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WTO Accession, Foreign Bank Entry, and the Productivity of Chinese Manufacturing Firms

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Disclaimer

This paper is preliminary and incomplete.

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Introduction

- Chinese banking sector has traditionally been dominated by the "Big 4" state-owned commercial banks:
  1. Bank of China.
  2. Agriculture Bank of China.
  3. Construction Bank of China.
  4. Industrial and Commercial Bank of China.
- These banks in general have worse performance in terms of profitability, efficiency, and asset qualtiy **(Lin and Zhang, 2009 *J of Banking & Fin*)**.

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- After China's accession to WTO in December 2001, foreign banks can enter the Chinese market in different phases.
  - Start in the end of 2001.
  - By end of 2006, all restrictions on foreign banks are removed.
- Foreign banks, being more efficient, bring in more competition in the banking sector **(Xu, 2011 *J of Banking & Fin*)**.

- During the same period, Chinese economy has been growing rapidly.
  - GDP growth rate in 2001: $\sim 8\%$.
  - GDP growth rate in 2007: $> 14\%$.
- Does foreign bank entry play any role in China's growth?

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Related literature

- Relation between banking market structure and firm/industry growth is non-trivial.
- **Banking competition** can have opposite effects on growth of the real sector.
  - Theory: E.g., **Pagano (1993 *European Econ Review*)**, **Petersen and Rajan (1995 *QJE*)**.
  - Evidence: E.g., **Cetorelli and Gambera (2001 *J of Fin*)**, **Claessens and Laeven (2005 *J of EEA*)**.

- Many of the empirical studies are cross-country but few are within-country.
- In the case of China, **Lin (2011 *J of Banking & Fin*)** examines relation between foreign bank entry and performance of *listed* firms.
- But none studies the impact on all manufacturing firms in China.

- Other relevant factors:
  - Allocation efficiency and effects of firm entry/exit **(Hsieh and Klenow, 2009 *QJE*; Brandt, Van Biesebroeck, and Zhang, 2012 *J of Dev Econ*)**.
  - Industry's **external dependence (Rajan and Zingales, 1998 *AER*)**: how much external liquidity is needed to finance investment projects.

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Main research questions

1. Does foreign bank entry after China's WTO accession affect the productivity growth of the domestic manufacturing firms?

2. What are the relative contributions of technical efficiency, allocation efficiency, and firm net entry to the changes in productivity growth?

3. Do industries with different reliance on external finance benefit (or suffer) differently from foreign bank entry?

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Preview of (preliminary) results

1. Foreign bank entry does not seem to affect aggregate productivity growth.
2. It also does not seem to affect growth components.
3. But externally dependent industries seem to grow faster with foreign bank entry.

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Main data

- Main data set: Firm-level manufacturing data from Chinese National Bureau of Statistics.
- Sample period: 1998-2007.
- Census of all manufacturing firms with sales $\geq$ 5M RMB.
- Number of firm observations: ranging from $\sim$160,000 (in 1998) to $\sim$330,000 (in 2007).
- Advantages of this data set:
  - Allows us to estimate firm/industry productivity more accurately.
  - Allows us to analyze the productivity dynamics of these firms/industries.

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Productivity estimates

- We use the method proposed by **Ackerberg, Caves, and Frazer (2006 Working Paper)** to estimate firm-level productivity.
- We then use these estimates to compute aggregate productivity growth and its components **(Petrin and Levinsohn 2011 Working Paper)**.

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Aggregate productivity growth

- Change in the aggregate final demand minus the change in aggregate expenditure on labor and capital for *surviving* firms:

$$APG^{S}_{rjt} = \sum_{i} \overline{D}_{irjt} \Delta \log VA_{irjt} - \sum_{i} \overline{D}_{irjt} \bar{s}_{irjt} \Delta \log L_{irjt} - \sum_{i} \overline{D}_{irjt} (1 - \bar{s}_{irjt}) \Delta \log K_{irjt}, \quad (1)$$

where

- i is the index for the firms in industry j and region r which survive from year $t-1$ to year t.
- $\Delta \log VA_{irjt}$, $\Delta \log L_{irjt}$, and $\Delta \log K_{irjt}$ are the changes in (log) value-added, labor, and capital.
- $\overline{D}_{irjt}$ ($\bar{s}_{irjt}$) is the average value-added (labor income) share of firm i in industry j and region r between years $t-1$ and t.

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Decomposition

- We decompose aggregate productivity growth (APG^S_{rjt}) into technical efficiency (TE^S_{rjt}) and allocation efficiency (AE^S_{rjt}):

$$APG^S_{rjt} = TE^S_{rjt} + AE^S_{rjt}. \tag{2}$$

- Technical efficiency: Contribution of more productive firms, holding inputs fixed, to the aggregate productivity growth.
- Allocation efficiency: Output changes arising from the resource movements from firms with different marginal revenues.

