Local Crowding Out in China

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Discussion by Randall Morck
University of Alberta, NBER, ECGI & ABFER
Paul Krugman on Pump-Priming and Trump

By ALAN REYNOLDS

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.
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.

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Robust s.e. clustered at the city level in parenthesis

*** p<0.01, ** p<0.05, * p<0.1
City-level Results

Regression (1)

\[ I_{j,t} = -0.083^{***} \quad LGD_{j,t} + \delta^c_{j,t} + \delta^t_{j,t} + e_{j,t} \]

Variables

\[ I_{j,t} = \sum_{j \in c} \left( \frac{\text{assets}_{j,t}}{\sum_{j \in c} \text{assets}_{j,t}} \right) \text{capex}_{j,t} = \frac{\sum_{j \in c} \text{capex}_{j,t}}{\sum_{j \in c} \text{assets}_{j,t}} = \frac{\text{capex}_{c,t}}{\text{assets}_{c,t}} \]

\[ LGD_{j,t} = \frac{\text{city debt}_{c,t}}{\text{city gdp}_{c,t}} \]

\[ \delta^c_{j,t} = \text{city fixed} - \text{effects} \]

\[ \delta^t_{j,t} = \text{year fixed} - \text{effects} \]

Variables vary by city, \( c \), & time, \( t \)

Observations indexed by firm, \( j \), & time, \( t \)
"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 \( t \) \( \Rightarrow \) observation is repeated \( J_{c,t} \) times
- Clone each of \( \sim 1,800 \) city-year observations \( J_{c,t} \) times \( \Rightarrow \sim 1,000,000 \) firm-year observations

Not really cheating because
- Table reports \( N = 1,800 \)
- Cluster by city \( \Rightarrow \) 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?
Table 2: Local Government Debt and Investment: City-Level Regressions

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Interactions give separate \( LGD_{j,t} \) coefficients for each firm type
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 $\Rightarrow$ t-tests are adjusted back to reflect city-year degrees of freedom

But why do it this way?

- Economic issue
- Econometrics issue
What’s Really Being Estimated?

Regression (1)

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

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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, it’s 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

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

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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 $\Rightarrow$ 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_

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 **DOES** 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 1\textsuperscript{st} 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
  - $TOP = \# \text{ top CPC cadres from city}$
  - $STRI_{c,t} = \frac{\sum_c transfers_{c,t}}{\sum_c transfers_{c,t_0}}$

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 \(\Rightarrow\) reliability, esp for SOEs?
- Highly skewed debt variable (outliers? non-normality, ...)
- Which cities are weird? Why? Give us a sense of the data

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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 $\rightarrow$ fiscal expansion policies
- Keynesian (Behavioral Finance-based) macroeconomics
- But we’re mostly still alive in the long run $\rightarrow$ need exit strategy

China has a fiscal imbalance problem
- Services $\leftarrow$ city governments, but taxes & SOE earnings $\rightarrow$ 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 $= \text{central fiscal surplus} + \text{new revenue} + \text{inflation & depreciation}$

Silver linings?
- Genuine SOE mass privatization as revenue source for all levels of government?
- Tiebout competition $\rightarrow$ increasing government efficiency?
- Ability to issue bonds $\rightarrow$ fiscal prudence?
Very promising!