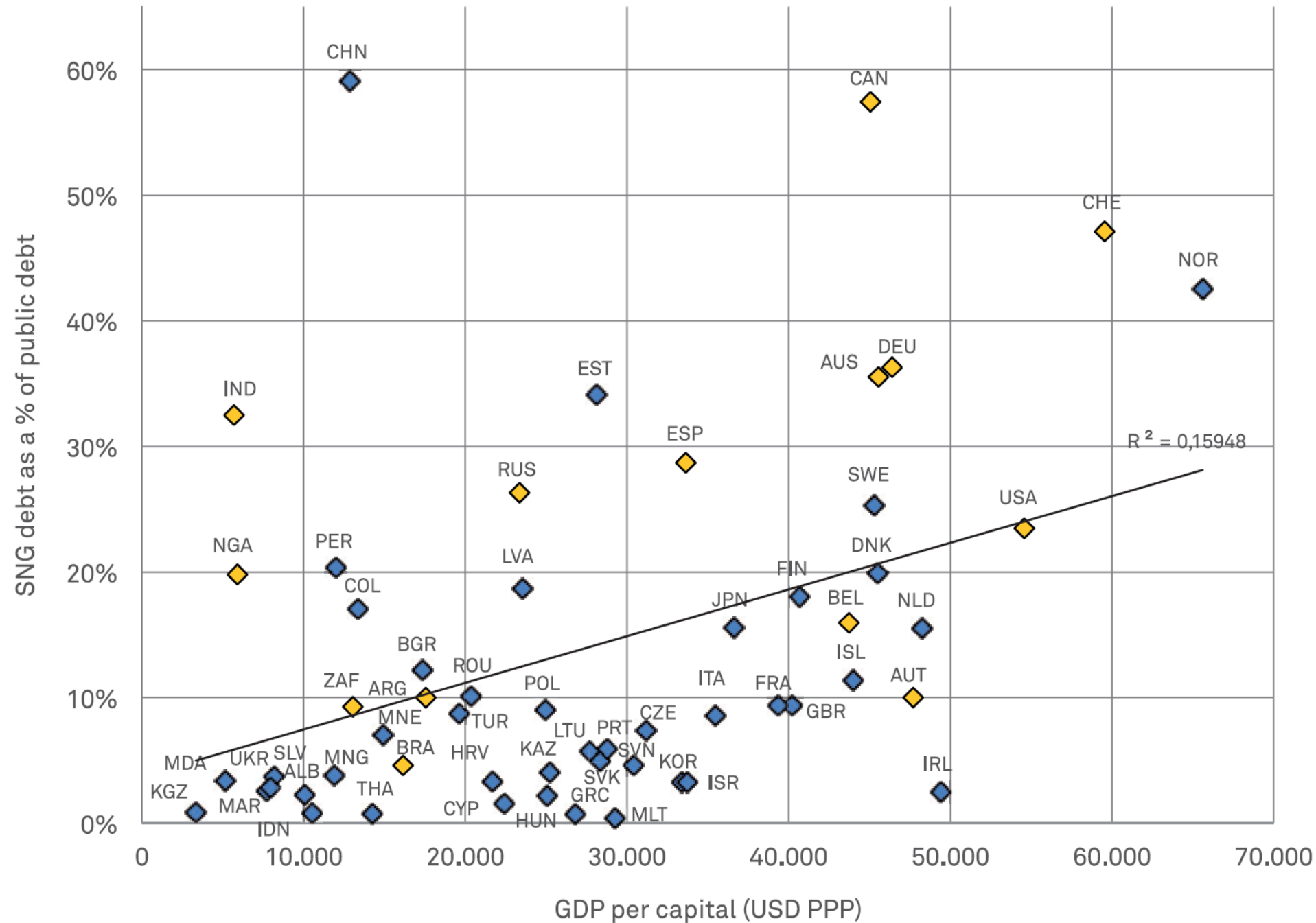# Local Crowding Out in China

Yi Huang, Marco Pagano & Ugo Panizza

Discussion by Randall Morck

University of Alberta, NBER, ECGI & ABFER

Subnational Government Debt / Total Government Debt

Scatter plot of SNG debt as a % of public debt (y-axis) versus GDP per capital (USD PPP) (x-axis, 0 to 70.000). R² = 0,15948.

Countries plotted: CHN, CAN, CHE, NOR, EST, DEU, AUS, ESP, SWE, USA, RUS, IND, DNK, FIN, LVA, NGA, PER, COL, JPN, BEL, NLD, BGR, ROU, ITA, FRA, ISL, AUT, ZAF, ARG, POL, CZE, GBR, MNE, TUR, LTU, PRT, SVN, KOR, MDA, UKR, SLV, MNG, BRA, HRV, KAZ, SVK, IRL, KGZ, MAR, ALB, IDN, THA, CYP, GRC, HUN, MLT, ISR.

Expansionary Fiscal Policy post-2008

CATO AT LIBERTY

MAY 23, 2017 12:39PM

Paul Krugman on Pump-Priming and Trump

*By* ALAN REYNOLDS ⸱⸱ **⊝ SHARE**

New York Times columnist Paul Krugman recently chided President Trump for imagining he invented the metaphor of "priming the pump" during an *Economist* interview. Yet Krugman, like Trump, buys into the premise that budget deficits really do "stimulate" total spending or "aggregate demand" which is commonly measured by growth of *Nominal* GDP (NGDP).

