Land Revenue Windfalls, Signaling, and Career Incentives of China’s Local Leaders

James Kai-sing KUNG and Ting CHEN
The Hong Kong University of Science and Technology

The 6th Annual Conference on U.S.-China Economic Relations and China’s Economic Development,
George Washington University

Nov 8th, 2013
Preamble

- Institutional foundations of "China Miracle"
Institutional foundations of “China Miracle”

- How did China manage to sustain high growth rate for nearly 3 decades when it was constrained by: (1) lack of protection of property rights, and (2) a highly centralized political system?
Preamble

- Institutional foundations of "China Miracle"
  - How did China manage to sustain high growth rate for nearly 3 decades when it was constrained by: (1) lack of protection of property rights, and (2) a highly centralized political system?

- High-powered incentives of local government officials in a decentralized economy
Preamble

- Institutional foundations of "China Miracle"
  - How did China manage to sustain high growth rate for nearly 3 decades when it was constrained by: (1) lack of protection of property rights, and (2) a highly centralized political system?

- High-powered incentives of local government officials in a decentralized economy
  - Political centralization of personnel control ("jurisdictional yardstick competition")
    * Faster GDP growth increases promotion likelihood of provincial officials for 1979-1995 (Li and Zhou, 2005) and for 1979-2002 (Chen, Li and Zhou)
    * Also the case for >300 mayors for the period 1990-2001 (Landry, 2008)
Institutional foundations of "China Miracle"

- How did China manage to sustain high growth rate for nearly 3 decades when it was constrained by: (1) lack of protection of property rights, and (2) a highly centralized political system?

High-powered incentives of local government officials in a decentralized economy

- Political centralization of personnel control ("jurisdictional yardstick competition")
  * Faster GDP growth increases promotion likelihood of provincial officials for 1979-1995 (Li and Zhou, 2005) and for 1979-2002 (Chen, Li and Zhou)
  * Also the case for >300 mayors for the period 1990-2001 (Landry, 2008)

- Economic decentralization of property rights over revenue (fiscal revenue incentives)
  * County coffers saw an appreciable rise in extra-budgetary revenue
Figure 1.1 County Revenue Structure, 1993-2008
Motivation and Hypothesis

Motivation

A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress) and led to phenomenal growth in land revenue or land conveyance fee (Tudi Zhuanrangjin).

Figure 1.2

James Kung and Ting CHEN (HKUST)
Land Revenue Windfalls & Career Incentives

Nov 8th, 2013
Motivation and Hypothesis

- Motivation
  - A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
Motivation and Hypothesis

- Motivation
  - A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
  - And led to phenomenal growth in land revenue or land conveyance fee (*Tudi Zhuanrangjin*)

Figure 1.2
Figure 1.2 County Revenue Structure, 1993-2008
Motivation and Hypothesis

- **Motivation**
  - A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
  - And led to phenomenal growth in land revenue or land conveyance fee (*Tudi Zhuanrangjin)*

Figure 1.2: Examine the effect of the revenue windfall on the career incentives of China’s local leaders. County enjoys autonomous decision rights over land sales. Jointly test the promotion incentive and (extra-budgetary) revenue hypotheses.

Hypothesis: Predict a positive relationship between land revenue (windfalls) and career incentives (promotion).
Motivation and Hypothesis

- Motivation
  - A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
  - And led to phenomenal growth in land revenue or land conveyance fee (Tudi Zhuanrangjin) figure 1.2
  - Examine the effect of the revenue windfall on the career incentives of China’s local leaders
    * County enjoys autonomous decision rights over land sales
    * Jointly test the promotion incentive and (extra-budgetary) revenue hypotheses
Motivation and Hypothesis

Motivation

- A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
- And led to phenomenal growth in land revenue or land conveyance fee (*Tudi Zhuanrangjin*)
- Examine the effect of the revenue windfall on the career incentives of China’s local leaders
  - County enjoys autonomous decision rights over land sales
  - Jointly test the promotion incentive and (extra-budgetary) revenue hypotheses

Hypothesis
Motivation and Hypothesis

- **Motivation**
  - A policy shock in 1998 assigned exclusive statutory rights to local officials over the conversion of arable land into nonfarm usages (passage of a statutory bill in 1998 at the 15th National Congress)
  - And led to phenomenal growth in land revenue or land conveyance fee (*Tudi Zhuanrangjin*)
  - Examine the effect of the revenue windfall on the career incentives of China’s local leaders
    * County enjoys autonomous decision rights over land sales
    * Jointly test the promotion incentive and (extra-budgetary) revenue hypotheses

- **Hypothesis**
  - Predict a positive relationship between land revenue (windfalls) and career incentives (promotion)
Data Sources

- Individual Characteristics of County Party Secretaries
  - Coverage: 24 provinces (1999-2008), containing 18,940 county-year observations from 3,623 county party secretaries covering 1,664 counties
  - Source: *Provincial Yearbook and Baidu Encyclopeida* [example](#)

Four directly governed prefectures (Beijing, Tianjin, Shanghai, and Chongqing) and Hainan Province are excluded, and Hebei and Tibet lack data.
An Example of County Party Secretary CV

Figure 2. A County Party Secretary’s Vita in *Baidu Encyclopedia*

**Individual-level Control Variables**
- Male, born 1953.01, college graduate, hometown: Shanxi Province, Liulin County

**Network Tie & Unobserved Ability**
Before taking up the position of county party secretary, he has had neither the experience of working in the attendant prefecture, nor the credential of a party secretary of the Communist Youth League. We thus assign the value of 0 to both dummies in his case.

**Y variables: Political Turnover**
- 1998-2003 County Party Secretary
- 2003- Promoted to Vice Mayor

Note: This example serves to illustrate how the county party secretaries’ dataset is constructed based upon their curriculum vitae in *Baidu Encyclopedia*. The curriculum vitae in turn are

**Original Source**
http://www.liang.gov.cn/misc/node_4708.htm

**James Kung and Ting CHEN (HKUST)**

**Land Revenue Windfalls & Career Incentives**

**Nov 8th, 2013**
Data Sources

- **Individual Characteristics of County Party Secretaries**
  - Coverage: 24 provinces (1999-2008), containing 18,940 county-year observations from 3,623 county party secretaries covering 1,664 counties
  - Source: *Provincial Yearbook and Baidu Encyclopedia* [example](#)

---

*Four directly governed prefectures (Beijing, Tianjin, Shanghai, and Chongqing) and Hainan Province are excluded, and Hebei and Tibet lack data.*
Data Sources

- **Individual Characteristics of County Party Secretaries**
  - Coverage: 24 provinces (1999-2008), containing 18,940 county-year observations from 3,623 county party secretaries covering 1,664 counties
  - Source: *Provincial Yearbook and Baidu Encyclopeida*

- **County-level Fiscal Revenues and Expenditures**
  - Source: *Prefectural and County Financial Statistics (Dishixian Caizheng Tongji Ziliao); Provincial Statistical Yearbook*

*Four directly governed prefectures (Beijing, Tianjin, Shanghai, and Chongqing) and Hainan Province are excluded, and Hebei and Tibet lack data*
Data Sources

- **Individual Characteristics of County Party Secretaries**
  - Coverage: 24 provinces (1999-2008), containing 18,940 county-year observations from 3,623 county party secretaries covering 1,664 counties
  - Source: *Provincial Yearbook and Baidu Encyclopedi*a

- **County-level Fiscal Revenues and Expenditures**
  - Source: *Prefectural and County Financial Statistics (Dishixian Caizheng Tongji Ziliao); Provincial Statistical Yearbook*

