The Political Economy of Land Sales: Evidence from China

Working in Progress

John William Hatfield
University of Texas, Austin

Ginger Zhe Jin
University of Maryland & NBER

Guang Shi
Development Research Center of the State Council of China

Viewpoints expressed in this paper does not represent the opinion of the State Council of China.
Average GDP growth rate 1980-2013: China 9.84%, India 6.18%, US 2.68%
The Miracle of China

• From 1980-2013, China has maintained an average 9.8% GDP growth rate
  – Researchers attribute it to labor participation, capital investment and productivity improvement (Zhu 2012; Huang 2012)

• All these achieved in an authoritarian regime
  – A top-down political structure
  – Decentralized local jurisdictions compete under a centralized federal government (Xu 2011)
Inter-jurisdictional competition

• Studied extensively in the economics literature
  – Theories that emphasize the role of information (Hayek 1945), individual sorting (Tiebout 1956), yardstick competition (Besley and Case 1995), government’s power over citizens (Brennan and Buchanan 1980)
  – Based on a democratic or Leviathan system
  – Jurisdictions compete in tax policy in order to attract mobile factors (Zodrow and Mieszkowski 1996, Hatfield 2010)
  – Jurisdictional competition may be beneficial or detrimental to economic development and total welfare (Wilson & Wildasin 2004 JPubE)
Our research

• We document how competition among Chinese cities contributes to economic growth
  – Economic competition
  – Political incentives

• We emphasize a specific channel
  – land sales (leasing the right to use government-owned land)
Economic competition

• 319 cities in 26 provinces of China
  – Provincial level
  – Vice-provincial level
  – Prefecture level
  – Excluding direct-controlled municipality (Beijing, Shanghai, Tianjin, Chongqing), and cities in Tibet

• Capital mobility
  – Large-scale manufacturers are sensitive to local cost
  – Manufacturing can bring GDP and fiscal revenue in both current and future periods

• Labor mobility
  – Hukou (residential permit) is a barrier for permanent migration from rural to urban or from city to city
  – Low-skill labor is mobile but has little demand for real estate
  – High-skill labor is less mobile and has more demand for local real estate and high-end commerce

• Prediction: Competing jurisdictions should favor the factor that is more mobile (capital)
Political incentives

• “Race to top” rather than “race to bottom”

• Evaluation of local politicians
  – For provincial leaders, 60% of performance targets are related to economic construction (Tsui and Wang 2004, Li and Zhou 2005)
  – Measurable performance is more important for lower-level officials
  – For regional officials, 60-70% of evaluation is work achievement, the other 30-40% are political integrity, competence, diligence, etc. (Edin 2003, citing a handbook issued by the Communist Party)

• Prospect of promotion
  – Retirement age = 60 for city-leader and vice-provincial level, but 65 for provincial level
    • Incentive to beat the retirement age cutoff (Yu, Zhou and Zhu 2014)
  – Tenure effect
    • Promotion is less likely for officials with longer tenure (Li and Zhou 2005, for provincial officials)
    • Transition period may be disruptive in GDP growth (Xi and Zhou 2014)
  – Tournament competition among similar-GDP cities within the same province (Yu, Zhou and Zhu 2014)

• Prediction: Politicians with strong incentives for GDP growth should tilt its fiscal policy towards capital
Land sale: one important fiscal policy

- Government owns the land and leases the right to use the land since 1992
  - Industrial use, max 50 years ➔ GDP, fiscal revenue, now and future
  - Residential use, max 70 years ➔ one-time sale, no property tax
  - Commercial and recreational use, max 40 years ➔ like industrial use, mostly for retail services, hard to collect tax
- Urban constructed area has increased from 214,000 km$^2$ in 1998 to 325,000 km$^2$ in 2005 (Cao, Feng, Tao 2008)
- The number of industrial park rose from 3,837 in 2003 to 6,015 in 2006 (Zhai and Xiang 2007)
- Over 40 million farmers lost their land to urbanization with little compensation, 70% of farmer complaints are related to land requisition (UIE 2007)
- Land sales totaled 3.1 trillion RMB in 2011, accounting for 25% of local government revenue (Annual Report of China Ministry of Finance)
Land price