Economic booms and busts clearly have huge effects on budget deficits, but where is the evidence that deficits and surpluses have their own separate ("exogenous") effect on NGDP?
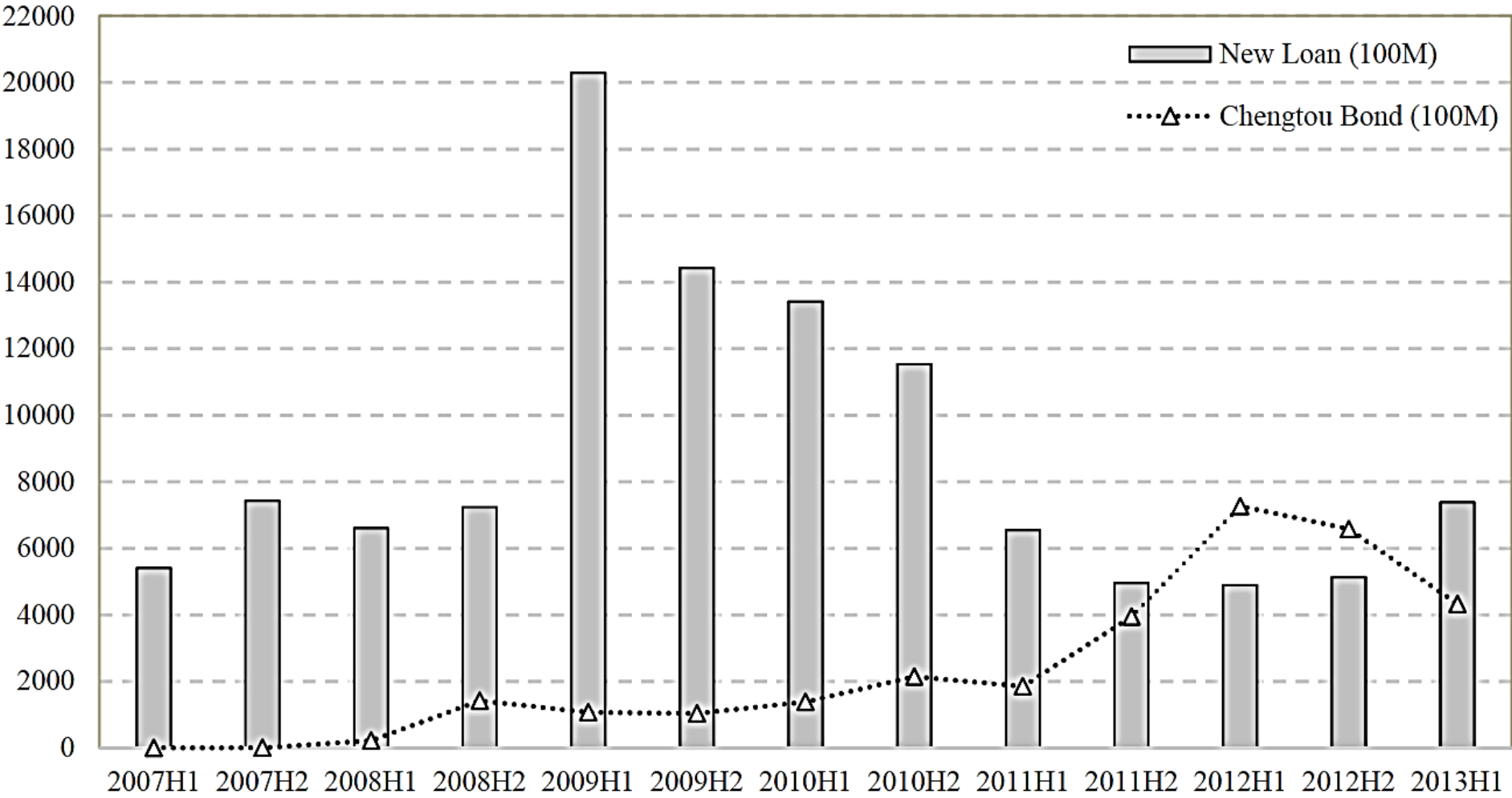
Figure 3: Debt Financing to China Local Governments, 2007-2013. This figure plots the semi-annual new debt issuance by China local governments. The grey bars represent the amount of new issuance of bank loans. The dashed line shows the amount of new issuance of urban construction and investment ("*Chengtou*") bonds. Unit for the vertical axis is in RMB 100 million. Loan data are from the China Banking Regulatory Commission and the *Chengtou* bond data are from Wind database.