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Entry effect

- We also examine the effect of net entry on productivity.
- We compute a similar measure of aggregate productivity growth for *all* firms in industry j in region r between years $t-1$ and t as:

$$APG^{A}_{rjt} = \Delta \log VA_{rjt} - \bar{s}_{rjt} \Delta \log L_{rjt} - (1 - \bar{s}_{rjt}) \Delta \log K_{rjt}. \quad (3)$$

- The net entry effect is defined as:

$$EF_{rjt} = APG^{A}_{rjt} - APG^{S}_{rjt}. \quad (4)$$

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Foreign bank entry

- According to the WTO Accession Protocol documents, geographical restrictions for foreign banks are phased out as follows:
  1. End of 2001: Shanghai, Shenzhen, Tianjin, and Dalian.
  2. End of 2002: Guangzhou, Zhuhai, Qingdao, Nanjing, and Wuhan.
  3. End of 2003: Jinan, Fuzhou, Chengdu, and Chongqing.
  4. End of 2004: Kunming, Beijing, and Xiamen.
  5. End of 2005: Shantou, Ningbo, Shenyang, and Xi'an.
  6. End of 2006: All geographic restrictions will be removed.
- We define a foreign bank dummy $FB = 1$ if region r is open to foreign banks in year t.

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External dependence

- We follow **Rajan and Zingales (1998 *AER*)** and define the external dependence of an industry as:

$$ED = \frac{\text{Capital Expenditure} - \text{Cash Flow from Operations}}{\text{Capital Expenditure}}.$$

- It measures the fraction of capital investment that cannot be financed by internal cash of the firm.
- We use U.S. data (from Compustat) between 1990-1997 to construct the ratio as a benchmark for the corresponding industries in China.

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Empirical specifications

- Main models:

$$y_{rjt} = \alpha_r + \alpha_t + \beta FB_{rt} + \varepsilon_{rjt}, \tag{5}$$

$$y_{rjt} = \alpha_r + \alpha_t + \beta_1 FB_{rt} + \beta_2 ED_j + \beta_3 (FB_{rt} \times ED_j) + \varepsilon_{rjt}, \tag{6}$$

  where r, j, and t are indexes for region, industry, and year respectively.
- In (5), we use the (exogenous) regional-time variation of foreign bank de-regulation following WTO accession for identification.
- In (6), we also use the (exogenous) variation in industry differences of external dependence for identification.

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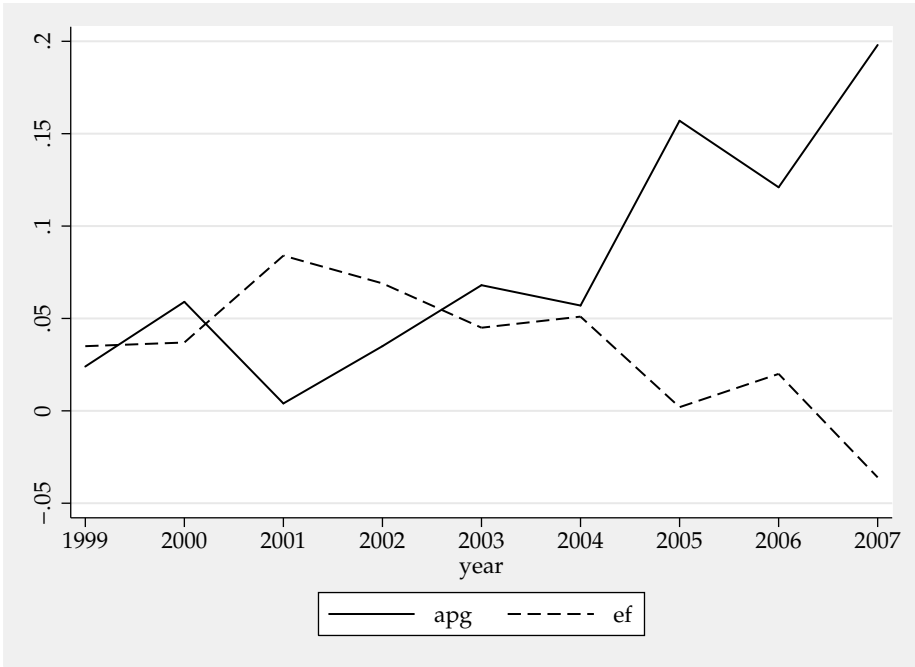
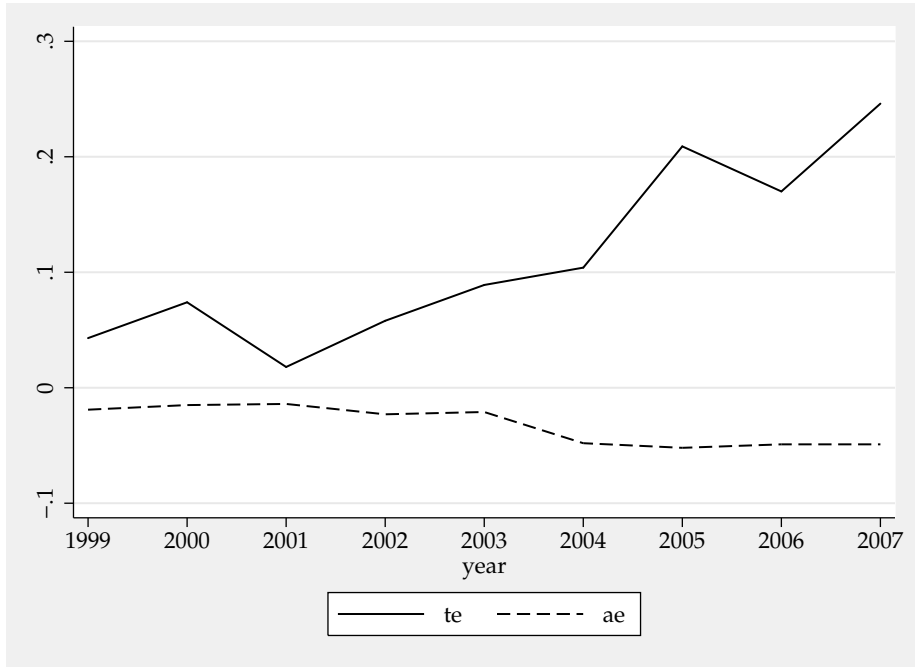
Time trends



