Barriers to Entry and Regional Economic Growth in China

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Motivation

• Since the onset of economic reform in the late 1970s, China has gone from one of the poorest to a middle-income economy

• Expansion of non-state sector was main source of growth (Zhu, 2012)

• But growth was highly uneven across localities (≈ 350 prefectures)

• We show that
  - By mid-1990s, there were **sizable local differences** in productivity, wages, & size of non-state manufacturing sector
    - dispersion reflected divergence before 1995
  - Reversal of fortune from mid-1990s: differences across localities in non-state manufacturing performance started disappearing
    - **strong convergence across prefectures** in non-state value added per worker, TFP, wages, and capital per worker
Overview

- Aim of paper: understand forces behind initial dispersion and 1995-2008 convergence

- Brandt et al. (2012) argue: creation and selection of new firms is most important source of non-state sector productivity and output growth

- We find: this process is very different across prefectures:

  ... in prefectures with a large presence of state firms,

  - less entry of non-state firms
  - non-state entrants pay lower wages, have lower TFP, lower value added per worker, lower capital per worker
Overview

- Build closed economy version of Hopenhayn (1992) model with 3 distortions to account for empirical patterns:
  - capital and output wedges,
  - an entry wedge
- Interpretation of entry wedge: restriction on number of licences allowing potential entrants to operate.
- Solve model analytically
- Develop a political economy model to rationalize local government behavior
Findings: Entry Wedge Is Quantitatively Most Important

- Entry wedge:
  - main driver of initial 1995 dispersion
  - main driver of 1995-2008 convergence

  - indices match well with our 2008 entry wedge estimates

- Study the empirical factors behind measured entry wedges:
  - 1995 level systematically linked to size of SOE sector
  - convergence after 1995 tied to downsizing of state sector
Static Hopenhayn Model

\[ y_i = z_i^{1-\eta} k_i^{(1-\alpha_j)\eta} n_i^{\alpha_j\eta} \]

- firms in each industry have common production function
- \( j = J(i) \) denotes industry for firm \( i \)
- \( 0 < \eta < 1 \): decreasing returns to scale
- common rental rate of capital \((r + \delta)\)
- closed labor market: prefecture-specific wage rate \( w \)
- distortions: output tax \( \tau^y \) and capital tax \( \tau^k \)
- Benchmark: focus on prefecture-specific wedges.
  - Extension: allow within-prefecture firm heterogeneity
Entrepreneur’s Problem, Entry Wedges

• Large (but finite) number $M$ of potential entrepreneurs in each prefecture

• Potential entrepreneurs observe individual TFP $z$

• $z$ is Pareto distributed $f(z) = z^{\xi} z^{-\xi - 1}$ (with $z^\xi \geq z$)

• Entrepreneur incurs fixed cost $\nu$ if firm is operated

• Entry wedge: only a share $(1 - \psi)$ of potential entrants allowed to enter
  - random selection/lottery
Entry Decision and Clearing of Labor Market

- Only entrepreneurs with $z \geq z^*$ will operate, where
  \[ z^*(\tau^Y, \tau^k; w) = \frac{\nu}{(1 - \tau^Y)(1 - \eta) \cdot \bar{y}} \]

- Equilibrium wage $w$ clears the (local) labor market
Equilibrium Mechanism

- Suppose \((1 - \psi)\) is small

- Low \((1 - \psi)\) implies that few firms enter

- Low entry implies low wages required to clear the labor market (since little competition for workers)

- Low wages implies low \(z^*\) (since labor is cheap)

- Low \(z^*\) implies negative selection
  ... hence low TFP and low \(Y/N\)
Effects of Wedges on Allocations

<table>
<thead>
<tr>
<th></th>
<th>((1 - \tau_y))</th>
<th>((1 + \tau_k))</th>
<th>((1 - \psi))</th>
<th>(N/M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>wage rate (w)</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Solow residual (Z)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Entry (\Gamma)</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>(\frac{Y}{N})</td>
<td>+</td>
<td>-</td>
<td>+</td>
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Chinese Industrial Census

- Chinese Industrial Census (CIC)
- Large: covers most of the manufacturing sector
- Rich: firm-level observations on value added, employment, capital stock, wage bill, year of birth, ownership, sector

Data work (issues)
- make prefectures consistent across years
- define the SOE sector (especially in 2004 and 2008)
- construct measures of real capital
Calibration