He, Zhiguo, Zhuo Chen & Chun Liu. 2017. The Financing of Local Government in China: Stimulus Loan Wanes and Shadow Banking Waxes

Panel B: Local Government Non-Bank Debt over Shadow Banking
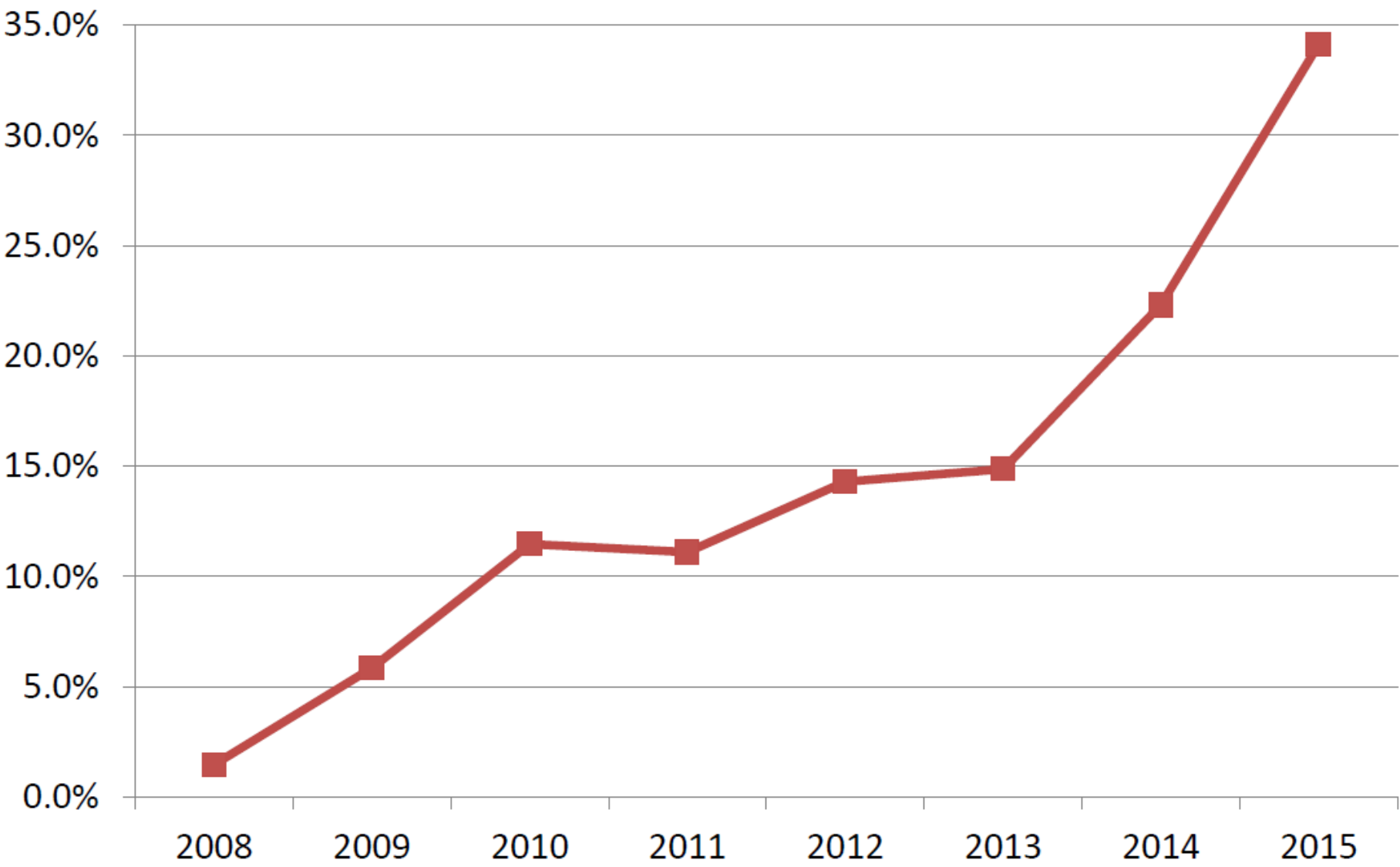
Subnational Govt. Public Spending / Total Public Spending