- **Other county-level socioeconomic characteristics (e.g. GDP, population etc.)**
  - Coverage: whole of China (1999-2008)
  - Source: *Statistical Yearbook of Regional Economies (Quyu Jingji Tongji Nianjian), Provincial Statistical Yearbook (Sheng Tongji Nianjian)*

Four directly governed prefectures (Beijing, Tianjin, Shanghai, and Chongqing) and Hainan Province are excluded, and Hebei and Tibet lack data.
Data Sources

- **Individual Characteristics of County Party Secretaries**
  - Coverage: 24 provinces (1999-2008), containing 18,940 county-year observations from 3,623 county party secretaries covering 1,664 counties
  - Source: *Provincial Yearbook and Baidu Encyclopeida*

- **County-level Fiscal Revenues and Expenditures**
  - Source: *Prefectural and County Financial Statistics (Dishixian Caizheng Tongji Ziliao); Provincial Statistical Yearbook*

- **Other county-level socioeconomic characteristics (e.g. GDP, population etc.)**
  - Coverage: whole of China (1999-2008)
  - Source: *Statistical Yearbook of Regional Economies (Quyu Jingji Tongji Nianjian), Provincial Statistical Yearbook (Sheng Tongji Nianjian)*

- **The GIS data, employed for construction of IV (e.g. slope)**
  - Coverage: whole of China
  - Source: U.S. Geological Survey (USGS) Digital Elevation Model (DEM) at 90 square-meter-cell grids

*Four directly governed prefectures (Beijing, Tianjin, Shanghai, and Chongqing) and Hainan Province are excluded, and Hebei and Tibet lack data*
Hypothesis: Land Revenue vs. Promotion

- **Dependent Variable**: political turnover of CPS at end of term

- **Promotion**: promoted to higher-rank positions at the prefectural or province level
- **Lateral transfer**: transferred to other county as CPS or other post at the same rank
- **Retirement**: assigned to advisory positions with less control over resources (Zhengxie, Renda)
- **Termination**: dismissal due to corruption, resignation or death

Source: Authors’ calculations
Hypothesis: Land Revenue vs. Promotion

- **Dependent Variable**: political turnover of CPS at end of term

- **Promotion**: promoted to higher-rank positions at the prefectural or province level

- **Lateral Transfer**: transferred to other county as CPS or other post at the same rank

- **Retirement**: assigned to advisory positions with less control over resources (Zhengxie, Renda)

- **Termination**: dismissal due to corruption, resignation or death

Interest lies in comparing PROMOTION vs. ALL OTHER OUTCOMES/LATERAL TRANSFER at the end of term as CPS

<table>
<thead>
<tr>
<th>Frequency Distribution of Four Types of Outcomes at the End of Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>1082</td>
</tr>
<tr>
<td>29.86%</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations
Independent Variables

- Model Specification

\[ Promotion_{ij} = \alpha_1 LandRev_{ij} + \alpha_2 GDPGrowth_{ij} + \beta_1 X_{ij} + \beta_2 W_j + \phi_p + T_j + \nu_{ij} \] (1)

Key independent variables: share of land revenue to total revenue (average over a party secretary’s tenure) and per capita GDP growth rate (average)
Independent Variables

- Model Specification

\[ Promotion_{ij} = \alpha_1 \text{LandRev}_{ij} + \alpha_2 \text{GDPGrowth}_{ij} + \beta_1 X_{ij} + \beta_2 W_j + \phi_p + T_j + \nu_{ij} \]  

- *Key independent variables*: share of land revenue to total revenue (average over a party secretary's tenure) and per capita GDP growth rate (average)
Independent Variables

Model Specification

\[ \text{Promotion}_{ij} = \alpha_1 \text{LandRev}_{ij} + \alpha_2 \text{GDPGrowth}_{ij} + \beta_1 X_{ij} + \beta_2 W_j + \phi_p + T_j + \nu_{ij} \] (1)

Key independent variables: share of land revenue to total revenue (average over a party secretary’s tenure) and per capita GDP growth rate (average)

Table 1.2 Summary Statistics of Independent Variables (1999-2008)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Observations</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>County-level Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Share of Land Revenue</td>
<td>3623</td>
<td>0.074</td>
</tr>
<tr>
<td>Average Per Capita GDP Growth</td>
<td>3563</td>
<td>0.144</td>
</tr>
<tr>
<td>Average Share of Business Tax</td>
<td>3585</td>
<td>0.161</td>
</tr>
<tr>
<td>Average Prefectural APR</td>
<td>3553</td>
<td>0.101</td>
</tr>
<tr>
<td>Average Log(Per Capita GDP)</td>
<td>3588</td>
<td>-1.44</td>
</tr>
<tr>
<td>Average Log(Total Revenue)</td>
<td>3589</td>
<td>9.053</td>
</tr>
<tr>
<td><strong>Individual-level Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>3061</td>
<td>46.82</td>
</tr>
<tr>
<td>Year of Education</td>
<td>3061</td>
<td>17.06</td>
</tr>
<tr>
<td>Local Origin (dummy=1)</td>
<td>3061</td>
<td>59.49%</td>
</tr>
<tr>
<td>CYL Party Secretary (dummy=1)</td>
<td>3061</td>
<td>14.70%</td>
</tr>
<tr>
<td>Prefectural Government Experience (dummy=1)</td>
<td>3061</td>
<td>27.38%</td>
</tr>
</tbody>
</table>
Key Findings

- Career incentives have been strengthened by land revenue windfalls
Key Findings

- Career incentives have been strengthened by land revenue windfalls
  - A doubling of land revenue increases the odds of promotion by 59%-68%

Table 2
Table 2. Political Turnover of County Party Secretaries Upon Term Completion, 1999-2008

<table>
<thead>
<tr>
<th></th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Promotion vs. All Others</td>
<td>Promotion vs. Lateral Transfer</td>
<td>Promotion vs. All Others</td>
<td>Promotion vs. Lateral Transfer</td>
</tr>
<tr>
<td><strong>County Level Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Share of Land Revenue</td>
<td>0.684***</td>
<td>0.590***</td>
<td>2.958***</td>
<td>0.677***</td>
</tr>
<tr>
<td></td>
<td>(0.140)</td>
<td>(0.139)</td>
<td>(0.558)</td>
<td>(0.158)</td>
</tr>
<tr>
<td>Avg. Per Capita GDP Growth</td>
<td>0.052</td>
<td>0.046</td>
<td>0.221</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.063)</td>
<td>(0.186)</td>
<td>(0.064)</td>
</tr>
<tr>
<td>Avg. Share of Business Tax</td>
<td>-0.033</td>
<td>-0.061</td>
<td>-0.648**</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(0.112)</td>
<td>(0.118)</td>
<td>(0.310)</td>
<td>(0.123)</td>
</tr>
<tr>
<td>Avg. Prefectural APR</td>
<td>0.392**</td>
<td>0.360**</td>
<td>-0.043</td>
<td>0.390**</td>
</tr>
<tr>
<td></td>
<td>(0.161)</td>
<td>(0.167)</td>
<td>(0.466)</td>
<td>(0.174)</td>
</tr>
<tr>
<td>Avg. Log(Per Capita GDP)</td>
<td>0.033**</td>
<td>0.022</td>
<td>0.064</td>
<td>0.040**</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(0.045)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Avg. Log(Total Revenue)</td>
<td>0.017*</td>
<td>0.015</td>
<td>0.038</td>
<td>0.025**</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.027)</td>
<td>(0.010)</td>
</tr>
<tr>
<td><strong>Individual Level Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age†</td>
<td>-0.003</td>
<td>0.011*</td>
<td>0.005*</td>
<td>0.035***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.006)</td>
<td>(0.003)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.021</td>
<td>-0.128**</td>
<td>-0.032</td>
<td>-0.156***</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.051)</td>
<td>(0.020)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>Local Origin</td>
<td>0.013***</td>
<td>0.071***</td>
<td>0.009*</td>
<td>0.068***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.014)</td>
<td>(0.005)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>CYL Party Secretary</td>
<td>0.097***</td>
<td>0.205***</td>
<td>0.110***</td>
<td>0.206***</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.075)</td>
<td>(0.025)</td>
<td>(0.079)</td>
</tr>
<tr>
<td>Pref. Gov. Experience</td>
<td>0.244***</td>
<td>0.755***</td>
<td>0.231***</td>
<td>0.739***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.055)</td>
<td>(0.021)</td>
<td>(0.058)</td>
</tr>
<tr>
<td>Pref.- and Year-FE</td>
<td>Yes</td>
<td>Yes</td>
<td>NO</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>3494</td>
<td>2950</td>
<td>2950</td>
<td>2971</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.203</td>
<td>0.254</td>
<td>0.126</td>
<td>0.265</td>
</tr>
</tbody>
</table>