• Before 2005, most pieces of land were “sold” by negotiation instead of tender/auction (Cao, Feng, Tao 2008)

• Negotiation price lower than auction price
  – The form of auction may reflect corruption (Cai, Henderson and Zhang 2009)

• Negotiation sales have been prohibited since 2004

• Industrial land is priced significantly lower than residential and commercial land
Our approach

• Observation = city-year
• $Y = f$ (economic competition, political incentive, other controls, provincial FE)
• $Y = \text{GDP growth rate,}$
  \begin{align*}
  \text{GDP per capita growth rate,} \\
  \% \text{ of land given out free,} \\
  \% \text{ of industrial land (among land for sale)} \\
  \log(p_{\text{industrial}}) - \log(p_{\text{residential}}), \\
  \log(p_{\text{industrial}}) - \log(p_{\text{commercial}})
  \end{align*}
Right-hand side variables

• Economic competition
  – distance to nearest city,
    • Linear(distance), log(distance), inverse(distance)
  – Average distance to three closest cities
  – # of cities within 100km distance

• Political incentive
  – leader age
  – term of service (potentially endogenous, not used)
  – # of same-province cities within 80%-120% of a city’s own GDP (as of 2001, no effects at all, not reported)
  – # of cities within a province

• Controls
  – As of 2001: GDP, population, % of urban population, area, road mileage, # of counties within a city
Data

• GDP

• Land
  – City-year level data on total area and area given out free, 2001-2011, China Land and Resources Statistical Yearbook, Ministry of Land and Resources (《中国国土资源年鉴》)

• Political career
  – Source: CVs from the information available on the Internet. Covering 2001-2011
  – Focus on the party leader of each city-year
Data Summary on land transactions

<table>
<thead>
<tr>
<th>Use</th>
<th>Avg p (RMB/m²)</th>
<th>Std dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>625.8</td>
<td>1049.2</td>
<td>274871</td>
</tr>
<tr>
<td>Industrial</td>
<td>183.2</td>
<td>214.9</td>
<td>175626</td>
</tr>
<tr>
<td>Commercial</td>
<td>870.3</td>
<td>1268.6</td>
<td>99301</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sale form</th>
<th>Avg p (RMB/m²)</th>
<th>Std dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auction</td>
<td>733.0</td>
<td>1139.1</td>
<td>295241</td>
</tr>
<tr>
<td>Negotiation</td>
<td>291.4</td>
<td>613.7</td>
<td>254557</td>
</tr>
</tbody>
</table>
Hedonic price of land

• For each use and each form of sale, we run

\[
\log(p_{it}) = a + b \times \text{LandQuality}_{it} + g \times \text{Landsize}_{it} + d \times \text{year} + e_{it}
\]

• Define:

\[
\text{hedonic log } p_{it} = \hat{a} + \hat{e}_{it}
\]