Scatter plot of SNG expenditure as a % of GDP (y-axis, 0% to 40%) versus GDP per capita (USD PPP) (x-axis, 0 to 70.000). R² = 0,35547. Country data points labeled including DNK, CAN, SWE, FIN, BEL, ESP, RUS, BRA, ZAF, CHN, VNM, DEU, CHE, USA, NOR, AUT, AUS, NLD, JPN, ITA, KOR, ISL, FRA, GBR, and many others.
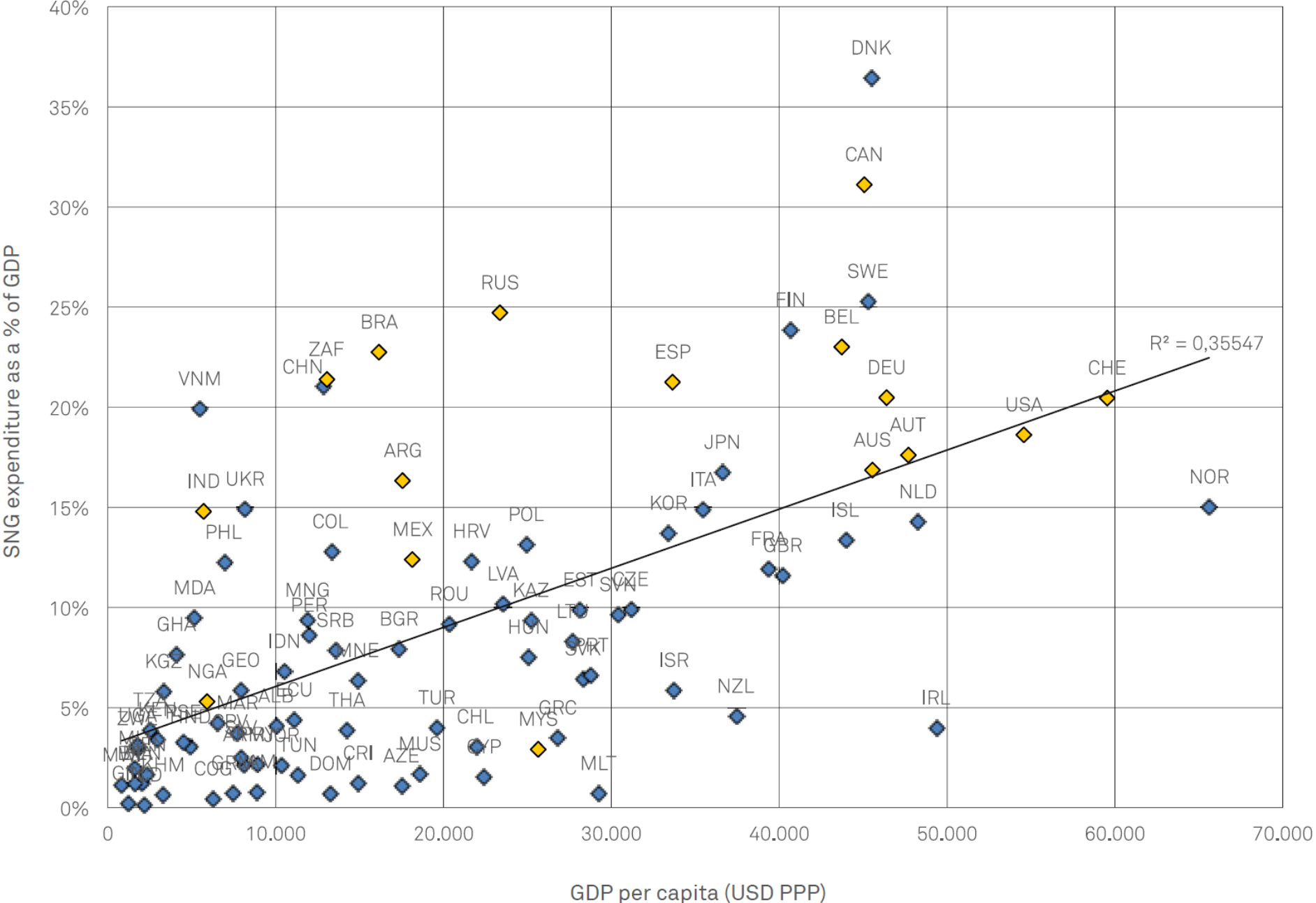
Subnational Government Tax Revenues / GDP

Scatter plot of SNG tax revenue as a % of GDP (y-axis, 0% to 16%) versus GDP per capita (USD PPP) (x-axis, 0 to 70.000). R² = 0,27014

Notable data points: CAN (~14.2%), SWE (~13.7%), DNK (~12.5%), ARG (~12.6%), DEU (~11.3%), CHE (~11%), BRA (~10.9%), IND (~10.1%), FIN (~10.2%), CHN (~9.5%), ISL (~9.6%), USA (~8.8%), RUS (~8.8%), VNM (~7.8%), ESP (~7.7%), JPN (~7.4%), ITA (~6.5%), UKR (~5.6%), FRA (~5.5%), LVA (~5.4%), NOR (~5.3%), BEL (~5.1%), CZE (~5%), AUS (~4.6%), SVN (~4.1%), POL (~4.1%), KOR (~3.9%), COL (~3.7%), KGZ (~3.6%), MDA (~4.4%), PHL (~4.4%), SRB (~4.5%), HRV (~4.5%), KAZ, MYS, MNG (~3.2%), MNE (~2.9%), ZWE (~2%), HUN, PRT, ISR, NZL, GBR, AUT, NLD, IRL, and others.

Bottom line: Lots to like, but …

Likeable things

- **Firm-level analysis is convincing. Might lead off with this?**
- **Seriously thinks about firms' investment decisions**
- **Seriously thinks about China's institutional environment**

Other things

- **City & industry-level analysis**
  - **Economics**
  - **Econometrics**
- **Identification police report**
- **Data issues**
- **Yet other things**

Table 2: **Local Government Debt and Investment: City-Level Regressions**

This table reports the results of a set of regressions where the dependent variable is the city-level investment ratio of the manufacturing sector (computed as the weighted average of investment over total assets of all manufacturing firms in city c year t) and the dependent variable is local government debt over GDP (LGD). Column 1 includes all manufacturing firms, column 2 only private sector manufacturing firms, column 3 state-owned manufacturing firms, column 4 foreign-owned manufacturing firms, and column 5 all types of firm but estimating separate effects by interacting local government debt with private sector (PRI), state-owned (SOE), and foreign-owned (FOR) dummies. The regressions cover 261 cities for the period 2006-2013.