† Age when the party secretary took office
Standard errors in parentheses;* p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
### Table 2. Political Turnover of County Party Secretaries Upon Term Completion, 1999-2008

<table>
<thead>
<tr>
<th>County Level Variables</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Share of Land Revenue</td>
<td>0.684***</td>
<td>0.590***</td>
<td>2.958***</td>
<td>0.677***</td>
</tr>
<tr>
<td>Avg. Per Capita GDP Growth</td>
<td>0.052</td>
<td>0.046</td>
<td>0.221</td>
<td>0.022</td>
</tr>
<tr>
<td>Avg. Share of Business Tax</td>
<td>-0.033</td>
<td>-0.061</td>
<td>-0.648**</td>
<td>-0.004</td>
</tr>
<tr>
<td>Avg. Prefectural APR</td>
<td>0.392**</td>
<td>0.360**</td>
<td>-0.043</td>
<td>0.390**</td>
</tr>
<tr>
<td>Avg. Log(Per Capita GDP)</td>
<td>0.033**</td>
<td>0.022</td>
<td>0.064</td>
<td>0.040**</td>
</tr>
<tr>
<td>Avg. Log(Total Revenue)</td>
<td>0.017*</td>
<td>0.015</td>
<td>0.038</td>
<td>0.025**</td>
</tr>
</tbody>
</table>

| Individual Level Variables            |                           |              |                           |              |
| Age†                                   | -0.003                    | 0.011*       | 0.005*                   | 0.035***     |
| Education                              | -0.021                    | -0.128**     | -0.032                   | -0.156***    |
| Local Origin                           | 0.013***                  | 0.071***     | 0.009*                   | 0.068***     |
| CYL Party Secretary                    | 0.097***                  | 0.205***     | 0.110***                 | 0.206***     |
| Pref. Gov. Experience                  | 0.244***                  | 0.755***     | 0.231***                 | 0.739***     |

| Preference- and Year-FE                | Yes                       | Yes          | NO                       | Yes          | Yes          | NO           |
| Robust SE                              | Yes                       | Yes          | Yes                      | Yes          | Yes          | Yes          |
| No. of Obs.                            | 3494                      | 2950         | 2950                     | 2971         | 2584         | 2584         |
| Adj. R-squared                         | 0.203                     | 0.254        | 0.126                    | 0.265        | 0.296        | 0.131        |

† Age when the party secretary took office
Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
### Table 2. Political Turnover of County Party Secretaries Upon Term Completion, 1999-2008

<table>
<thead>
<tr>
<th>County Level Variables</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Promotion vs. All Others</td>
<td>Promotion vs. Lateral Transfer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Avg. Share of Land Revenue</td>
<td>0.684*** (0.140)</td>
<td>0.590*** (0.139)</td>
<td>2.958*** (0.558)</td>
<td>0.677*** (0.158)</td>
</tr>
<tr>
<td>Avg. Per Capita GDP Growth</td>
<td>0.052 (0.058)</td>
<td>0.046 (0.063)</td>
<td>0.221 (0.186)</td>
<td>0.022 (0.064)</td>
</tr>
<tr>
<td>Avg. Share of Business Tax</td>
<td>-0.033 (0.112)</td>
<td>-0.061 (0.118)</td>
<td>-0.648** (0.310)</td>
<td>-0.004 (0.123)</td>
</tr>
<tr>
<td>Avg. Prefectural APR</td>
<td>0.392** (0.161)</td>
<td>0.360** (0.167)</td>
<td>-0.043 (0.466)</td>
<td>0.298 (0.174)</td>
</tr>
<tr>
<td>Avg. Log(Per Capita GDP)</td>
<td>0.033** (0.016)</td>
<td>0.022 (0.018)</td>
<td>0.064 (0.045)</td>
<td>0.028 (0.017)</td>
</tr>
<tr>
<td>Avg. Log(Total Revenue)</td>
<td>0.017* (0.010)</td>
<td>0.015 (0.010)</td>
<td>0.038 (0.027)</td>
<td>0.025** (0.010)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Individual Level Variables</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
<th>Linear Probability Model</th>
<th>Probit Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age†</td>
<td>-0.003 (0.002)</td>
<td>0.011* (0.006)</td>
<td>0.005* (0.003)</td>
<td>0.035*** (0.007)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.021 (0.018)</td>
<td>-0.128** (0.051)</td>
<td>-0.032 (0.020)</td>
<td>-0.156*** (0.054)</td>
</tr>
<tr>
<td>Local Origin</td>
<td>0.013*** (0.005)</td>
<td>0.071*** (0.014)</td>
<td>0.009* (0.005)</td>
<td>0.068*** (0.015)</td>
</tr>
<tr>
<td>CYL Party Secretary</td>
<td>0.097*** (0.024)</td>
<td>0.205*** (0.075)</td>
<td>0.110*** (0.025)</td>
<td>0.206*** (0.079)</td>
</tr>
<tr>
<td>Pref. Gov. Experience</td>
<td>0.244*** (0.020)</td>
<td>0.755*** (0.055)</td>
<td>0.231*** (0.021)</td>
<td>0.739*** (0.058)</td>
</tr>
</tbody>
</table>

| Pref.- and Year-FE | Yes | Yes | NO | Yes | Yes | NO |
| Robust SE           | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of Obs.         | 3494 | 2950 | 2950 | 2971 | 2584 | 2584 |
| Adj. R-squared      | 0.203 | 0.254 | 0.126 | 0.265 | 0.296 | 0.131 |

† Age when the party secretary took office
Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Endogeneity of land revenue

- Land revenue is endogenous with official’s promotion probability
Endogeneity of land revenue

- Land revenue is endogenous with official’s promotion probability
- Land revenue a function of supply constraint interacting with varying/growing demand for land
Endogeneity of land revenue

- Land revenue is endogenous with official’s promotion probability
- Land revenue a function of supply constraint interacting with varying/growing demand for land
  - Exploit the variation among counties with respect to their suitability of land development by using slope as the proxy:
    - Exclude land with a slope above the elevation of 15 degrees using data from USGS Digital Elevation Model (DEM) at its 90-m resolution (Saiz, 2010)
Figure 4.1 Construction of the Suitability Index (of the Instrumental Variable)

