

# FDI and Firm Productivity: The Role of Financial Constraints

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May 12, 2014  
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- The above two factors may not work in the same direction.

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- FDI firms can have lower productivity than local firms.
  - Show this in a simple theoretical model.
  - Find empirical evidence in the firm-level data of China.

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  - High-productivity firms are financed by local banks for start-up costs.
- FDI finances firms with middle-range productivity.

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- Consistent with China's capital account liberalization

# Policy implications and related literature

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    - Market stealing effect: Aitken and Harrison (1999)
    - Negative effect on local firm's credit constraint: Harrison and McMillan (2003)



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  - Efficient local financial markets  $\Rightarrow$  local firms less financial constrained
  - FDI more likely driven by high productivity
- Economies with better financial institutions benefit more from FDI for economic growth.
  - Alfaro et al. (2004)
  - Better local financial institutions finance technology spillovers more efficiently.

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  - FDI may be an indicator of inefficient local financial markets
  - Improving local financial markets can decrease FDI inflows.
  - No policy is needed to maintain FDI inflows in this case.
    - Subsidize low-productivity firms at the cost of high-productivity firms.

# Data



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- Income statement: total sales, production, exports, income, costs, etc.

# Productivity

- Follow Akerberg, Caves and Frazer (2006)
  - Assumption: Productivity affects firms' decision on labor and capital
  - Advantage: No collinearity problem as in Olley and Parkes (1996) and Levinshon and Petrin (2003)

- $y_{it} = \alpha_l l_{it} + \alpha_k k_{it} + \alpha_{it} + \epsilon_{it}$

- Estimation result:  $\alpha_{it} \Rightarrow \hat{\alpha}_{it}$

- $\hat{\alpha}_{it} = \frac{\hat{\alpha}_{it} - \bar{\alpha}_t}{s_t}$

- $\bar{\alpha}_t$ : Industry mean

- $s_t$ : Industry standard deviation

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  - Measuring financial constraints at the firm level: endogeneity
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  - Five variables calculated from publicly traded US firms (Manova, et al. (2013))

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  - Trade credit intensity:  $\text{account payable} / \text{total assets}$
  - Asset tangibility:  $\text{tangible assets} / \text{total assets}$

# Financial vulnerability: statistics

Variable	25th percentile	75th percentile
External finance dependence	-0.27	0.06
Inventory ratio	0.13	0.18
R&D ratio	0.01	0.02
Tangibility	0.20	0.40
Trade credit	0.05	0.08
First principal component (FPC)	-0.79	0.79

- Obtained from Kroszner et al. (2007) and Fisman and Love (2003)
- First principal component (FPC)
  - Orthogonal transformation: 5 measures  $\rightarrow$  5 linearly uncorrelated principal components
  - FPC accounts for the largest portion of variance.

# Empirical Results

## Result 1: firm productivity and FDI shares

# FDI firms more productivity?

For every year:

$$Productivity_{ijp} = \alpha + \beta_1 FDI_{ijp} + \beta_2 Firmcontrol_i + \beta_3 Inddummy_j + \beta_4 Locadummy_p + \epsilon_{ijp}$$

- $FDI_{ijp}$ : FDI share
- $Firmcontrol_i$ : log(employment), log(age+1), export/output
- $Inddummy_j$ : 2-digit industry dummies
- $Locadummy_p$ : Province dummies, economic zone dummies

# Result for 2000

	Coefficient	std. err.	t-value	95% Conf. Interval	
FDI share	0.168	0.0121	13.86	0.14	0.19
Employment	-0.054	0.0027	-20.34	-0.06	-0.05
Age	-0.185	0.0038	-48.84	-0.19	-0.18
Export ratio	0.001	0.0001	8.28	0.00	0.00
Economic zone	0.033	0.0094	3.52	0.01	0.05
R-squared	0.12	# of Observations		89,905	

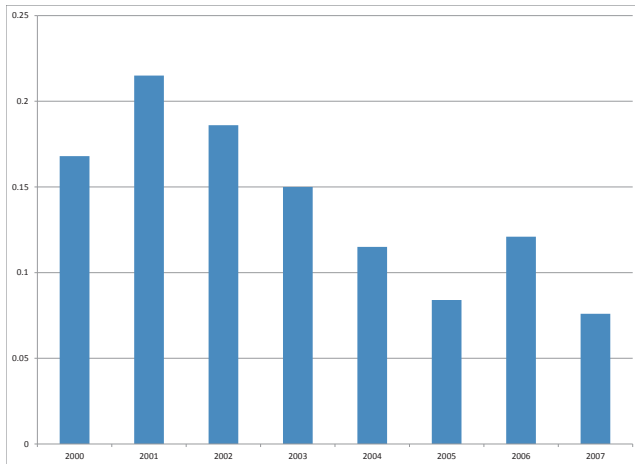


# Fixed-Effects Regressions: 2000-2007

	Coefficient	std. err.	t-value	95% Conf. Interval	
FDI share	0.0218	0.0071	3.06	0.0078	0.0358
Employment	-0.1030	0.0020	-52.79	-0.1068	-0.0992
Age	0.0990	0.0025	39.21	0.0941	0.1040
Export ratio	0.0000	0.0001	-0.20	-0.0001	0.0001
# of Observations	912,343		# of Groups	313,150	