	(1)	(2)	(3)	(4)	(5)
LGD	-0.083***	-0.089***	-0.017	0.017	
	(0.026)	(0.0289)	(0.029)	(0.052)	
$LGD \times PRI$					-0.090***
					(0.031)
$LGD \times SOE$					-0.029
					(0.028)
$LGD \times FOR$					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
$LGD \times PRI - LGD \times SOE$					-0.060*
p-value					(0.06)
$LGD \times PRI - LGD \times FOR$					-0.105***
p-value					(0.01)
$LGD \times SOE - LGD \times FOR$					-0.045
p-value					(0.13)

Robust s.e. clustered at the city level in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

City-level Results

Regression (1)

$$I_{j,t} = -0.083^{***} LGD_{j,t} + \delta_{j,t}^c + \delta_{j,t}^t + e_{j,t}$$

Variables

$$I_{j,t} = \sum_{j \in c} \left(\frac{assets_{j,t}}{\sum_{j \in c} assets_{j,t}} \right) \frac{capex_{j,t}}{assets_{j,t}} = \frac{\sum_{j \in c} capex_{j,t}}{\sum_{j \in c} assets_{j,t}} = \frac{capex_{c,t}}{assets_{c,t}}$$

$$LGD_{j,t} = \frac{city\ debt_{c,t}}{city\ gdp_{c,t}}$$

$$\delta_{j,t}^c = city\ fixed - effects$$

$$\delta_{j,t}^t = year\ fixed - effects$$

Variables vary by city, c, & time, t

↑

Observations indexed by firm, j, & time, t

Unnatural

"You can clone yourself as much as you like, Brainstorm, but you're only getting one salary."

Data Cloning

Look like a cheat

- ❑ If $J_{c,t}$ firms in city c in year t ➜ observation is repeated $J_{c,t}$ times
- ❑ Clone each of ~1,800 city-year observations $J_{c,t}$ times ➜ ~ 1,000,000 firm-year observations

Not really cheating because

- ❑ Table reports $N = 1,800$
- ❑ Cluster by city ➜ cuts degrees of freedom in t-tests from 1,000,000 back to 1,800
- ❑ Precisely equals no data cloning + run WLS weighting city-year observation by
  $J_{c,t}$ = # firms in that city that year

OK, so why do it this way?

- ❑ Why weight by $J_{c,t}$ = # firms?
  - ❑ Gives larger (also more liberalized?) cities more weight in regressions
  - ❑ Why not weight by population?
- ❑ Why use covert WLS? Why not OLS?
  - ❑ Treat every city's debt equally?

j	c	t	$I_{j,t}$	$LGD_{j,t}$	City fixed effects …						Time fixed effects …			
1	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
2	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
3	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
4	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
5	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
6	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
7	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
8	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
9	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
10	1	1	3.1	2.2	1	0	0	0	0	…	1	0	0	…
11	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
12	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
13	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
14	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
15	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
16	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
17	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
18	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
19	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
20	2	1	2.8	0.5	0	1	0	0	0	…	1	0	0	…
21	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
22	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
23	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
24	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
25	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
26	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
27	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
28	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
29	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
30	3	1	1.4	0.9	0	0	1	0	0	…	1	0	0	…
31	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
32	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
33	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
34	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
35	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
36	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
37	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
38	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
39	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…
40	4	1	0.3	1.6	0	0	0	1	0	…	1	0	0	…

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p-value					(0.13)

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City-level Results

Regression (5)

$$I_{j,t} = -0.090^{***} \, LGD_{j,t} \, \delta_{j,t}^{p} - 0.029 \, LGD_{j,t} \, \delta_{j,t}^{s} + 0.015 \, LGD_{j,t} \, \delta_{j,t}^{f} + \delta_{j,t}^{c} + \delta_{j,t}^{t} + e_{j,t}$$

Variables

$$I_{j,t} = \sum_{j \in c} \left(\frac{assets_{j,t}}{\sum_{j \in c} assets_{j,t}} \right) \frac{capex_{j,t}}{assets_{j,t}} = \frac{\sum_{j \in c} capex_{j,t}}{\sum_{j \in c} assets_{j,t}} = \frac{capex_{c,t}}{assets_{c,t}}$$

$$LGD_{j,t} = \frac{city\ debt_{c,t}}{city\ gdp_{c,t}}$$

$$\delta_{j,t}^{p} = private\ firm\ dummy$$

$$\delta_{j,t}^{s} = SOE\ dummy$$

$$\delta_{j,t}^{f} = foreign\ firm\ dummy$$

Firm-type fixed effects

Interactions give separate $LGD_{j,t}$ coefficients for each firm type

$$\delta_{j,t}^{c} = city\ fixed-effects$$

$$\delta_{j,t}^{t} = year\ fixed-effects$$

Data Cloning

Still unnatural

- ☐ **Still cloning observations, each city-year observation becomes $J_{c,t}$ firm-year observations**
- ☐ **But now partition the cloned city-year observation into subgroups by firm type (p, s, or f)**

OK anyway because

- ☐ **Cluster by city ➜ t-tests are adjusted back to reflect city-year degrees of freedom**

But why do it this way?