Figure 4.2 Examples of High and Low Suitability Counties

Hubei Province
Laohekou County
SI=0.86
Xiangshan County
SI=0.26

Slope
High : 1
Low : 0
Endogeneity of land revenue

- Land revenue is endogenous with official’s promotion probability
- Land revenue a function of supply constraint interacting with growing demand for land
  - Exploit inter-county variations w.r.t. suitability of land development by using slope as the proxy:
    - Exclude land with a slope above the elevation of 15 degrees using data from USGS Digital Elevation Model (DEM) at its 90-m resolution (Saiz, 2010)
  - Exploit variation in the length of time a county has been auctioning land use rights (public auctions and open tenders [Zhao, Pai, Gua] became mandatory in 2002)
    - The earlier the adoption the greater the demand for land and the larger the effect of geographical suitability on land revenue
    - Length of time land market has been developing in a county
      - Measured by (the YEAR of initial appointment of county party secretaries) - (the YEAR a prefecture sold its first plot of land by auctions)

Figure 4

Figure 5
Endogeneity of land revenue

- Land revenue is endogenous with official’s promotion probability
- Land revenue a function of supply constraint interacting with growing demand for land
  - Exploit inter-county variations w.r.t. suitability of land development by using slope as the proxy:
    - Exclude land with a slope above the elevation of 15 degrees using data from USGS Digital Elevation Model (DEM) at its 90-m resolution (Saiz, 2010) Figure 4
  - Exploit variation in the length of time a county has been auctioning land use rights (public auctions and open tenders [Zhao, Pai, Gua] became mandatory in 2002)
    - The earlier the adoption the greater the demand for land and the larger the effect of geographical suitability on land revenue
    - Length of time land market has been developing in a county
    - Measured by (the YEAR of initial appointment of county party secretaries) - (the YEAR a prefecture sold its first plot of land by auctions) Figure 5
Figure 5. Construction of the Land Market Measure (of the Instrumental Variable)
Acknowledgments

References

Figure 5. Construction of the Land Market Measure (of the Instrumental Variable)
Endogeneity of land revenue

- Our IV is an interaction term between *suitability* and *length of time* land market has been developing:

\[
\text{LandRev}_{ij} = \gamma_1 Supply_i \times Demand_i + \gamma_2 GDPGrowth_{ij} + \xi_1 X_{ij} + \xi_2 W_j + \phi_p + T_j + \omega_{ij}
\]  

(2)
Endogeneity of land revenue

- Our IV is an interaction term between *suitability* and *length of time* land market has been developing:

\[
\text{LandRev}_{ij} = \gamma_1 \text{Supply}_i \ast \text{Demand}_i + \gamma_2 \text{GDPGrowth}_{ij} + \xi_1 X_{ij} + \xi_2 W_j + \phi_p + T_j + \omega_{ij}
\]

(2)

- First-stage regression is similar to the setting of a differences-in-differences Estimation

Figure 6  Table 3
Figure 6. A DID Estimation of the Changing Effects of Development Suitability on Land Revenue (First-stage regression results)

* p<0.10, ** p<0.05, *** p<0.01
Figure 6. A DID Estimation of the Changing Effects of Development Suitability on Land Revenue (First-stage regression results)

* p<0.10, ** p<0.05, *** p<0.01

**Main Results**

**IV Results**
### Table 3. Political Turnover of County Party Secretaries upon Term Completion, 1999-2008, IV Estimation

<table>
<thead>
<tr>
<th></th>
<th>IV Regression Model</th>
<th>Promotion vs. All Others</th>
<th>Promotion vs. Lateral Transfer</th>
<th>Promotion vs. All Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Stage 2nd Stage</td>
<td>1st Stage 2nd Stage</td>
<td>1st Stage 2nd Stage</td>
<td></td>
</tr>
<tr>
<td><strong>County Level Variables</strong></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Land Suitability* Post-auctioning Time Trend</td>
<td>0.095*** (0.007)</td>
<td>0.098*** (0.008)</td>
<td>0.095*** (0.007)</td>
<td></td>
</tr>
<tr>
<td>Average Share of Land Revenue</td>
<td>1.959*** (0.386)</td>
<td>2.306*** (0.425)</td>
<td>1.991*** (0.388)</td>
<td></td>
</tr>
<tr>
<td>Average Per Capita GDP Growth</td>
<td>0.041*** (0.014)</td>
<td>-0.064 (0.068)</td>
<td>0.043*** (0.016)</td>
<td>-0.103 (0.076)</td>
</tr>
<tr>
<td>Other Control Variables</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Group-specific Time Trends</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pref.-and Year-FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>2580</td>
<td>2580</td>
<td>2267</td>
<td>2267</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.498</td>
<td>0.184</td>
<td>0.507</td>
<td>0.183</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported
Endogeneity of land revenue

- Our IV is an interaction term between *suitability* and *length of time* land market has been developing:

\[ LandRev_{ij} = \gamma_1 Supply_i \times Demand_i + \gamma_2 GDPGrowth_{ij} + \xi_1 X_{ij} + \xi_2 W_j + \phi_p + T_j + \omega_{ij} \]  

(3)

- First-stage regression is similar to the setting of a differences-in-differences Estimation

[Figure 6] [Table 3]
**Endogeneity of land revenue**

- Our IV is an interaction term between *suitability* and *length of time* land market has been developing:

\[
LandRev_{ij} = \gamma_1 Supply_i \ast Demand_i + \gamma_2 GDPGrowth_{ij} + \xi_1 X_{ij} + \xi_2 W_j + \phi_p + T_j + \omega_{ij}
\]  
(3)

- First-stage regression is similar to the setting of a differences-in-differences Estimation

- Second-stage equation:

\[
Promotion_{ij} = \theta_1 \widehat{LandRev}_{ij} + \theta_2 GDPGrowth_{ij} + \varphi_1 X_{ij} + \varphi_2 W_j + \phi_p + T_j + \sigma_{ij}
\]  
(4)

- A 10% increase in land revenue increases the odds of promotion by 19.6%-23.1% (instrumented results, Table 3)
### Table 3. Political Turnover of County Party Secretaries upon Term Completion, 1999-2008, IV Estimation

<table>
<thead>
<tr>
<th>County Level Variables</th>
<th>Promotion vs. All Others 1st Stage</th>
<th>Promotion vs. Lateral Transfer 1st Stage</th>
<th>Promotion vs. All Others 1st Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Land Suitability* Post-auctioning Time Trend</td>
<td>0.095***</td>
<td>0.098***</td>
<td>0.095***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.008)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Average Share of Land Revenue</td>
<td>1.959***</td>
<td>2.306***</td>
<td>1.991***</td>
</tr>
<tr>
<td></td>
<td>(0.386)</td>
<td>(0.425)</td>
<td>(0.388)</td>
</tr>
<tr>
<td>Average Per Capita GDP Growth</td>
<td>0.041***</td>
<td>-0.064</td>
<td>0.043***</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.068)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Other Control Variables</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Group-specific Time Trends</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pref.-and Year-FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>2580</td>
<td>2580</td>
<td>2267</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.498</td>
<td>0.184</td>
<td>0.507</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported
### Table 3. Political Turnover of County Party Secretaries upon Term Completion, 1999-2008, IV Estimation

