# The Role of Market Competition in Fiscal Policy Transmission

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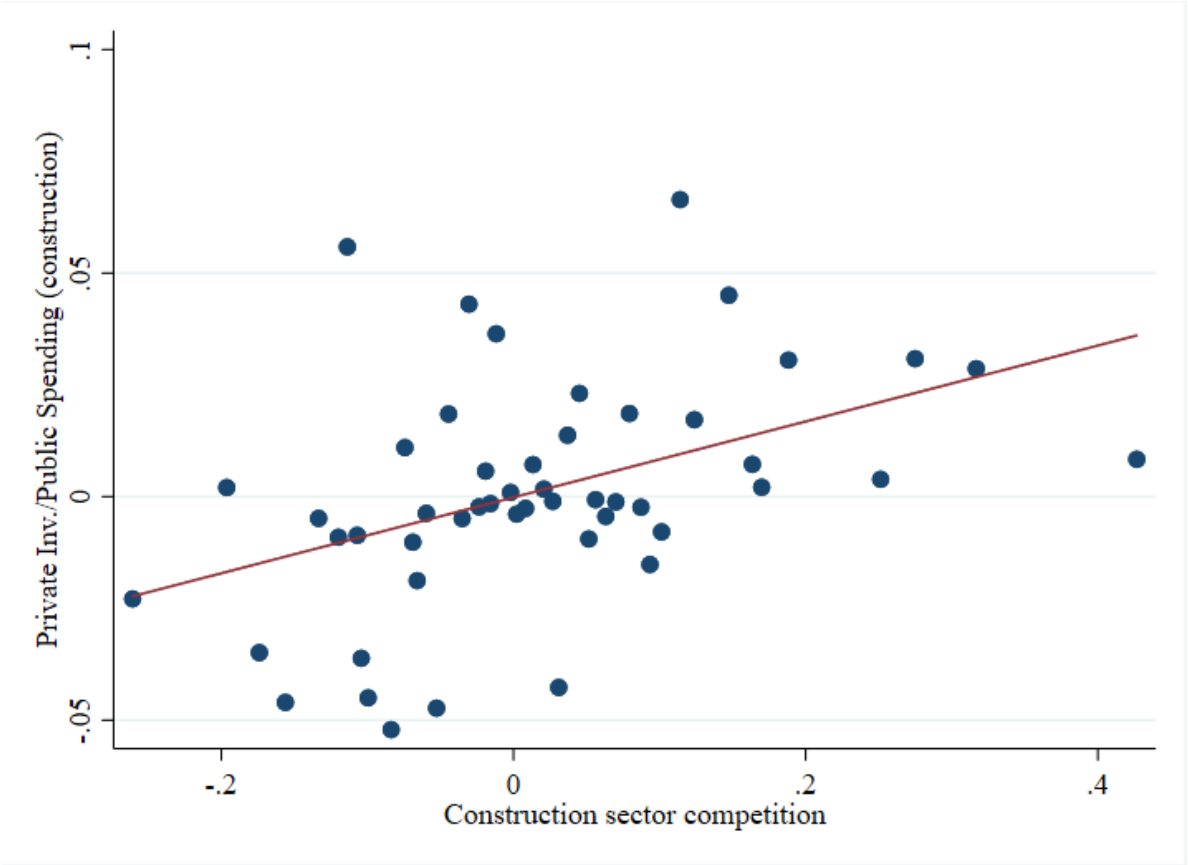
# Motivation

- A large-scale Chinese stimulus targeted on infrastructure and housing (2009-10)




Sector competitiveness and private investment response to stimulus

# Summary and intuition of findings

- Question: Why/How does the impact of stimulus spending on private investment vary with the competitiveness of the targeted sector?