- ☐ **Economic issue**
- ☐ **Econometrics issue**

j	c	t	$I_{j,t}$	$LGD_{j,t}\delta^p_{j,t}$	$LGD_{j,t}\delta^s_{j,t}$	$LGD_{j,t}\delta^p_{j,t}$	City fixed effects ...						Time f
1	1	1	3.1	2.2	0	0	1	0	0	0	0	...	1 0 0
2	1	1	3.1	2.2	0	0	1	0	0	0	0	...	1 0 0
3	1	1	3.1	2.2	0	0	1	0	0	0	0	...	1 0 0
4	1	1	3.1	0	2.2	0	1	0	0	0	0	...	1 0 0
5	1	1	3.1	0	2.2	0	1	0	0	0	0	...	1 0 0
6	1	1	3.1	0	2.2	0	1	0	0	0	0	...	1 0 0
7	1	1	3.1	0	2.2	0	1	0	0	0	0	...	1 0 0
8	1	1	3.1	0	2.2	0	1	0	0	0	0	...	1 0 0
9	1	1	3.1	0	0	2.2	1	0	0	0	0	...	1 0 0
10	1	1	3.1	0	0	2.2	1	0	0	0	0	...	1 0 0
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12	2	1	2.8	0.5	0	0	0	1	0	0	0	...	1 0 0
13	2	1	2.8	0.5	0	0	0	1	0	0	0	...	1 0 0
14	2	1	2.8	0	0.5	0	0	1	0	0	0	...	1 0 0
15	2	1	2.8	0	0.5	0	0	1	0	0	0	...	1 0 0
16	2	1	2.8	0	0.5	0	0	1	0	0	0	...	1 0 0
17	2	1	2.8	0	0.5	0	0	1	0	0	0	...	1 0 0
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25	3	1	1.4	0	0.9	0	0	0	1	0	0	...	1 0 0
26	3	1	1.4	0	0.9	0	0	0	1	0	0	...	1 0 0
27	3	1	1.4	0	0.9	0	0	0	1	0	0	...	1 0 0
28	3	1	1.4	0	0.9	0	0	0	1	0	0	...	1 0 0
29	3	1	1.4	0	0	0.9	0	0	1	0	0	...	1 0 0
30	3	1	1.4	0	0	0.9	0	0	1	0	0	...	1 0 0
31	4	1	0.3	1.6	0	0	0	0	0	1	0	...	1 0 0
32	4	1	0.3	1.6	0	0	0	0	0	1	0	...	1 0 0
33	4	1	0.3	1.6	0	0	0	0	0	1	0	...	1 0 0
34	4	1	0.3	0	1.6	0	0	0	0	1	0	...	1 0 0
35	4	1	0.3	0	1.6	0	0	0	0	1	0	...	1 0 0
36	4	1	0.3	0	1.6	0	0	0	0	1	0	...	1 0 0
37	4	1	0.3	0	1.6	0	0	0	0	1	0	...	1 0 0
38	4	1	0.3	0	1.6	0	0	0	0	1	0	...	1 0 0
39	4	1	0.3	0	0	1.6	0	0	0	1	0	...	1 0 0
40	4	1	0.3	0	0	1.6	0	0	0	1	0		

What's Really Being Estimated?

Regression (1)

$$\frac{\sum_{j\in c} capex_{j,t}}{\sum_{j\in c} assets_{j,t}} = -0.083 \frac{city\ debt_{c,t}}{city\ gdp_{c,t}} + \delta^c_{j,t} + \delta^t_{j,t} + e_{j,t}$$

Regression (5)

$$\frac{\sum_{j\in c} capex_{j,t}}{\sum_{j\in c} assets_{j,t}} = \left(-0.090\ \delta^p_{j,t} - 0.029\ \delta^s_{j,t} + 0.015\ \delta^f_{j,t}\right)\frac{city\ debt_{c,t}}{city\ gdp_{c,t}} + \delta^c_{j,t} + \delta^t_{j,t} + e_{j,t}$$

City capex   Coefficient different for different firms   City debt

What firms?

❑ **Firms only enter the picture to determine how many clones of each firm-year observation get manufactured**

❑ **So what's going on? Again, its WLS with weights $J_{c,t}$ for each city-year observation, except that the variable $\frac{city\ debt_{c,t}}{city\ gdp_{c,t}}$ enters three times in each city-year, each time with a different weight**

What's Really Being Estimated

Regression (1) is really WLS, weighting observations by $J_{c,t}$, estimation of

$$\frac{\sum_{j \in c} capex_{j,t}}{\sum_{j \in c} assets_{j,t}} = -0.083 \frac{city\ debt_{c,t}}{city\ gdp_{c,t}} + \delta_{j,t}^c + \delta_{j,t}^t + e_{j,t}$$

Regression (5) is really WLS, weighting observations by $J_{c,t}$, estimation of

$$\frac{\sum_{j \in c} capex_{j,t}}{\sum_{j \in c} assets_{j,t}} = -0.090 \frac{J_{c,t}^p\ city\ debt_{c,t}}{J_{c,t} city\ gdp_{c,t}} - 0.029 \frac{J_{c,t}^s\ city\ debt_{c,t}}{J_{c,t} city\ gdp_{c,t}} + 0.015 \frac{J_{c,t}^f\ city\ debt_{c,t}}{J_{c,t} city\ gdp_{c,t}} + \delta_{j,t}^c + \delta_{j,t}^t + e_{j,t}$$

City capex   **City debt x %private firms**   **City debt x %SOE firms**   **City debt x %foreign firms**

City debt correlates negatively with city-level capex more strongly in cities with more private-sector firms = fewer SOEs & foreign firms

- ❑ **Breakdown between SOEs & foreign firms doesn't matter**

Economic issues

- ❑ **Fewer SOEs & foreign firms ➜ city debt crowds out private firm borrowing more?**
- ❑ **Why accord cities more importance for having more firms?**
- ❑ **Why not weight by population (social welfare importance)?**
- ❑ **Why not treat cities equally (one city debt number for each city each year)?**
- ❑ **Why gauge importance of types of firms by % of firms? Why not % of assets?**