# Diminishing elasticity of productivity w.r.t. FDI shares



# Test: FDI's productivity advantage diminished?

- Seemingly Uncorrelated Regression
- Cross-model comparison
  - $H_0 : \quad t^{+1} = \quad t$
  - $H_1 : \quad t^{+1} \neq \quad t$
- A Wald Test

# Productivity Elasticity of FDI Share Over Time

Year	Elasticity	t-value	Cross-year Comparision	<sup>2</sup> Statistic
2001	0.215	19.66	2002 vs. 2001	9.15
2002	0.186	17.57	2003 vs. 2002	3.85
2003	0.150	15.34	2004 vs. 2003	6.58
2004	0.115	13.84	2005 vs. 2004	7.78
2005	0.084	10.29	2006 vs. 2005	7.33
2006	0.121	15.80	2007 vs. 2006	11.37
2007	0.076	10.55	2001 vs. 2007	18.73

# TFP of new entrants decreases with the FDI share

	New Entrants (Age=0)			Incumbents (Age >0)		
Year	Coefficient	std. err.	t-value	Coefficient	std. err.	t-value
2000	-0.274	0.123	-2.220	0.159	0.012	13.040
2001	-0.101	0.072	-1.410	0.203	0.011	18.390
2002	-0.215	0.088	-2.440	0.184	0.011	17.330
2003	-0.129	0.062	-2.080	0.144	0.010	14.630
2004	-0.033	0.040	-0.820	0.111	0.008	13.150
2005	-0.070	0.047	-1.510	0.077	0.008	9.360
2006	-0.003	0.045	-0.070	0.114	0.008	14.740
2007	-0.041	0.044	-0.930	0.069	0.007	9.540



# A possible explanation

- High-productivity FDI firms entered China before 2000.
  - Before 2000: Performance requirements for FDI firms
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  - More sectors are opened to FDI.
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- The shrinking difference in TFP is also caused by the fast catch-up by local firms.

# New entrants and financial vulnerability

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	Less vulnerable			More vulnerable			$\chi^2$
	Coef.	s.e.	No.	Coef.	s.e.	No.	
Ex. Fin.	-0.039	(0.045)	4391	-0.184	(0.044)	4460	5.29
Inv.	0.008	(0.037)	6922	-0.125	(0.031)	7459	7.33
R&D	-0.026	(0.026)	14185	-0.159	(0.045)	4641	6.32
Tang.	-0.091	(0.040)	4575	-0.028	(0.047)	5905	1.03
T. Credit	-0.088	(0.070)	1725	-0.128	(0.042)	5412	0.23
FPC	-0.024	(0.038)	6860	-0.184	(0.040)	4820	8.46

## Result 2: FDI share and financial vulnerability

# FDI shares and financial vulnerability

- FDI firms finance through: Parent firms/international markets
- If no financial friction: FDI share is equalized across sectors
- Financial friction: FDI share should be higher in financially more vulnerable industries

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# Higher FDI Shares in Financially More Vulnerable Sectors

	2000	2007	
	Coefficient	Coefficient	<sup>2</sup>
Ex. Fin.	0.007	0.016	10.08
Inv. ratio	0.017	0.323	68.84
R&D ratio	0.009	0.016	0.30
Tang.	-0.089	-0.216	115.45
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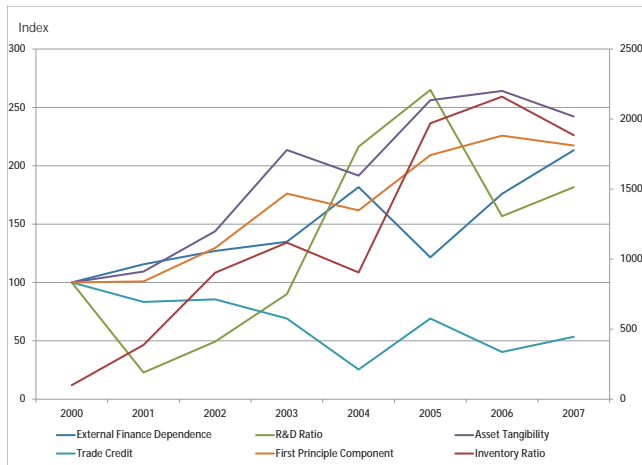
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- Future work

- Loose ends in empirical exercises
- Theoretical model