- Market power as a transmission mechanism for fiscal stimulus
  - Targeted fiscal stimulus
  - Competitiveness of the targeted sector $\uparrow$, investment response $\uparrow$
  - Competitiveness of the targeted sector $\uparrow$, price response $\downarrow$

- Intuitions
  - Firms face aggregate demand from households and government
  - Stimulus reduces effective demand elasticity in the targeted sector
  - Competitiveness of the sector $\uparrow$, markup response $\downarrow$

# Model setting: Production

- Final goods

$$Y = [\int_0^1 (y_s)^{(\rho-1)/\rho} ds]^{\rho/(\rho-1)},$$

$\rho > 1$: cross-sector elasticity of substitution

- Construction sector $h$

$$y_h = [\sum\nolimits_{i \in h} y_{hi}^{(\eta-1)/\eta}]^{\eta/(\eta-1)},$$

$$y_{hi} = A k_i^{\alpha} d_i^{1-\alpha},$$

$\eta > 1$: within-sector elasticity of substitution, $A$: productivity shifter, $d$: land, $k$: nonland factors

- Assume $1 < \rho < \eta$.

# Household and government

- Representative household

$$maxC = [\int_0^1 (c_s)^{(\rho-1)/\rho} ds]^{(\rho/(\rho-1)},$$

$$s.t. \int_0^1 p_s c_s ds = I,$$

$I$: after-tax disposable income

- Government spending $G$. Implied demand elasticity is 1

# Construction firms

- Construction firms purchase land from the government. They spilt the profit through Nash bargaining with the government and has $0 < B(N) < 1$ share of the profit with $B'(N)\frac{N}{B(N)} < 1$.

- Construction firm's problem

$$max_{y_{hi}} B(N)[p_{hi}y_{hi} - y_{hi}MC_h],$$

where

$$MC_h = A^{-1}(r/\alpha)^{\alpha}(m/(1-\alpha))^{1-\alpha},$$

# Competitive equilibrium

- Households take sectoral prices and after-tax income as given and maximize total consumption.
- Each construction firm maximizes profit taking house price, and factor costs, the number of firms N, and other firms' output as given.
- Output markets clear: $c_s = y_s, \forall s \neq h$ and $y_h = c_h + G/p_h$

# Markup

- Firm i's markup:

$$\mu_i = \frac{p_{hi}}{MC_h} = \frac{\epsilon_i}{\epsilon_i - 1}.$$

- If $G = 0$, firm i's effective demand elasticity satisfies

$$\frac{1}{\epsilon_i} = (1 - s_i)\frac{1}{\eta} + s_i\frac{1}{\rho},$$

  where $s_i = p_{hi}y_{hi}/p_h y_h$ is firm i's market share

- If $G > 0$, firm i's effective demand elasticity satisfies

$$\frac{1}{\epsilon_i} = (1 - s_i)\frac{1}{\eta} + s_i\frac{1}{\frac{g_h}{g_h+c_h} + \frac{c_h}{g_h+c_h}\rho}.$$

# Theoretical predictions

- Given positive stimulus spending in the construction sector,

  1) Markup increases; construction sector competitiveness $\uparrow$, markup $\uparrow$ less

  2) Construction sector competitiveness $\uparrow$, $\Delta$output prices and $\Delta$input (land) prices $\uparrow$ less

  3) Construction sector competitiveness $\uparrow$, output & investment $\uparrow$ more

# Empirical setting

- Empirical challenge
  - Hard to find cross-sectional variations in market competition
  - Existing studies rely on sectoral differences
  - However, fiscal stimulus often targets a few sectors

- Our strategy: cross-city variations from the Chinese stimulus
  - Stimulus was mostly implemented by local governments
  - Construction sector is highly localized
  - Exogenous drivers of local competition: entry regulations and geography

# Data

- Government stimulus: annual reports on off-balance sheet companies (LGFV)
  - Not subjected to buget balance rules
  - Off-balance sheet spending accounts for 3/4 of total stimulus
  - Avoids "double counting"

- Investment: 2008 and 2013 censuses
  - 22,357 private construction and real estate development firms

# Specification

- Pre- (2008) and post-stimulus (2013) construction firm investment:

$$\frac{I_{it}}{K_{it-1}} = \alpha + \beta G_{ct} + \gamma G_{ct} \times Competition_c + \kappa X_{it} + \epsilon_{it}$$