<table>
<thead>
<tr>
<th></th>
<th>Promotion vs. All Others</th>
<th>Promotion vs. Lateral Transfer</th>
<th>Promotion vs. All Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Stage</td>
<td>2nd Stage</td>
<td>1st Stage</td>
</tr>
<tr>
<td>Land Suitability* Post-auctioning Time Trend</td>
<td>0.095*** (0.007)</td>
<td>0.098*** (0.008)</td>
<td>0.095*** (0.007)</td>
</tr>
<tr>
<td>Average Share of Land Revenue</td>
<td>0.041*** (0.014)</td>
<td>-0.064 (0.068)</td>
<td>0.043*** (0.016)</td>
</tr>
<tr>
<td>Average Per Capita GDP Growth</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Other Control Variables</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Group-specific Time Trends</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pref.-and Year-FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>2580</td>
<td>2580</td>
<td>2267</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.498</td>
<td>0.184</td>
<td>0.507</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Evidence of Signaling

- Local leaders spend significantly more on "image projects" (Xingxianggongcheng) to signal their "achievements" (a flamboyant indicator of "competence")
Main Results

Channel of Signaling

Evidence of Signaling

- Local leaders spend significantly more on "image projects" (Xingxianggongcheng) to signal their "achievements" (a flamboyant indicator of "competence")

  - Land revenue increases expenditures on both city construction and land development examples Table 4.1
Examples of Grandiose Government Building
Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures</th>
<th>Log of Per Capita Social Welfare Expenditures</th>
<th>Log of Per Capita Land Development Expenditure</th>
<th>Log of Per Capita City Construction Expenditure</th>
<th>Log of Per Capita Administration Expenditures</th>
<th>Log of Bureaucracy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112</td>
<td>0.004</td>
<td>8.727***</td>
<td>3.128***</td>
<td>0.439***</td>
<td>0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.030)</td>
<td>(0.534)</td>
<td>(0.340)</td>
<td>(0.064)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td>Panel B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557**</td>
<td>0.059</td>
<td>4.067***</td>
<td>10.751***</td>
<td>0.501***</td>
<td>0.614***</td>
</tr>
<tr>
<td></td>
<td>(0.219)</td>
<td>(0.058)</td>
<td>(1.259)</td>
<td>(0.678)</td>
<td>(0.079)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures</th>
<th>Log of Per Capita Social Welfare Expenditures</th>
<th>Log of Per Capita Land Development Expenditure</th>
<th>Log of Per Capita City Construction Expenditure</th>
<th>Log of Per Capita Administration Expenditures</th>
<th>Log of Bureaucracy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112 (0.101)</td>
<td>0.004 (0.030)</td>
<td>8.727*** (0.534)</td>
<td>3.128*** (0.340)</td>
<td>0.439*** (0.064)</td>
<td>0.185*** (0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td>Panel B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557** (0.219)</td>
<td>0.059 (0.058)</td>
<td>4.067*** (1.259)</td>
<td>10.751*** (0.678)</td>
<td>0.501*** (0.079)</td>
<td>0.614*** (0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Evidence of Signaling

- Local leaders spend significantly more on "image projects" (Xingxianggongcheng) to signal their "achievements" (a flamboyant indicator of "competence")
  - Land revenue increases expenditures on both city construction and land development

Examples

Table 4.1
Evidence of Signaling

- Local leaders spend significantly more on "image projects" (*Xingxianggongcheng*) to signal their "achievements" (a flamboyant indicator of "competence")
  - Land revenue increases expenditures on both city construction and land development [examples][Table 4.1]
  - Spending on these items also strategically timed to avoid effects of signaling going to waste [Table 4.2]
### Table 4.2. The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures</th>
<th>Log of Per Capita Social Welfare Expenditures</th>
<th>Log of Per Capita Land Development Expenditure</th>
<th>Log of Per Capita City Construction Expenditure</th>
<th>Log of Per Capita Administration Expenditures</th>
<th>Log of Bureaucracy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel C</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.280</td>
<td>-0.014</td>
<td>6.868***</td>
<td>-0.173</td>
<td>0.309**</td>
<td>0.237***</td>
</tr>
<tr>
<td></td>
<td>(0.215)</td>
<td>(0.053)</td>
<td>(1.088)</td>
<td>(0.739)</td>
<td>(0.125)</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Share of Land Revenue*Year in Office</td>
<td>0.179</td>
<td>0.045</td>
<td>1.484**</td>
<td>2.155***</td>
<td>0.066</td>
<td>-0.030</td>
</tr>
<tr>
<td></td>
<td>(0.146)</td>
<td>(0.035)</td>
<td>(0.753)</td>
<td>(0.529)</td>
<td>(0.084)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>Share of Land Revenue*Year in Office²</td>
<td>-0.031</td>
<td>-0.009*</td>
<td>-0.266**</td>
<td>-0.252***</td>
<td>-0.003</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.006)</td>
<td>(0.122)</td>
<td>(0.080)</td>
<td>(0.013)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>14267</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.135</td>
<td>0.975</td>
<td>0.545</td>
<td>0.475</td>
<td>0.953</td>
<td>0.746</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Table 4.2. The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures</th>
<th>Log of Per Capita Social Welfare Expenditures</th>
<th>Log of Per Capita Land Development Expenditure</th>
<th>Log of Per Capita City Construction Expenditure</th>
<th>Log of Per Capita Administration Expenditures</th>
<th>Log of Bureaucracy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel C Fixed Effects Regression Estimation</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.280</td>
<td>-0.014</td>
<td>6.868***</td>
<td>-0.173</td>
<td>0.309**</td>
<td>0.237***</td>
</tr>
<tr>
<td></td>
<td>(0.215)</td>
<td>(0.053)</td>
<td>(1.088)</td>
<td>(0.739)</td>
<td>(0.125)</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Share of Land Revenue*Year in Office</td>
<td>0.179</td>
<td>0.045</td>
<td>1.484**</td>
<td>2.155***</td>
<td>0.066</td>
<td>-0.030</td>
</tr>
<tr>
<td></td>
<td>(0.146)</td>
<td>(0.035)</td>
<td>(0.753)</td>
<td>(0.529)</td>
<td>(0.084)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>Share of Land Revenue*Year in Office²</td>
<td>-0.031</td>
<td>-0.009*</td>
<td>-0.266**</td>
<td>-0.252***</td>
<td>-0.003</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.006)</td>
<td>(0.122)</td>
<td>(0.080)</td>
<td>(0.013)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>12557</td>
<td>14267</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.135</td>
<td>0.975</td>
<td>0.545</td>
<td>0.475</td>
<td>0.953</td>
<td>0.746</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
## Main Results

### Channel of Signaling

Table 4.2. The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th>Panel C</th>
<th>Fixed Effects Regression Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Share of Land Revenue</strong></td>
<td><strong>0.179</strong> (0.053) <strong>0.045</strong> (0.035) <strong>1.484</strong>**  ** (0.753) <strong>2.155</strong>* (0.529) <strong>0.066</strong> (0.084) <strong>0.003</strong> (0.013) <strong>0.003</strong> (0.007)</td>
</tr>
<tr>
<td><strong>Share of Land Revenue*Year in Office</strong></td>
<td><strong>-0.031</strong> (0.022) <strong>-0.009</strong>* (0.006) <strong>-0.266</strong>**  ** (0.122) <strong>-0.252</strong>* (0.080) <strong>0.003</strong> (0.013) <strong>0.003</strong> (0.007)</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td><strong>12557</strong> <strong>12557</strong> <strong>12557</strong> <strong>12557</strong> <strong>12557</strong> <strong>14267</strong></td>
</tr>
<tr>
<td><strong>Adj. R-squared</strong></td>
<td><strong>0.135</strong> <strong>0.975</strong> <strong>0.545</strong> <strong>0.475</strong> <strong>0.953</strong> <strong>0.746</strong></td>
</tr>
<tr>
<td><strong>Control Variables †</strong></td>
<td>Yes Yes Yes Yes Yes Yes</td>
</tr>
<tr>
<td><strong>Clustered Error in County</strong></td>
<td>Yes Yes Yes Yes Yes Yes</td>
</tr>
<tr>
<td><strong>County- and Year-Fixed Effects</strong></td>
<td>Yes Yes Yes Yes Yes Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Evidence of Signaling