• Aggregate \( \text{hedonic log } p_{it} \) into city-year
Data summary

<table>
<thead>
<tr>
<th>Metric</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth rate (%)</td>
<td>3517</td>
<td>13.08</td>
<td>3.72</td>
<td>-8.8</td>
<td>47.6</td>
</tr>
<tr>
<td>GDP per capita growth rate (%)</td>
<td>3375</td>
<td>12.50</td>
<td>4.13</td>
<td>-7.8</td>
<td>47.9</td>
</tr>
<tr>
<td>% of land given out free</td>
<td>3443</td>
<td>0.28</td>
<td>0.24</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% of land sold for industrial use</td>
<td>1491</td>
<td>0.4996</td>
<td>0.1875</td>
<td>0</td>
<td>0.9772</td>
</tr>
<tr>
<td>p_industrial / p_residential</td>
<td>1459</td>
<td>0.2865</td>
<td>0.2355</td>
<td>0.0362</td>
<td>1.7361</td>
</tr>
<tr>
<td>p_industrial / p_commercial</td>
<td>1454</td>
<td>0.1864</td>
<td>0.1614</td>
<td>0.0239</td>
<td>1.4004</td>
</tr>
<tr>
<td>Distance to closest city (100km)</td>
<td>3517</td>
<td>0.98</td>
<td>1.12</td>
<td>0.05</td>
<td>15.30</td>
</tr>
<tr>
<td>City leader age</td>
<td>3507</td>
<td>52.2</td>
<td>3.84</td>
<td>40</td>
<td>64</td>
</tr>
<tr>
<td>City leader term year</td>
<td>3507</td>
<td>2.91</td>
<td>1.85</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td># of cities within 80-120% of own GDP (as of 2001) in the same province</td>
<td>3507</td>
<td>2.28</td>
<td>2.07</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>
Interquartile range of GDP growth rate by distance to the nearest city
Interquartile range of GDP growth rate by age of city leader
Interquartile range of GDP growth rate by term year of city leader
Average hedonic land price by use
Interquartile range of \( \log(p_{\text{industrial}}/p_{\text{commercial}}) \) by distance to the nearest city.
Interquartile range of $\log(p_{\text{industrial}}/p_{\text{commercial}})$ by age of city leader.
Interquartile range of $\log(p_{\text{industrial}}/p_{\text{commercial}})$ by term year of city leader.
# Regressions on GDP growth rate

<table>
<thead>
<tr>
<th></th>
<th>GDP growth rate</th>
<th>(std err)</th>
<th>GDP per capita growth rate</th>
<th>(std err)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to nearest city</td>
<td>-0.13**</td>
<td>(0.055)</td>
<td>-0.19***</td>
<td>(0.068)</td>
</tr>
<tr>
<td>Term of service 3-4 years</td>
<td>0.31**</td>
<td>(0.123)</td>
<td>0.33**</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Term of service 5-6 years</td>
<td>0.48***</td>
<td>(0.169)</td>
<td>0.66***</td>
<td>(0.192)</td>
</tr>
<tr>
<td>Term of service 7-8 years</td>
<td>-0.13</td>
<td>(0.318)</td>
<td>-0.37</td>
<td>(0.363)</td>
</tr>
<tr>
<td>Term of service 9+</td>
<td>0.29</td>
<td>(0.473)</td>
<td>-0.07</td>
<td>(0.575)</td>
</tr>
<tr>
<td>Leader age</td>
<td>0.60**</td>
<td>(0.346)</td>
<td>0.76**</td>
<td>(0.346)</td>
</tr>
<tr>
<td>Leader age squared</td>
<td>-0.005848**</td>
<td>(0.003)</td>
<td>-0.0074**</td>
<td>(0.003)</td>
</tr>
<tr>
<td># of similar cities in same province</td>
<td>0.00</td>
<td>(0.039)</td>
<td>0.04</td>
<td>(0.044)</td>
</tr>
<tr>
<td>No similar cities</td>
<td>0.55**</td>
<td>(0.176)</td>
<td>0.46**</td>
<td>(0.202)</td>
</tr>
<tr>
<td>Province FE+controls</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Observations / R2</td>
<td>3,507 / 0.314</td>
<td></td>
<td>3,365 / 0.305</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses. *** p<0.01, **p<0.05, *p<0.1.
## Regressions on land sales