- $Competition_c$: local construction sector competition
  - Pre-period (2004) # of firms in construction sector
  - Predicted value using exogenous entry regulations and geographical constraints

$$Competition_{ct} = \alpha + \beta Elas_c + \gamma EntryReq_{pt} + \delta_p + \phi_t + \nu_{ct},$$

$$\hat{Competition}_{ct} = \hat{\alpha} + \hat{\beta} Elas_c + \hat{\gamma} EntryReq_{pt} + \hat{\delta}_p.$$

# Specification (cont')

- Transaction-level land price (2000-2016):

$$P_{zt} = \alpha + \beta G_{ct} + \gamma G_{ct} Compeition_c + \psi X_{zt} + \tau_c + \rho_t + \epsilon_{zt}$$

- City-level Hedonic land price

$$\widehat{\Pi}_{ct} = \alpha + \beta G_{ct} + \gamma G_{ct} \times Competition_{ct} + \nu_{ct}$$

where $\widehat{P}_{ct}$ is estimated from

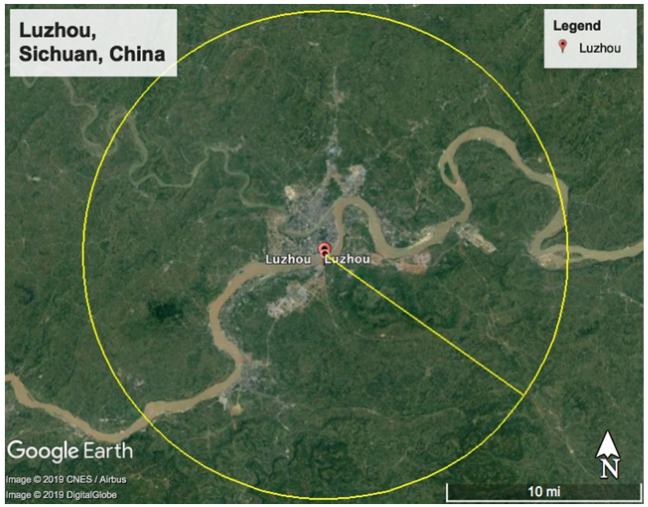
$$P_{zt} = \sigma + \varphi X_{zt} + \widehat{P}_{ct} + \epsilon_{zt}$$

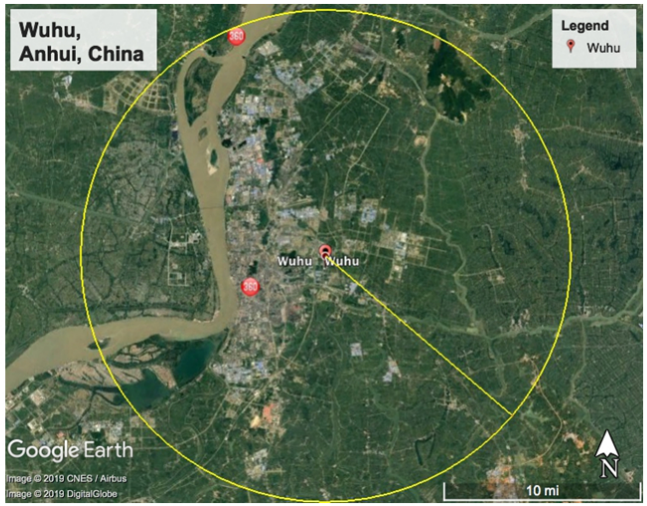
- City-level house price controlled for land price (proxy for sectoral markup)

# Results: investment

| | Private Investment | | | |
|---|---|---|---|---|
| $G_{ct}$ | -0.0754*** | -0.134*** | -0.0991*** | -0.149*** |
| | (0.010) | (0.019) | (0.016) | (0.023) |
| $Competition_{c,2004}$ | -0.00125 | | -0.00745*** | |
| | (0.002) | | (0.003) | |
| $\hat{Competition}_{ct}$ | | -0.000268 | | 0.0022 |
| | | (0.003) | | (0.003) |
| $G_{ct} \times Competition_{ct}$ | 0.00482*** | | 0.0126*** | |
| | (0.001) | | (0.002) | |
| $G_{ct} \times \hat{Competition}_{ct}$ | | 0.00959*** | | 0.0112*** |
| | | (0.002) | | (0.002) |
| Firm and bank structure controls | YES | YES | YES | YES |
| Land price control | NO | NO | YES | YES |
| Observations | 12,173 | 8,593 | 7,652 | 6,886 |
| R2 | 0.268 | 0.293 | 0.298 | 0.324 |