- Local leaders spend significantly more on "image projects" (Xingxianggongcheng) to signal their "achievements" (a flamboyant indicator of "competence")
  - Land revenue increases expenditures on both city construction and land development (examples Table 4.1)
  - Spending on these items also strategically timed to avoid effects of signaling going to waste (Table 4.2)
Evidence of Signaling

- Local leaders spend significantly more on "image projects" (Xingxianggongcheng) to signal their "achievements" (a flamboyant indicator of "competence")
  - Land revenue increases expenditures on both city construction and land development [examples, Table 4.1]
  - Spending on these items also strategically timed to avoid effects of signaling going to waste [Table 4.2]
- Land revenue has been spent on welfare-enhancing activities that benefit the welfare of the bureaucrats but not the general population [Table 4.3]
Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures (1)</th>
<th>Log of Per Capita Social Welfare Expenditures (2)</th>
<th>Log of Per Capita Land Development Expenditure (3)</th>
<th>Log of Per Capita City Construction Expenditure (4)</th>
<th>Log of Per Capita Administration Expenditures (5)</th>
<th>Log of Bureaucracy Size (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112</td>
<td>0.004</td>
<td>8.727***</td>
<td>3.128***</td>
<td>0.439***</td>
<td>0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.030)</td>
<td>(0.534)</td>
<td>(0.340)</td>
<td>(0.064)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td><strong>Panel B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557**</td>
<td>0.059</td>
<td>4.067***</td>
<td>10.751***</td>
<td>0.501***</td>
<td>0.614***</td>
</tr>
<tr>
<td></td>
<td>(0.219)</td>
<td>(0.058)</td>
<td>(1.259)</td>
<td>(0.678)</td>
<td>(0.079)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
### Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures</th>
<th>Log of Per Capita Social Welfare Expenditures</th>
<th>Log of Per Capita Land Development Expenditure</th>
<th>Log of Per Capita City Construction Expenditure</th>
<th>Log of Per Capita Administration Expenditures</th>
<th>Log of Bureaucracy Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112</td>
<td>0.004</td>
<td>8.727***</td>
<td>3.128***</td>
<td>0.439***</td>
<td>0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.030)</td>
<td>(0.534)</td>
<td>(0.340)</td>
<td>(0.064)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td>Panel B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557**</td>
<td>0.059</td>
<td>4.067***</td>
<td>10.751***</td>
<td>0.501***</td>
<td>0.614***</td>
</tr>
<tr>
<td></td>
<td>(0.219)</td>
<td>(0.058)</td>
<td>(1.259)</td>
<td>(0.678)</td>
<td>(0.079)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.

► Consume more welfare (*Xingzheng Guanli Zhichu*) in the form of in-kind benefits (bonuses, subsidies, allowances, vehicles, official entertainment, etc.—part and parcel of an informal compensation structure/"Organizational Corruption"), and enlarge Size of Bureaucracy (number of government employees per 100,000 population)
### Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures (1)</th>
<th>Log of Per Capita Social Welfare Expenditures (2)</th>
<th>Log of Per Capita Land Development Expenditure (3)</th>
<th>Log of Per Capita City Construction Expenditure (4)</th>
<th>Log of Per Capita Administration Expenditures (5)</th>
<th>Log of Bureaucracy Size (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A</strong></td>
<td>Fixed Effects Regression Estimation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112</td>
<td>0.004</td>
<td>8.727***</td>
<td>3.128***</td>
<td>0.439***</td>
<td>0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.030)</td>
<td>(0.534)</td>
<td>(0.340)</td>
<td>(0.064)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td><strong>Panel B</strong></td>
<td>IV Regression Estimation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557**</td>
<td>0.059</td>
<td>4.067***</td>
<td>10.751***</td>
<td>0.501***</td>
<td>0.614***</td>
</tr>
<tr>
<td></td>
<td>(0.219)</td>
<td>(0.058)</td>
<td>(1.259)</td>
<td>(0.678)</td>
<td>(0.079)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td>Control Variables †</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clustered Error in County</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County- and Year-Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.

- Consume more welfare (Xingzheng Guanli Zhichu) in the form of in-kind benefits (bonuses, subsidies, allowances, vehicles, official entertainment, etc.—part and parcel of an informal compensation structure/"Organizational Corruption"), and enlarge Size of Bureaucracy (number of government employees per 100,000 population)
- Do not increase in social welfare spending (not "Stationary Bandits")
### Table 4.1 The Effect of Land Revenue Share on Government Expenditures, 1999–2007

<table>
<thead>
<tr>
<th></th>
<th>Log of Per Capita Production Expenditures (1)</th>
<th>Log of Per Capita Social Welfare Expenditures (2)</th>
<th>Log of Per Capita Land Development Expenditure (3)</th>
<th>Log of Per Capita City Construction Expenditure (4)</th>
<th>Log of Per Capita Administration Expenditures (5)</th>
<th>Log of Bureaucracy Size (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects Regression Estimation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.112</td>
<td>0.004</td>
<td>8.727***</td>
<td>3.128***</td>
<td>0.439***</td>
<td>0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.030)</td>
<td>(0.534)</td>
<td>(0.340)</td>
<td>(0.064)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.138</td>
<td>0.977</td>
<td>0.582</td>
<td>0.481</td>
<td>0.956</td>
<td>0.769</td>
</tr>
<tr>
<td><strong>IV Regression Estimation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>-0.557**</td>
<td>0.059</td>
<td>4.067***</td>
<td>10.751***</td>
<td>0.501***</td>
<td>0.614***</td>
</tr>
<tr>
<td></td>
<td>(0.219)</td>
<td>(0.058)</td>
<td>(1.259)</td>
<td>(0.678)</td>
<td>(0.079)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>13352</td>
<td>15067</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.784</td>
<td>0.454</td>
<td>0.186</td>
<td>0.896</td>
<td>0.581</td>
</tr>
<tr>
<td><strong>Control Variables †</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Clustered Error in County</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>County- and Year-Fixed Effects</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Control variables in the models include per capita GDP growth, log of per capita GDP, log of per capita total revenue, log of population; additionally, year in office and quadratic term for year in office are added in models in panel C.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.

- Consume more welfare (*Xingzheng Guanli Zhichu*) in the form of in-kind benefits (bonuses, subsidies, allowances, vehicles, official entertainment, etc.—part and parcel of an informal compensation structure/”Organizational Corruption”), and enlarge Size of Bureaucracy (number of government employees per 100,000 population)
- Do not increase in social welfare spending (not ”Stationary Bandits”)
- Effect on production expenditure (*Shangmao Bumen Zhichu*) ambiguous
Why *signaling* can help promotion?