Why Belabor Data Cloning

Bigger datasets are not always better

There is no need to worry about mere size. We do not necessarily respect a fat man more than a thin man. Sir Isaac Newton was very much smaller than a hippopotamus, but we do not on that account value him less.
Bertrand Russell, 1959
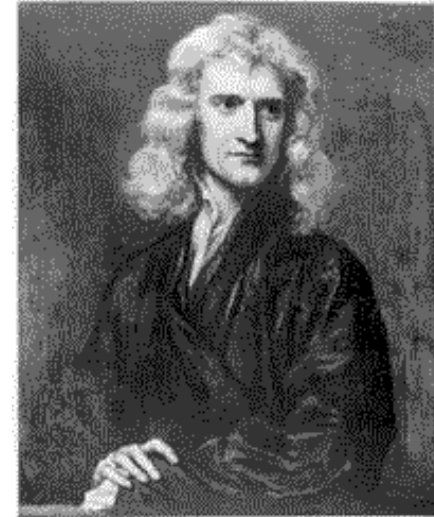
Isaac Newton

New (in my view, muddled) thinking

❑ **Better computers ➔ no reason not to use maximally disaggregated data, esp. if cluster to fix degree of freedom inflation**

❑ **Why this can cause trouble**

  ❑ **Tons of papers freely combine data with different levels of aggregation**

  ❑ **A few cluster appropriately, too many do not**

❑ **Why this muddles econometrics**

  ❑ **Even papers that cluster correctly implicitly introduce (sometimes very strange) weightings (OLS becomes de facto WLS) of whatever independent aggregate-level observations they have**

Endogeneity Police Report

Things I like

- ☐ **Actually <u>DOES</u> take causality seriously**
- ☐ **Thinks through alternative causality scenarios & tests them!!!**

Other things

- ☐ **Instrumental variables need to be exogenous, exclusive & strong**
  - ☐ **Strong: IVs have joint F > 8 in 1st stage**
  - ☐ **Exogenous: City govt. debt does not "cause" the IVs**
  - ☐ **Exclusion: IVs affect investment ONLY via city govt. debt**
- ☐ **Both instruments look a lot like city size measures**
  - ☐ $TOP = \# \, top \, CPC \, cadres \, from \, city$
  - ☐ $STRI_{c,t} = transfers_{C,t_0} \dfrac{\sum_c transfers_{C,t}}{\sum_c transfers_{C,t_0}}$

Things I wish I could say in public

- ☐ **Prohibition wastes resources & standard identification strategies mostly really doesn't help identify anything**
- ☐ **Time to legalize endogeneity?**

What's a City?

Urban Cats & dogs?

- ☐ **Province-level cities probably drive results because of the implicit WLS**
- ☐ **These have different government structures, contain HQs of national policy banks, commercial banks, etc. ➜ qualitatively different**
- ☐ **Equal-weight cities? Drop province-level cities?**

Do cities & private firms compete for loans?

- ☐ **Cities & SOEs compete for loans from SOE banks**
  - ☐ **I sort of expected to see city debt ➜ less SOE borrowing & capex**
- ☐ **What I sort of thought I understood**
  - ☐ **Private firms borrow little & finance capex via earnings?**
  - ☐ **If private firms borrow, they do so informally via e.g. trade credit (shadow banks)?**
  - ☐ **Foreign firms are conduits for foreign capital, so oughtn't to be affected?**

Other Issues

Chinese GDP is less than the sum of its parts?

❑ **Cadres lie exaggerate contributions to GDP growth**

$$GDP = C + I + G + (X - M)$$

❑ **Investment probably most stretchable ➔ reliability, esp for SOEs?**

## Highly skewed debt variable (outliers? non-normality, …)

❑ **Which cities are weird? Why? Give us a sense of the data**

	Mean	Median	Std. Dev.	P25	P75	Min	Max	N. Obs
			Table A4: **Summary Statistics**					
			Firm-level variables					
I	8.63	1.77	19.87	0.10	9.53	-1.86	74.68	1,150,340
REV	0.47	0.14	1.16	0.09	0.64	0..00	4.33	1,150,340
LCF	0.14	0.07	0.21	0.02	0.18	0.00	0.81	1,150,340
AGE	9.1	8	4.99	5	12	1	20	1,150,340
Assets	144,916	28,488	674,096	11,369	83,282	0	1.4e+08	1,150,340
Z − score	6.81	5.57	5.73	3.35	8.89	0	23	1,078,981
			City-year variables					
LGD	8.12	3.56	14.38	1.28	7.67	0	147.81	2,093
BL	92.40	79.31	52.10	55.36	112.98	7.53	381.31	2,093
GB	-8.30	-6.85	6.07	-11.89	-3.59	-22.00	5.00	2,089
GR	13.02	13.24	3.36	11.19	15.10	5.00	24.00	2,064
GDP PC	3.8	2.6	4.3	1.6	4.4	0.5	51.0	2,080

