

Firm Performance and Industrial Policy in China

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Questions Posed in this Research (joint with Luosha Du and Gary Jefferson)

- Are there productivity externalities from foreign investment in China?
- Is average protection in China associated with productivity gains or losses?
- Are tax holidays associated with greater benefits from foreign investment?

Why Focus on China?

- Most popular destination for foreign investment
- Perception that government has been successful in its use of industrial policy
- Excellent data on different measures of selective intervention, including trade intervention and tax incentives

Methodology

$$\ln Y_{ijt} = \alpha + \beta_1 \ln K_{ijt} + \beta_2 \ln L_{ijt} + \beta_3 \ln M_{ijt} + \beta_4 \text{ForeignShHKT}M_{ijt} + \beta_5 \text{ForeignShFR}_{ijt} + \beta_6 \text{StateShare}_{ijt} + \beta_7 \text{Horizontal}_{jt} + \beta_8 \text{Backward}_{jt} + \beta_9 \text{Forward}_{jt} + \alpha_i + \alpha_t + \varepsilon_{ijt} \quad (1).$$

$$\text{Horizontal}_{jt} = \left[\sum_{i \text{ for all } i \in j} \text{ForeignSh}_{it} * Y_{it} \right] / \sum_{i \text{ for all } i \in j} Y_{it}$$

$$\text{Backward}_{jt} = \sum_{k \text{ if } k \neq j} \alpha_{jk} \text{Horizontal}_{kt}$$

$$\text{Forward}_{jt} = \sum_{m \text{ if } m \neq j} \delta_{jm} \left[\sum_{i \text{ for all } i \in m} \text{ForeignSh}_{it} * (Y_{it} - X_{it}) \right] / \left[\sum_{i \text{ for all } i \in m} (Y_{it} - X_{it}) \right]$$

Dataset

- Industrial firms from NBS: annual survey of all enterprises with more than 5 million RMB sales
- 1988-2005
- Information on outputs and inputs, ownership
- Merged with final goods tariffs from WITS
- Calculated input tariffs using IO table
- Calculated sector-level foreign shares at horizontal and vertical levels

Table 3 OLS and Levinsohn-Petrin Regression with Contemporaneous Spillover Variables with Tariff Controls: with vs. without firm-fixed effects (with the sample of all firms)

	Dependent variable: lnY		Dependent variable: TFP	
lnL	0.117*** (0.005)	0.076*** (0.003)	0.085*** (0.002)	0.085*** (0.002)
lnK	0.025*** (0.002)	0.032*** (0.002)	0.013*** (0.001)	0.013*** (0.001)
lnM	0.746*** (0.009)	0.866*** (0.004)	0.966*** (0.005)	0.966*** (0.005)
Foreign Share (by HK-Taiwan-Macau)	0.003 (0.004)	0.011** (0.005)	-0.006 (0.004)	-0.027*** (0.005)
Foreign Share (by other countries)	0.008** (0.004)	0.066*** (0.006)	-0.002 (0.005)	0.006 (0.006)
State Share	-0.019*** (0.004)	-0.065*** (0.005)	-0.007** (0.003)	-0.008 (0.011)
Horizontal	0.051 (0.078)	0.051 (0.080)	0.068 (0.075)	0.090 (0.100)
Backward	0.827*** (0.206)	0.863*** (0.257)	0.791*** (0.198)	0.613** (0.284)
Forward	0.231** (0.085)	0.232*** (0.075)	0.206** (0.085)	0.231*** (0.074)
lnTariff	-0.015 (0.016)	0.008 (0.023)	-0.016 (0.017)	0.019 (0.026)
lnTariff_backward	-0.030* (0.016)	-0.013 (0.030)	-0.037** (0.018)	0.004 (0.035)
lnTariff_input	-0.015** (0.006)	-0.019** (0.009)	-0.015** (0.063)	-0.020** (0.009)
Constant	2.188***	0.917***	0.336***	0.042***
Firm-fixed effect	Yes	No	Yes	No

Summarizing Results from Table 3

- SOEs exhibit lower productivity growth
- Tariffs associated with lower growth due to negative impact of tariffs on inputs on productivity growth
- Large vertical linkages
 - Backward
 - Forward (not found for other countries)
- Why didn't previous studies find backward linkages for China?

Foreign firms put downward pressure on domestic supplier prices

Table A-3 FDI Effect on Price Level

Dependent variable: log of price index		
Horizontal	-0.023 (0.031)	-0.023 (0.020)
Backward	-0.225*** (0.059)	-0.225*** (0.035)
Forward	-0.0001 (0.062)	-0.0001 (0.079)
Robust Standard Error	No	Yes
Year Dummies	Yes	Yes
Industry fixed effect	Yes	Yes
Number of observations	519	519
R-squared	0.353	0.353

Did Activist Industrial Policy help foster these large Vertical linkages from FDI ?

