Regional Specialization, Tax, and Profit: Evidence from China’s Industries

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Introduction

- After reform, local governments have control over revenue, which creates an incentive to protect the local industries from interregional competitions and create barriers to trade. More protection, less specialization.
- Protectionism in China is increasing: Yong (2000) provides evidence on the rise of local protectionism in China during the reform era especially in 1980s.

Hypothesis and Literature

- Hypothesis 1: High tax or high profit attracts protectionism, leads to low specialization.
  - Bai et al. (2004): Less specialization is found in industries where the tax-plus-profit margins are high, reflecting stronger local protection for these industries.
  - Hypothesis 2: High immobility, high productivity, and stable employment attracts protectionism and low specialization.
    - Krugman (1991): In an industry where there is significant fixed cost of production, a firm would enjoy a lower average cost by increasing the volume of production, to remain competitive.
    - Krugman and Obstfeld (2000): The cluster of an industry attracts specialized suppliers, which allows labor-market pooling and knowledge spillover.
  - Bai et al. (2000): Local industries offer stable employment opportunities for the local people, and it is crucial for social stability in economic transition.

Original Data

- Each original observation is at industry-province-year level. 31 provinces, 774 4-digit industries, 1999-2006, total of 270,499 observations.
- Information includes: year, industry code, district, (province), output, sales revenue, profit, number of employees, number of firms, tax, and fixed assets.

Constructed GINI Coefficients

- GINI Coefficients (measurements for specialization).
- GINI=α/(α+B)+2A, range from 0 to 1.
- Higher value, more specialization, less protection, Lorenz curve more concave. Lorenz curve represents the cumulative distribution function of output.

Tax Structure in China

- 19 different taxes in China, and we only consider 4 major business taxes.
- Value Added Tax: Biggest source of tax; 75% central government, 25% local government. For general taxpayer: 17% for repair and maintenance services; 13% for other production. For small-scale taxpayer: 4-6%.
- Consumption Tax: 14 tax items (tobacco, alcohol, cosmetics, jewelry, etc.) 100% central government. Tax on quantity or sales revenue. Cigarettes: ¥150/Std case of 250 cartons, or 30-45%; Alcohol: ¥1,000/ton, or 15-25%.
- Business Tax: 7 tax items, 100% central government. 20% entertainment, 8% finance, insurance; 5% service; 3% transportation, construction, etc.
- Enterprise Income Tax: 100% central government. Tax on the net profit. 25% for regular business, 20% for small business, 15% for hi-tech industries.

Basic Model

The basic regional specialization equation is:

\[
\text{GINI} = \beta_1 \text{taxrate} + \beta_2 \text{profitrate} + \beta_3 \text{logSize} + \beta_4 \text{logEmployees} + \beta_5 \text{logFA} + \beta_6 \text{Coastal} + \beta_7 \text{Year} + \text{Yeardummies} + \epsilon
\]

- Use both Static Model and Dynamic Panel Data (GMM, Generalized Methods of Moments).
- The districts (provinces) are separated into either inland or coastal region based on their geographic locations, and we assign value as 1 for coastal area.
- At the regional level (inland or coastal), we have 8,397 observations, and each observation represents the information at industry-region-year level.
- Potential Issue: Endogeneity of profit (reverse causality).

Solution: use lagged value to serve as IV (instrumental variable).

Table 2 Summary Statistics

<table>
<thead>
<tr>
<th>Definition</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GINI</td>
<td>0.398</td>
<td>0.405</td>
<td>0.1532</td>
<td>0.9143</td>
</tr>
<tr>
<td>Independent Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total tax revenue/Sales revenue of output</td>
<td>0.0156</td>
<td>0.2273</td>
<td>0</td>
<td>0.4327</td>
</tr>
<tr>
<td>Profit rate</td>
<td>0.0283</td>
<td>0.0704</td>
<td>-2.7668</td>
<td>0.8899</td>
</tr>
<tr>
<td>LogSize</td>
<td>8.5394</td>
<td>3.7363</td>
<td>0</td>
<td>15.1749</td>
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<tr>
<td>LogFA</td>
<td>10.2981</td>
<td>6.3081</td>
<td>0</td>
<td>20.3726</td>
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<tr>
<td>LogEmployees</td>
<td>0.0312</td>
<td>0.7711</td>
<td>0</td>
<td>14.9868</td>
</tr>
<tr>
<td>Coastal Dummy variable, equals to 1 for coastal area</td>
<td>0.4997</td>
<td>0.5000</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3 Regression Results of Static Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>obs</th>
<th>p-value</th>
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<td>Mean R-squared</td>
<td>0.398</td>
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Table 4 Results of GMM

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GMM Model Results

- AR(2)>0 shows that there is no evidence of second-order serial correlation, and 1 lagged value as IV is good enough to generate the unbiased estimates.
- Previous period specialization has a significant positive effect on current period, and the adjustment depends on historical pattern. It is consistent with Bai et al. (2004) in the case of specialization in China.
- The coefficients of tax and profit rates are significant in both negative and long run. It is consistent with our Hypothesis 1: High tax or high profit attracts protectionism, leads to low specialization.
- Coastal area has lower specialization, consistent with the Fig 2 time trend pattern.

Conclusion

- GMM is the preferred model here to deal with the endogeneity issue.
- High tax or high profit gives the government strong incentives to protect industries from competitions, resulting in less specialization.
- Coastal benefits more from specialization, and is more diversified than inland. Central government should accelerate the openness of inland.

Table 5 Short-run & Long-run effect

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Fig 1. Time Trend of Cross-industry Average National GINI

Fig 2. Time Trend of Average Regional GINI