Other Issues

Fiscal Imbalance
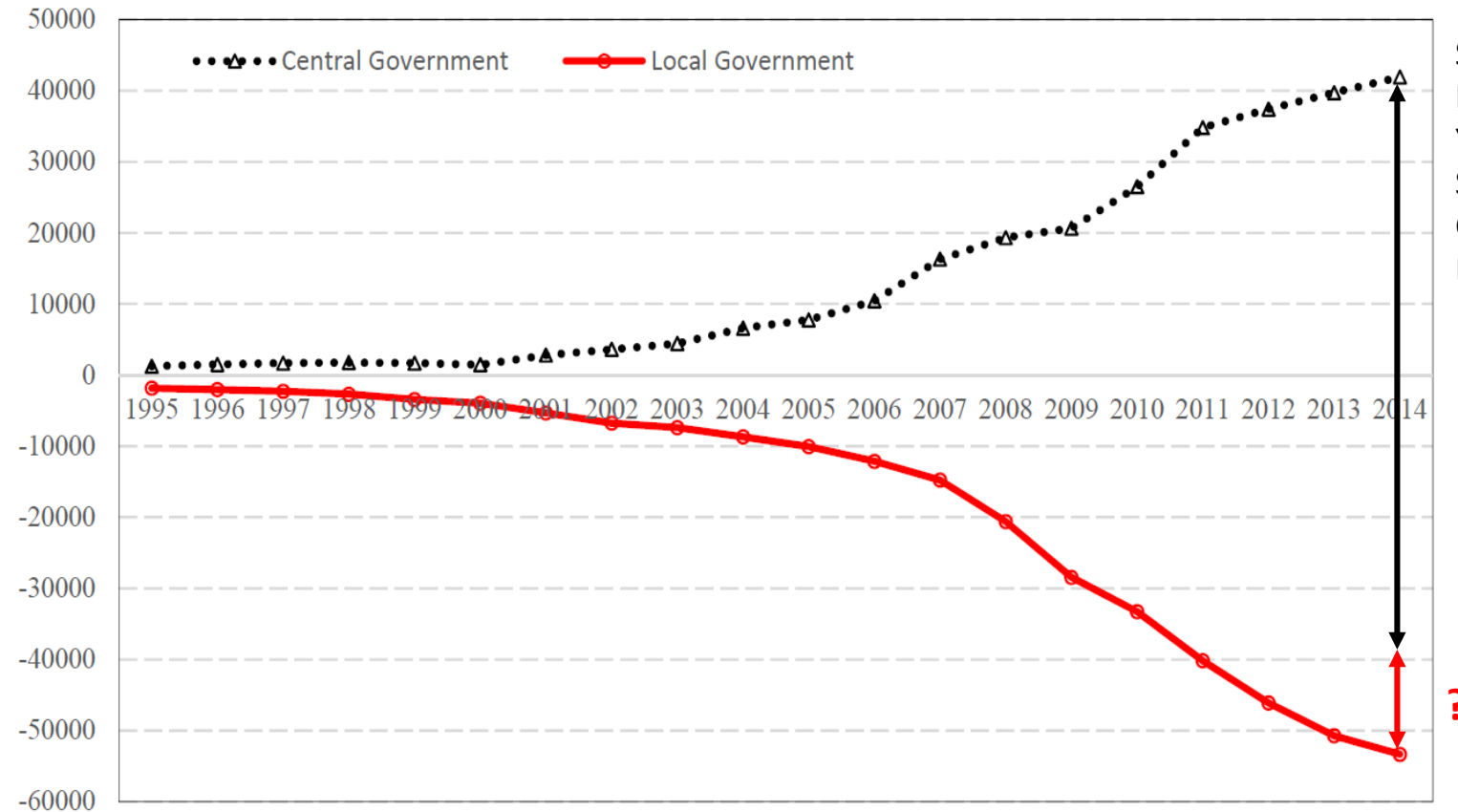
Source: Ru, Hong, Haoyu Gao, Dragon Yongjun Tang. 2017. Subnational Debt of China: The Politics-Finance Nexus

Figure 1: Fiscal Gap of Chinese Governments. This figure plots the fiscal balance (revenues minus expenditures) for central and local governments in China from 1995 to 2014 post the 1994 Tax Sharing Scheme and Budget Law. The vertical axis presents the government budget surplus or deficit. The unit is RMB 100 million. The dashed line is for central government and the solid line is for total 31 provincial local governments in China. Data are from the National Bureau of Statistics of China.

Ultimately Credible (Firm-level) Results

2008 crisis ➔ fiscal expansion policies

❑ **Keynesian (Behavioral Finance-based) macroeconomics**

❑ **But we're mostly still alive in the long run➔ need exit strategy**

China has a fiscal imbalance problem

❑ **Services ⬅ city governments, but taxes & SOE earnings ➔ central government**

Obvious solution: Let subnational governments levy whatever taxes they want

❑ **Residential property tax; city income tax, GST, …**

Obvious problem: Path to a federal state

❑ **But disharmonious**

Stopgap solution: Limited transfers + rising subnational debt = storm clouds

❑ **Debt guaranteed by central government, central bank?**

❑ **Is city default possible? If so, what next? If not, how will Beijing finance bailouts?**

$$Solution = central\ fiscal\ surplus + new\ revenue + inflation\ \&\ depreciation$$

Silver linings?

❑ **Genuine SOE mass privatization as revenue source for all levels of government?**

❑ **Tiebout competition ➔ increasing government efficiency?**

❑ **Ability to issue bonds ➔ fiscal prudence?**

Very promising!