Sutton (2004) describes efforts in India and China to encourage vertical linkages in the car industry as follows:

From the early '90s onwards, a wave of multinational firms entered both markets. In both countries, these entrants were required to achieve a high level of domestic content within a specified period (typically, 70 percent within 3 years). For at least some of the new entrants, this was seen as an unreasonable target, as domestic suppliers could not meet the price and quality requirements of the car makers. Achieving the 70 percent target required the car makers to switch rapidly from a reliance on imported components to sourcing from local vendors; and this in turn gave the car makers a strong incentive to work closely with (first-tier) suppliers, to ensure that quality standards were met, within an acceptable price.

Focus: how institutional characteristics affect spillovers from FDI

- Comparing gains from FDI originating in Hong Kong, Macao and Taiwan versus other regions
- Comparing state-owned enterprises (SOEs) and privately owned enterprises
- Comparing FDI which receives tax benefits versus other FDI

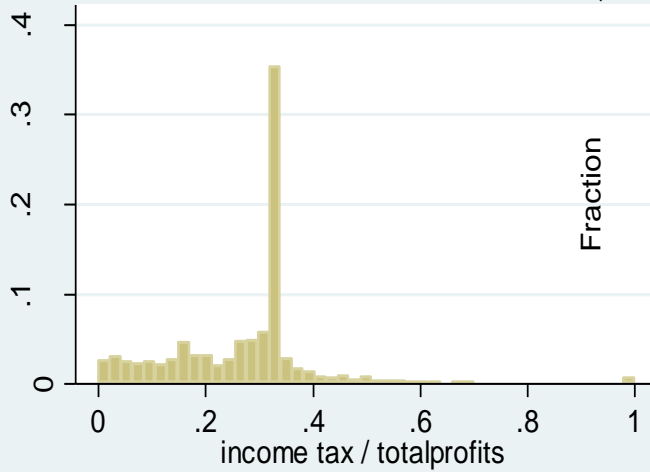
Results

- Origin of foreign investment matters for existence and magnitude of vertical linkages:
 - Positive vertical linkages only for foreign investment originating in Hong Kong, Macao Taiwan (HKMT)
 - Horizontal linkages also differ: negative for HKMT but positive for foreign investment from elsewhere
 - Large vertical linkages from HKMT firms suggests support for Lin's work emphasizing CAF policies
- Magnitude of vertical spillovers larger for SOEs
- Suggests partnerships with foreign firms used to upgrade SOEs

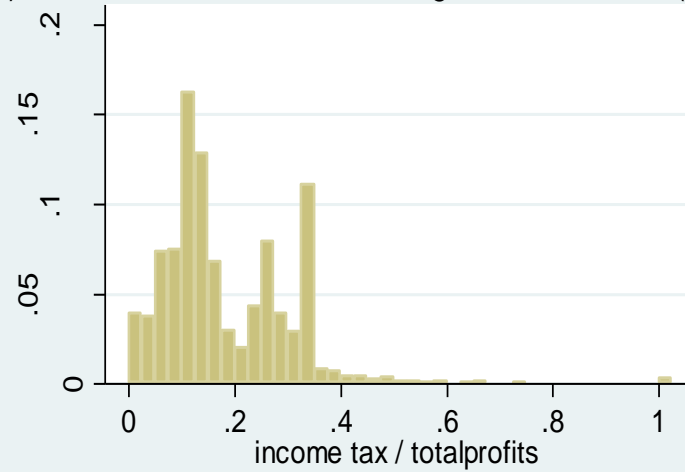
Tax Subsidies and FDI

- More than half of FDI in China during sample period benefiting from tax holidays
- Tax holidays gradually phased out beginning in 2008
- Did FDI targeted for special tax treatment lead to bigger externalities?
 - No bigger effects on productivity BUT
 - Some evidence on higher growth, indicating benefits in the form of more entry

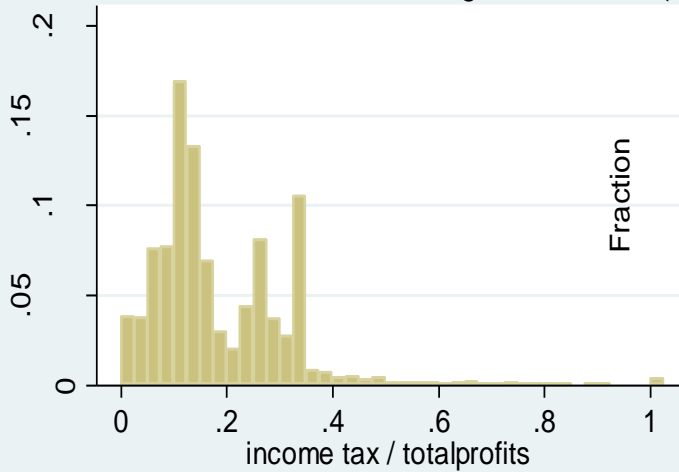
Tax Rate Distribution for Domestic Firms (2000)



