- A selection equation that estimates the likelihood that the firm is in regime 1 ($l_{i,c,t} = l_{1,i,c,t}$ if $W_{i,c,t}^* < 0$) or regime 2 ($l_{i,c,t} = l_{2,i,c,t}$ if $W_{i,c,t}^* \geq 0$) as a function of financial strength and other factors
 - Log of firm age, the log of total assets, distance to default -Altman Z-score-, industry-level asset intangibility, firm ownership, local government debt
- Two investment equations
 - Identical to our baseline model but allowing for different coefficients in the two regimes.

Firm-Level Regressions: Switching Regression Model

	(1)	(2)	(3)			
A. Selection Equation						
<i>ln(Age)</i>	10.93*** (0.077)	7.236*** (0.721)	8.532*** (0.066)			
<i>ln(Assets)</i>	0.077** (0.034)	0.725*** (0.030)	1.706*** (0.026)			
<i>Zscore</i>	0.110*** (0.008)	0.049*** (0.008)	0.033*** (0.007)			
<i>Private</i>	-9.340*** (0.142)	-5.09*** (0.013)	-4.339*** (0.012)			
<i>Tangible</i>	7.898*** (0.279)	4.62*** (0.026)				
<i>LGD</i>	-0.012* (0.008)					
N. Obs	1,060,404	1,060,404	1,060,404			
B. Investment Equation						
	(1.1)	(1.2)	(2.1)	(2.2)	(3.1)	(3.2)
	Not Constr.	Constr.	Not Constr.	Constr.	Not Constr.	Constr.
CF_{t-1}	1.62*** (0.03)	0.40*** (0.02)	0.31*** (0.03)	0.81*** (0.02)	0.14*** (0.03)	0.71*** (0.02)
$CF_{t-1} \times LGD$	-0.042*** (0.005)	0.014*** (0.003)	-0.063*** (0.01)	0.052*** (0.01)	-0.033*** (0.01)	0.011*** (0.004)
<i>LGD</i>	-0.012*** (0.001)	-0.041*** (0.004)				
N. Obs.	306,175	754,229	274,822	785,222	231,925	828,479
City FE	YES		NO		NO	
Year FE	YES		NO		NO	
City-Year FE	NO		YES		YES	
Ind-Year FE	NO		NO		YES	

Conclusions

- In China local public debt issuance in 2007-13 crowded out the investment of private firms by tightening their credit constraints
- We test this hypothesis owing to a novel dataset of city-level public debt, featuring strong cross-sectional and time-series variation
- Our evidence allays most endogeneity concerns
- The Chinese fiscal stimulus reduced investment by private manufacturing firms, and left SOEs unaffected
 - Reallocation of investment from private to SOEs is likely to reduce on China's long-run growth potential
 - By boosting the fraction of public debt in banks' portfolios, this policy has strengthened the bank-sovereign nexus in China, with possible systemic risk consequences: see Europe in 2010-12!