- Being “visible” and “quantifiable”, these projects provide a distinguishable metric
  - Formal performance indicators lack variations (but enormous variations in land revenue) Table 5
Table 5. The Decomposition of Performance Indicators*

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Between Prefecture Variance</th>
<th>Within Prefecture Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita GDP</td>
<td>66.14%</td>
<td>33.86%</td>
</tr>
<tr>
<td>GDP Growth Rate</td>
<td>99.43%</td>
<td>0.57%</td>
</tr>
<tr>
<td>Per Capita Total Revenue</td>
<td>60.79%</td>
<td>39.21%</td>
</tr>
<tr>
<td>Total Revenue Growth Rate</td>
<td>96.94%</td>
<td>3.06%</td>
</tr>
<tr>
<td>Total Employment Population</td>
<td>68.35%</td>
<td>31.65%</td>
</tr>
<tr>
<td>Average Salary of Urban Employee</td>
<td>72.90%</td>
<td>27.10%</td>
</tr>
<tr>
<td>Per Capita Total Fixed Asset Investment</td>
<td>65.81%</td>
<td>34.19%</td>
</tr>
<tr>
<td>Share of Extra-budetary Revenue</td>
<td>32.52%</td>
<td>67.48%</td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>14.73%</td>
<td>85.27%</td>
</tr>
</tbody>
</table>

* The indicators are from the 2008 statistics
### Table 5. The Decomposition of Performance Indicators*

<table>
<thead>
<tr>
<th></th>
<th>Between Prefecture Variance</th>
<th>Within Prefecture Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita GDP</td>
<td>66.14%</td>
<td>33.86%</td>
</tr>
<tr>
<td>GDP Growth Rate</td>
<td>99.43%</td>
<td>0.57%</td>
</tr>
<tr>
<td>Per Capita Total Revenue</td>
<td>60.79%</td>
<td>39.21%</td>
</tr>
<tr>
<td>Total Revenue Growth Rate</td>
<td>96.94%</td>
<td>3.06%</td>
</tr>
<tr>
<td>Total Employment Population</td>
<td>68.35%</td>
<td>31.65%</td>
</tr>
<tr>
<td>Average Salary of Urban Employee</td>
<td>72.90%</td>
<td>27.10%</td>
</tr>
<tr>
<td>Per Capita Total Fixed Asset Investment</td>
<td>65.81%</td>
<td>34.19%</td>
</tr>
<tr>
<td>Share of Extra-budgetary Revenue</td>
<td>32.52%</td>
<td>67.48%</td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>14.73%</td>
<td>85.27%</td>
</tr>
</tbody>
</table>

* The indicators are from the 2008 statistics
Table 5. The Decomposition of Performance Indicators*

<table>
<thead>
<tr>
<th></th>
<th>Between Prefecture Variance</th>
<th>Within Prefecture Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita GDP</td>
<td>66.14%</td>
<td>33.86%</td>
</tr>
<tr>
<td>GDP Growth Rate</td>
<td>99.43%</td>
<td>0.57%</td>
</tr>
<tr>
<td>Per Capita Total Revenue</td>
<td>60.79%</td>
<td>39.21%</td>
</tr>
<tr>
<td>Total Revenue Growth Rate</td>
<td>96.94%</td>
<td>3.06%</td>
</tr>
<tr>
<td>Total Employment Population</td>
<td>68.35%</td>
<td>31.65%</td>
</tr>
<tr>
<td>Average Salary of Urban Employee</td>
<td>72.90%</td>
<td>27.10%</td>
</tr>
<tr>
<td>Per Capita Total Fixed Asset Investment</td>
<td>65.81%</td>
<td>34.19%</td>
</tr>
<tr>
<td>Share of Extra-budgetary Revenue</td>
<td>32.52%</td>
<td>67.48%</td>
</tr>
<tr>
<td>Share of Land Revenue</td>
<td>14.73%</td>
<td>85.27%</td>
</tr>
</tbody>
</table>

* The indicators are from the 2008 statistics

- Land revenue does not translate into competition directly, but those with more at their disposal are better able to use them to enhance promotion prospects
Why signaling can help promotion?

- Being “visible” and “quantifiable”, these projects provide a distinguishable metric

  - Formal performance indicators lack variations (but enormous variations in land revenue) Table 5
Why \textit{signaling} can help promotion?

- Being "visible" and "quantifiable", these projects provide a distinguishable metric
  - Formal performance indicators lack variations (but enormous variations in land revenue) \textit{Table 5}

- Some supervisors may take credit and signaling can be more effective under autocratic regimes
Why *signaling* can help promotion?

- Being “visible” and “quantifiable”, these projects provide a distinguishable metric

  - Formal performance indicators lack variations (but enormous variations in land revenue)  

- Some supervisors may take credit and signaling can be more effective under autocratic regimes

- Short tenure of the county leaders predisposes myopic behavior (<4 years)
Robustness Check

- Validity of instrument—placebo test  
- Land revenue vs. “other” performance indicators  
- The Effect of Tenure  
- Problem of endogenous appointment
Implications of China’s Institutions for Growth

- Political centralization matters: Our finding reaffirms the importance of an institutional design that links promotion to cadre performance (not necessarily GDP growth)

- Economic decentralization matters: Career incentives are strengthened by land revenue windfalls, which serve as a complement rather than a substitute

- Policy shock generates variances in the allocation of revenue rights, allowing some to use them to strengthen their promotion advantage (signaling)

- Institutional foundations: A combination of political centralization and economic decentralization
Implications of China’s Institutions for Growth

- Political centralization matters: Our finding reaffirms the importance of an institutional design that links promotion to cadre performance (not necessarily GDP growth)

- Economic decentralization matters: Career incentives are strengthened by land revenue windfalls, which serve as a complement rather than substitute
Implications of China’s Institutions for Growth

- Political centralization matters: Our finding reaffirms the importance of an institutional design that links promotion to cadre performance (not necessarily GDP growth)

- Economic decentralization matters: Career incentives are strengthened by land revenue windfalls, which serve as a complement rather than substitute

- Policy shock generates variances in the allocation of revenue rights, allowing some to use them to strengthen their promotion advantage (signaling)
Implications of China’s Institutions for Growth

- Political centralization matters: Our finding reaffirms the importance of an institutional design that links promotion to cadre performance (not necessarily GDP growth)

- Economic decentralization matters: Career incentives are strengthened by land revenue windfalls, which serve as a complement rather than substitute

- Policy shock generates variances in the allocation of revenue rights, allowing some to use them to strengthen their promotion advantage (signaling)

- Institutional foundations a combination of political centralization and economic decentralization
Thank you!
Robustness Check (1)

- Validity of instrument—placebo test
  - Both parts of IV should be uncorrelated with political turnover of officials except through the channel of land revenue
  - Regress four county socio-economic indicators during 1994-1998 (the period just before our regression analysis) on suitability and length of time for Land Market Development
Table 6. Placebo Test of the Instrumental Variable

<table>
<thead>
<tr>
<th></th>
<th>Annual Growth Rates, 1994-1998</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Capita GDP (1)</td>
<td>Tax Revenue (2)</td>
<td>Population (3)</td>
<td>Industrial Output (4)</td>
</tr>
<tr>
<td>Land Suitability</td>
<td>0.016</td>
<td>-0.126</td>
<td>-0.022</td>
<td>-0.202</td>
</tr>
<tr>
<td></td>
<td>(0.084)</td>
<td>(0.083)</td>
<td>(0.054)</td>
<td>(2.774)</td>
</tr>
<tr>
<td>Prefecture FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>5737</td>
<td>5828</td>
<td>5746</td>
<td>5825</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.080</td>
<td>0.128</td>
<td>0.056</td>
<td>0.026</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Average Growth Rates, 1994-1998</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Capita GDP (5)</td>
<td>Tax Revenue (6)</td>
<td>Population (7)</td>
<td>Industrial Output (8)</td>
</tr>
<tr>
<td>Post-auctioning trend</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.003</td>
<td>-2.092</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(1.583)</td>
</tr>
<tr>
<td>Provincial FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>3623</td>
<td>3623</td>
<td>3623</td>
<td>3623</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.629</td>
<td>0.406</td>
<td>0.270</td>
<td>0.260</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; * p<0.10, * p<0.05, ** p<0.01; Constant is included but not reported
Robustness Check (1)