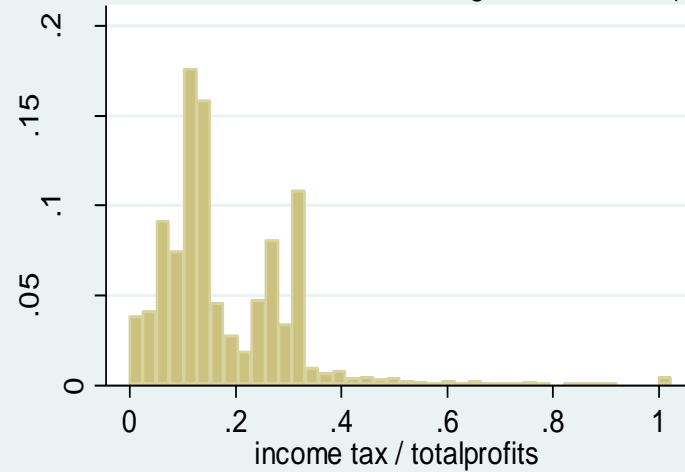
Tax Rate Distribution for Foreign-invested Firms (2000)



Firms with More Than 10% Foreign Investment (2000)



Firms with More Than 25% Foreign Investment (2000)



Subsidized FDI did not exhibit higher productivity increases

Table 8 OLS Results with Contemporaneous Subsidized and non-Subsidized Spillover Variables and Tariff Controls: all firms, foreign-invested and domestic firms with zero foreign investment

	All firms	Foreign-invested firms	Domestic firms (0 foreign share)
lnL	0.116*** (0.005)	0.144*** (0.009)	0.107*** (0.005)
lnK	0.025*** (0.002)	0.033*** (0.003)	0.022*** (0.002)
lnM	0.746*** (0.009)	0.714*** (0.009)	0.755*** (0.010)
Foreign Share (by HK-Taiwan-Macau)	0.003 (0.004)	0.007 (0.006)	
Foreign Share (by other countries)	0.008** (0.004)	0.012** (0.006)	
State Share	-0.019*** (0.004)	-0.005 (0.007)	-0.018*** (0.005)
Hor_subsidized	-0.026 (0.064)	-0.076 (0.063)	-0.003 (0.068)
Bw_subsidized	0.438*** (0.150)	0.430*** (0.136)	0.508*** (0.178)
Fw_subsidized	0.192*** (0.053)	0.198*** (0.050)	0.197*** (0.063)
Hor_non-subsidized	0.291* (0.168)	0.341** (0.159)	0.305 (0.188)
Bw_non-subsidized	2.023*** (0.494)	2.166*** (0.466)	1.934*** (0.588)
Fw_non-subsidized	0.277 (0.197)	0.447*** (0.116)	0.100 (0.262)

BUT subsidized sectors did generate higher growth—
suggesting tax incentives may have facilitated entry

Table A-5 Growth effects of Subsidized and Non-subsidized Spillover Variables

	All firms		Foreign-invested firms		Domestic firms	
	Non-SOEs	SOEs	Non-SOEs	SOEs	Non-SOEs	SOEs
Foreign share (by HK-Taiwan-Macau investors)	0.046*** (0.00690)	0.066 (0.126)	-0.006 (0.0133)	-0.341 (0.261)		
Foreign share (by other countries)	0.054*** (0.009)	0.521*** (0.134)	0.004 (0.013)	-0.086 (0.211)		
State share	0.018* (0.011)	-0.098*** (0.012)	0.010 (0.015)	-0.434*** (0.126)	0.025** (0.012)	-0.094*** (0.012)
Hor_subsidized	-0.035 (0.127)	-0.388 (0.248)	0.0770 (0.132)	-1.411* (0.840)	-0.122 (0.144)	-0.383 (0.246)
Bw_subsidized	0.781** (0.295)	1.776** (0.716)	0.501 (0.322)	8.926* (4.941)	0.949*** (0.303)	1.442* (0.724)
Fw_subsidized	0.237** (0.090)	0.575** (0.229)	0.098 (0.127)	-0.082 (0.597)	0.301*** (0.093)	0.562** (0.236)
Hor_non-subsidized	0.084 (0.265)	0.785 (0.506)	0.649* (0.350)	0.280 (1.687)	-0.094 (0.259)	0.731 (0.512)
Bw_non-subsidized	1.459** (0.601)	2.797 (1.789)	2.041** (0.784)	-8.422** (3.993)	1.015 (0.642)	3.636** (1.663)
Fw_non-subsidized	0.530** (0.208)	0.162 (0.372)	0.696*** (0.176)	-2.000* (1.060)	0.264 (0.274)	0.390 (0.362)

So far, what does research indicate on benefits of IP in China?

- Much larger vertical (both backward and forward) linkages than found elsewhere
- FDI used to help SOEs become more competitive
- BUT tariffs associated with negative impact on productivity on average
- Tax incentives show mixed gains:
 - No higher externalities
 - Higher growth associated with favored sectors (see Lin and Monga (2010) on growth facilitation)

Next Steps

- New research commissioned by DEC will explore how the *pattern* of incentives matter:
 - Justin Lin (2009, 2010)
 - Nunn and Trefler (2006)
 - Lehmann and O'Rourke (2008)
 - Estevadeordal and Taylor (2008)
 - Aghion (2010)
- Case studies will illustrate how institutional and political economy considerations affect outcomes
- Case studies will also focus on successful and unsuccessful approaches (see Lin and Monga (2010))