# Economic significance




| | Luzhou, Sichuan (p25) | Wuhu, Anhui (p75) |
|---|---|---|
| Stimulus | 0.59 | 0.54 |
| Avg. private investment | 4.4% | 6% |
| No. firms/10K population | 0.73 | 3.07 |
| Land supply elasticity | 0.96 | 0.95 |
| Distancee to 1st tier city | 90km | 103km |

- Competition p25 $\rightarrow$ p75: 15% - 19% increase in private investment

# Results: land price

| | ln(land price/sq m) | | | |
|---|---|---|---|---|
| $G_{ct}$ | 0.0507*** | 0.165*** | -0.0182 | 0.0776 |
| | (0.014) | (0.078) | (0.020) | (0.086) |
| $\hat{Competition}_{ct}$ | | -0.00035 | | -0.00212 |
| | | (0.002) | | (0.002) |
| $G_{ct} \times Competition_{ct}$ | -2.14e-05*** | | -2.24e-05*** | |
| | (3.52E-06) | | (3.52E-06) | |
| $G_{ct} \times \hat{Competition}_{ct}$ | | -0.0148*** | | -0.0135*** |
| | | (0.005) | | (0.005) |
| Land supply control | NO | YES | NO | YES |
| Bank structure control | NO | NO | YES | YES |
| City, Year FE | YES | YES | YES | YES |
| Observations | 132,183 | 50,004 | 131,631 | 49,832 |
| R2 | 0.301 | 0.266 | 0.302 | 0.266 |

# Results: Hedonic land price

| | ln(land price/sq m) | | | |
|---|---|---|---|---|
| $G_{ct}$ | 0.00124*** | 0.336** | 0.0111 | 0.344*** |
| | (0.013) | (0.150) | (0.030) | (0.131) |
| $\hat{Competition}_{ct}$ | | 0.0185*** | | 0.0144*** |
| | | (0.006) | | (0.005) |
| $G_{ct} \times Competition_{ct}$ | -3.06e-05** | | -3.04e-05** | |
| | (1.21E-05) | | (1.24E-05) | |
| $G_{ct} \times \hat{Competition}_{ct}$ | | -0.0581*** | | -0.0509*** |
| | | (0.016) | | (0.014) |
| Land supply control | NO | YES | NO | YES |
| Bank structure control | NO | NO | YES | YES |
| City, Year FE | YES | YES | YES | YES |
| Observations | 2,055 | 848 | 1,955 | 829 |
| R2 | 0.031 | 0.074 | 0.037 | 0.070 |

# Results: sectoral markup

| | House price index | | | |
|---|---|---|---|---|
| Hedonic land price | 0.005 | 0.3024 | 0.007 | 0.038 |
| | (0.038) | (0.084) | (0.041) | (0.084) |
| $G_{ct}$ | 0.0135 | 0.716 | 0.107 | 0.811 |
| | (0.065) | (0.5067) | (0.089) | (0.542) |
| $\hat{Competition}_{ct}$ | | 0.003 | | 0.003 |
| | | (0.003) | | (0.003) |
| $G_{ct} \times Competition_{ct}$ | -2.43e-05* | | -2.39e-05* | |
| | (0.000) | | (0.000) | |
| $G_{ct} \times \hat{Competition}_{ct}$ | | -0.0458*** | | -0.0433*** |
| | | (0.0152) | | (0.0158) |
| Land supply control | NO | YES | NO | YES |
| Bank structure control | NO | NO | YES | YES |
| City, Year FE | YES | YES | YES | YES |
| Observations | 669 | 379 | 645 | 372 |
| R2 | 0.90 | 0.92 | 0.90 | 0.92 |

# Conclusion

- A model of fiscal stimulus with new elements on
  - Targeted stimulus and endogenous markup
  - Interaction between market competition and fiscal stimulus
- First empirical evidence on how market competition affects the transmission of fiscal stimuls
- Policy implications
  - Competition policy
  - Fiscal stimulus