- Labor share for each industry $\alpha \eta$: Hsieh and Klenow (2009)
- Decreasing returns: $\eta = 0.85$ (Restuccia and Rogerson 2008)
- $\xi = 1.05$, Pareto parameter, use 30% of the most productive firms

$$E(z|z \geq z^*) = \frac{\xi}{\xi - 1}$$

- Set $\nu$ such that $n^*(z^*) = 1$ in the lowest $s$ prefectures
- Set $z$ such that $\psi = 0$ in the lowest $s$ prefectures
- From 1995, 204, 2008 Chinese Industrial Census
  - value added: $y_i$
  - wage bill: $w_i n_i$
  - estimated real capital: $k_i$
Entry Wedge \( (1 - \psi_p) \)

- Estimate \( \psi_p \) in prefecture \( p \) from the equilibrium condition

\[
\ln(1 - \psi_p) = \ln \left( \frac{N_p}{M_p} \right) + \frac{1 - \eta + \xi \alpha \eta}{1 - \eta} \ln w_p \\
- \frac{\xi}{1 - \eta} \ln \Delta_p^y \\
+ \frac{\xi \eta (1 - \alpha)}{1 - \eta} \ln \Delta_k^p \\
+ (\xi - 1) \ln \nu + \Omega(\alpha, \eta, \xi, \zeta)
\]
Estimated NSOE Entry Wedge \((1 - \psi_p)\) in 1995

- Log gross entry wedge \(\ln(1 - \hat{\psi}_p)\)
- SOE share accounts for 52% of the variation in the entry wedge
Estimated NSOE Entry Wedge \((1 - \psi_p)\)
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<tbody>
<tr>
<td>all</td>
<td>0.044</td>
<td>0.079</td>
<td>0.083</td>
<td>0.011</td>
</tr>
<tr>
<td>$\alpha \eta$</td>
<td>-0.004</td>
<td>-0.005</td>
<td>0.025</td>
<td>0.018</td>
</tr>
<tr>
<td>$\frac{N}{M}$</td>
<td>-0.002</td>
<td>-0.001</td>
<td>0.003</td>
<td>-0.007</td>
</tr>
<tr>
<td>$(1 + \tau^k)$</td>
<td>-0.005</td>
<td>-0.001</td>
<td>0.015</td>
<td>0.031</td>
</tr>
<tr>
<td>$(1 - \tau^y)$</td>
<td>0.011</td>
<td>0.028</td>
<td>-0.011</td>
<td>-0.078</td>
</tr>
<tr>
<td>$(1 - \psi)$</td>
<td>0.044</td>
<td>0.054</td>
<td>0.032</td>
<td>0.056</td>
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Entry Wedge and SOE Share, 1995-2004
Time-Series IV for Change in SOE Share, $\Delta e^\text{soe}_p$

- **Bartik** instrument for 1995-2004 SOE empl. change
  
  : 1998 SOE reform “Grab the Large, Release the Small”

- Aggregate 1995-2004 SOE empl. change in industry $j$
  
  : $\mu^\text{soe}_j = \frac{E^\text{soe}_{j,2004}}{E^\text{soe}_{j,1995}} - 1$

  
  : $e^\text{soe}_{p,j} = \frac{E^\text{soe}_{p,j}}{E_p}$

- Predicted increase in SOE employment (Bartik instrument)
  
  : $IV^\text{ind}_p = \sum_j e^\text{soe}_{p,j} \ast \mu^\text{soe}_j$
Change in the Entry Wedge, 1995-2004

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>OLS</th>
<th>IV_{Bartik}</th>
<th>IV_{Bartik}</th>
</tr>
</thead>
<tbody>
<tr>
<td>\Delta \ln(1 - \psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\Delta S</td>
<td>-2.06*</td>
<td>-1.82</td>
<td>-8.99**</td>
<td>-10.28***</td>
</tr>
<tr>
<td></td>
<td>(1.16)</td>
<td>(1.16)</td>
<td>(2.63)</td>
<td>(2.91)</td>
</tr>
<tr>
<td>\Delta \ln FREV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.24***</td>
<td>0.76*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.46)</td>
<td></td>
<td></td>
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First stage:

<table>
<thead>
<tr>
<th>IV coefficient</th>
<th>OLS</th>
<th>OLS</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>0.62***</td>
<td>0.65***</td>
</tr>
<tr>
<td>st. error</td>
<td>(0.07)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.22</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Note: *** – statistically significant at 1%; ** – at 5%; * – at 10%.
Conclusion

- Study growth patterns of non-state sector across localities in China
- Build Hopenhayn model of new firm entry with multiple distortions
- Identify novel entry wedge as key to explaining heterogeneity in new firm behavior across prefectures
  - Provide out-of-sample validation for these wedges
  - Link size and changes of entry costs to dynamics of state-sector
- Future directions
  - Allow wedges to differ by industry and location
  - Extend through Great Recession to capture possible reversal
  - Study role of wedges for impeding structural transformation
Thank You!