- Validity of instrument—placebo test
  - Both parts of IV should be uncorrelated with political turnover of officials except through the channel of land revenue
  - Regress four county socio-economic indicators during 1994-1998 (the period just before our regression analysis) on *suitability* and *length of time* for Land Market Development

- Land revenue vs. "other" performance indicators
  - Positive effect of land revenue on promotion may come from the correlation between land revenue and other performance indicators of promotion
  - Control for these other performance indicators in the IV regression
### Table 7. Land Revenue Share vs. “Other” Performance Indicators, 1999-2008

<table>
<thead>
<tr>
<th>IV Estimation</th>
<th>Promotion vs. All Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Average Share of Land Revenue</td>
<td>1.924** (0.776)</td>
</tr>
<tr>
<td>“Other” Performance Indicators</td>
<td></td>
</tr>
<tr>
<td>Average Tax Revenue Growth</td>
<td>-0.024 (0.027)</td>
</tr>
<tr>
<td>Average Population Growth</td>
<td>0.054 (0.048)</td>
</tr>
<tr>
<td>Average Employment Growth</td>
<td>0.056 (0.057)</td>
</tr>
<tr>
<td>Average Salary Growth</td>
<td>0.002 (0.013)</td>
</tr>
<tr>
<td>Average Industrial Output Growth</td>
<td>-0.000** (0.000)</td>
</tr>
<tr>
<td>Average Share of the Tertiary Sector</td>
<td>0.001 (0.005)</td>
</tr>
<tr>
<td>Other Controls</td>
<td>Yes</td>
</tr>
<tr>
<td>Pref.- and Year-FE</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>2076</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.203</td>
</tr>
</tbody>
</table>

Other Controls are the same as column 2 in Table 4.
Standard errors in parentheses:  * p<0.10, ** p<0.05, *** p<0.01; Constant is included but not reported.
Robustness Check (2)

- The Effect of Tenure

- This variation in tenure duration may affect the odds of promotion via its effect on land revenue

- Dividing up the county party secretaries into groups of varying tenure duration ranging from one to five years (and beyond) and regress revenue on promotion over these subsamples
Table 8. The Effect of Tenure on the Political Turnover of County Party Secretaries, 1999-2008

<table>
<thead>
<tr>
<th>County Level Variables</th>
<th>1 Year (1)</th>
<th>2 Years (2)</th>
<th>3 Years (3)</th>
<th>4 Years (4)</th>
<th>5 Years (5)</th>
<th>&gt;5 Years (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Share of Land Revenue</td>
<td>1.177</td>
<td>2.511**</td>
<td>1.499**</td>
<td>2.338**</td>
<td>2.340</td>
<td>4.168</td>
</tr>
<tr>
<td>(1.500)</td>
<td>(1.115)</td>
<td>(0.643)</td>
<td>(1.188)</td>
<td>(4.241)</td>
<td>(3.860)</td>
<td></td>
</tr>
<tr>
<td>Average Per Capita GDP Growth</td>
<td>0.206</td>
<td>-0.155</td>
<td>-0.079</td>
<td>-0.086</td>
<td>0.183</td>
<td>-0.786</td>
</tr>
<tr>
<td>(0.341)</td>
<td>(0.201)</td>
<td>(0.209)</td>
<td>(0.274)</td>
<td>(0.704)</td>
<td>(0.871)</td>
<td></td>
</tr>
<tr>
<td>Control Variables†</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pref.-and Year-FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust SE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>193</td>
<td>548</td>
<td>609</td>
<td>617</td>
<td>332</td>
<td>281</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.143</td>
<td>0.299</td>
<td>0.167</td>
<td>0.246</td>
<td>0.174</td>
<td>0.181</td>
</tr>
</tbody>
</table>

†Other Controls are the same as column (2) in Table 3.

Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01; Constant terms are not reported.
Robustness Check (2)

- **The Effect of Tenure**
  - Table 8
  - This variation in tenure duration may affect the odds of promotion via its effect on land revenue.
  - Dividing up the county party secretaries into groups of varying tenure duration ranging from one to five years (and beyond) and regress revenue on promotion over these subsamples.

- **Problem of endogenous appointment**
  - Table 9
  - Need to rule out that no officials could influence the decision regarding the locational choice of their appointment.
  - Regress County Socioeconomic Characteristics (based on the year before they took office) on individual characteristics of county party secretaries.
  - 76.6% were promoted from within the same prefecture and absence of a rotation system below the province both mitigate selection bias problem.
Table 9. Regression of County Socioeconomic Characteristics on Individual Characteristics of County Party Secretaries †

<table>
<thead>
<tr>
<th></th>
<th>GDP Growth</th>
<th>Per Capita GDP</th>
<th>Share of Land Revenue</th>
<th>Per Capita Land Revenue</th>
<th>Total Revenue Growth</th>
<th>Population Growth</th>
<th>Employment Growth</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.003</td>
<td>0.004</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.002)</td>
<td>(0.001)</td>
<td>(0.004)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.005</td>
<td>-0.001</td>
<td>0.001</td>
<td>-0.002</td>
<td>0.003</td>
<td>0.002</td>
<td>0.003</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.002)</td>
<td>(0.006)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Local Origin</td>
<td>0.051*</td>
<td>0.055</td>
<td>-0.002</td>
<td>0.001</td>
<td>0.025</td>
<td>0.006</td>
<td>0.013</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.034)</td>
<td>(0.007)</td>
<td>(0.004)</td>
<td>(0.018)</td>
<td>(0.010)</td>
<td>(0.031)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>CYL</td>
<td>0.042</td>
<td>0.038</td>
<td>-0.013</td>
<td>0.001</td>
<td>-0.003</td>
<td>0.017</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.043)</td>
<td>(0.009)</td>
<td>(0.007)</td>
<td>(0.022)</td>
<td>(0.021)</td>
<td>(0.030)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>Pref. Gov. Exp.</td>
<td>0.011</td>
<td>0.037</td>
<td>0.007</td>
<td>0.002</td>
<td>0.012</td>
<td>-0.004</td>
<td>-0.013</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.038)</td>
<td>(0.008)</td>
<td>(0.004)</td>
<td>(0.019)</td>
<td>(0.012)</td>
<td>(0.033)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Year-and-Pref. FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>1388</td>
<td>1403</td>
<td>1352</td>
<td>1270</td>
<td>1231</td>
<td>1390</td>
<td>1040</td>
<td>1264</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.207</td>
<td>0.542</td>
<td>0.361</td>
<td>0.215</td>
<td>0.241</td>
<td>0.873</td>
<td>0.338</td>
<td>0.706</td>
</tr>
</tbody>
</table>

† For the value of the dependent variables we employ the year prior to the initial appointment of the county party secretaries.

Standard errors in parentheses; * P<0.10, ** P<0.05, *** P<0.01; Constant is included but not reported.
Figure 8. Annual Promotion Rate of Party Secretaries, 1999-2008

Source: Author's Calculations

James Kung and Ting CHEN (HKUST)  Land Revenue Windfalls & Career Incentives  Nov 8th, 2013  56 / 56