<table>
<thead>
<tr>
<th></th>
<th>Share given out free</th>
<th>(std err)</th>
<th>Share sold for industrial use</th>
<th>(std err)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to nearest city</td>
<td>0.0105***</td>
<td>(0.0037)</td>
<td>0.0028</td>
<td>(0.0045)</td>
</tr>
<tr>
<td>Term of service 3-4 years</td>
<td>0.0148*</td>
<td>(0.0085)</td>
<td>-0.0134</td>
<td>(0.0103)</td>
</tr>
<tr>
<td>Term of service 5-6 years</td>
<td>0.0028</td>
<td>(0.0119)</td>
<td>-0.0202</td>
<td>(0.0138)</td>
</tr>
<tr>
<td>Term of service 7-8 years</td>
<td>-0.0347</td>
<td>(0.022)</td>
<td>-0.0255</td>
<td>(0.0251)</td>
</tr>
<tr>
<td>Term of service 9+</td>
<td>0.0978***</td>
<td>(0.0352)</td>
<td>0.0525</td>
<td>(0.055)</td>
</tr>
<tr>
<td>Leader age</td>
<td>-0.0394*</td>
<td>(0.021)</td>
<td>0.0018</td>
<td>(0.0292)</td>
</tr>
<tr>
<td>Leader age squared</td>
<td>0.00038*</td>
<td>(0.0002)</td>
<td>-0.0001</td>
<td>(0.0003)</td>
</tr>
<tr>
<td># of similar cities in same province</td>
<td>-0.0035</td>
<td>(0.0027)</td>
<td>0.0004</td>
<td>(0.0032)</td>
</tr>
<tr>
<td>No similar cities</td>
<td>-0.0138</td>
<td>(0.0122)</td>
<td>-0.0092</td>
<td>(0.0148)</td>
</tr>
<tr>
<td>Province FE+controls</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Observations / R2</td>
<td>3,443 / 0.216</td>
<td></td>
<td>1,491 / 0.214</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses. *** p<0.01, **p<0.05, *p<0.1.
Regressions on land prices

<table>
<thead>
<tr>
<th></th>
<th>Log(p_industrial/p_residential)</th>
<th>(std err)</th>
<th>Log(p_industrial/p_commercial)</th>
<th>(std err)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to nearest city</td>
<td>0.0571***</td>
<td>(0.0159)</td>
<td>0.0312*</td>
<td>(0.0161)</td>
</tr>
<tr>
<td>Term of service 3-4 years</td>
<td>-0.0294</td>
<td>(0.0371)</td>
<td>-0.0977***</td>
<td>(0.0373)</td>
</tr>
<tr>
<td>Term of service 5-6 years</td>
<td>0.0031</td>
<td>(0.0498)</td>
<td>-0.0629</td>
<td>(0.0502)</td>
</tr>
<tr>
<td>Term of service 7-8 years</td>
<td>0.1348</td>
<td>(0.0892)</td>
<td>0.0353</td>
<td>(0.0906)</td>
</tr>
<tr>
<td>Term of service 9+</td>
<td>0.2568</td>
<td>(0.1952)</td>
<td>0.0459</td>
<td>(0.2075)</td>
</tr>
<tr>
<td>Leader age</td>
<td>0.1551</td>
<td>(0.1044)</td>
<td>0.0043</td>
<td>(0.1061)</td>
</tr>
<tr>
<td>Leader age squared</td>
<td>-0.0015</td>
<td>(0.0010)</td>
<td>0.0003</td>
<td>(0.0010)</td>
</tr>
<tr>
<td># of similar cities in same province</td>
<td>0.0090</td>
<td>(0.0115)</td>
<td>-0.0019</td>
<td>(0.0116)</td>
</tr>
<tr>
<td>No similar cities</td>
<td>0.0625</td>
<td>(0.0533)</td>
<td>0.0009</td>
<td>(0.0534)</td>
</tr>
<tr>
<td>Province FE+controls</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Observations / R2</td>
<td>1,459 / 0.319</td>
<td></td>
<td>1,454 / 0.283</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Robustness check

- Alternative measures of economic competition
- Different ways to trim outliers
- Balanced sample
Next Steps

• A theoretical model of inter-jurisdictional competition
  • Fiscal revenue = tax + land sales
  • Obj = f (GDP growth, fiscal revenue)
  • Fiscal constraint
  • Tournament competition among cities in the same province

• Alternative explanations
  – Economic conglomeration
  – Industrial land sale as a loss leader

• Other consequences of jurisdictional competition
  – Environmental problems
  – Social problems
  – Over-capacity