(a) APG and EF



(b) TE and AE

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Summary statistics

Variable	Description	Mean	S.D.	Min.	Max.
APG	Aggregate productivity growth	0.086	0.546	−2.033	2.228
EF	Net entry effect	0.031	0.686	−3.994	3.930
TE	Techical efficency	0.120	0.532	−1.806	2.122
AE	Allocation efficiency	−0.033	0.253	−3.268	3.372
FB	Foreign bank entry dummy	0.178	0.382	0.000	1.000
ED	External dependence	0.152	1.130	−1.935	5.191

Number of region-industry-year observations = 117, 548

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Preliminary regression results (1)

Model: $y_{rjt} = \alpha_r + \alpha_t + \beta FB_{rt} + \varepsilon_{rjt}$.

	(1)	(2)	(3)	(4)
Dep. Var.:	*APG*	*EF*	*TE*	*AE*
Constant	0.026***	0.037***	0.047***	−0.020***
	(5.080)	(5.568)	(9.316)	(−8.586)
FB	−0.004	−0.009	−0.000	−0.004
	(−0.452)	(−0.846)	(−0.032)	(−0.742)
Region FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	117548	117548	117548	117548
Adjusted R^2	0.019	0.004	0.028	0.008

S.E. clustered at region-industry level; $t-$stat in parentheses; *, **, ***: significance at 10%, 5%, 1% levels.

Results:

- Foreign bank entry does not seem to affect APG and its components.

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Preliminary regression results (2)

Model: $y_{rjt} = \alpha_r + \alpha_t + \beta_1 FB_{rt} + \beta_2 ED_j + \beta_3 (FB_{rt} \times ED_j) + \varepsilon_{rjt}$.

	(1)	(2)	(3)	(4)
Dep. Var.:	*APG*	*EF*	*TE*	*AE*
Constant	0.027***	0.037***	0.047***	−0.020***
	(5.257)	(5.628)	(9.481)	(−8.537)
FB	−0.006	−0.009	−0.001	−0.004
	(−0.671)	(−0.827)	(−0.171)	(−0.881)
ED	−0.007***	−0.003**	−0.006***	−0.001
	(−5.272)	(−2.132)	(−4.915)	(−1.341)
FB × *ED*	0.011***	−0.001	0.007**	0.004***
	(3.113)	(−0.306)	(2.019)	(2.620)
Region FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	117548	117548	117548	117548
Adjusted R^2	0.019	0.004	0.028	0.008

S.E. clustered at region-industry level; $t-$stat in parentheses; *, **, ***: significance at 10%, 5%, 1% levels.

Results:

- Externally dependent industries grow faster with foreign bank entry.

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Summary and next steps

- We use micro-level manufacturing data to examine the relation between foreign bank entry and productivity of Chinese manufacturing firms after China's WTO accession.
- We find that foreign bank entry has no effect on aggregate productivity growth, and that externally dependent industries grow faster.
- What are the underlying channels through which foreign bank entry affect growth in the case of China?

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Thank you!