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# **Trade, Finance and Global Value Chains: The Role of Multinational Companies**

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# No Finance, No Trade

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- ❑ Growing evidence that financial frictions severely impede global trade
  - Limited export entry, export volumes and value-chain position at the firm level
  - Distortions to aggregate trade flows, exceeding those to aggregate output
  - Effects more acute during financial crises
  - Potentially large amplification via global supply chains
  
- ❑ Very active market for the financing and insurance of international transactions, worth \$10-\$12 trillion in 2008 or 90% of world trade
  
- ❑ Credit constraints a major obstacle in developing countries that rely on trade for growth but suffer from weak financial institutions

# Global Value Chains

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- ❑ Increasing fragmentation of production across countries a key trend in international trade over last two decades
  - Rise in trade in intermediate inputs for further processing and assembly relative to trade in final consumer goods
  - 60 mil workers in 3,500 processing zones in 130 mostly developing countries
  
- ❑ Splicing of global production chains raises new policy questions
  - How should trade policy be designed?
  - What are the welfare and distributional consequences of global supply chains and policies that govern them?
  - How are firm growth, technology transfer to emerging economies and transmission of shocks across borders affected?

# Omnipresent and Omnipotent MNCs?

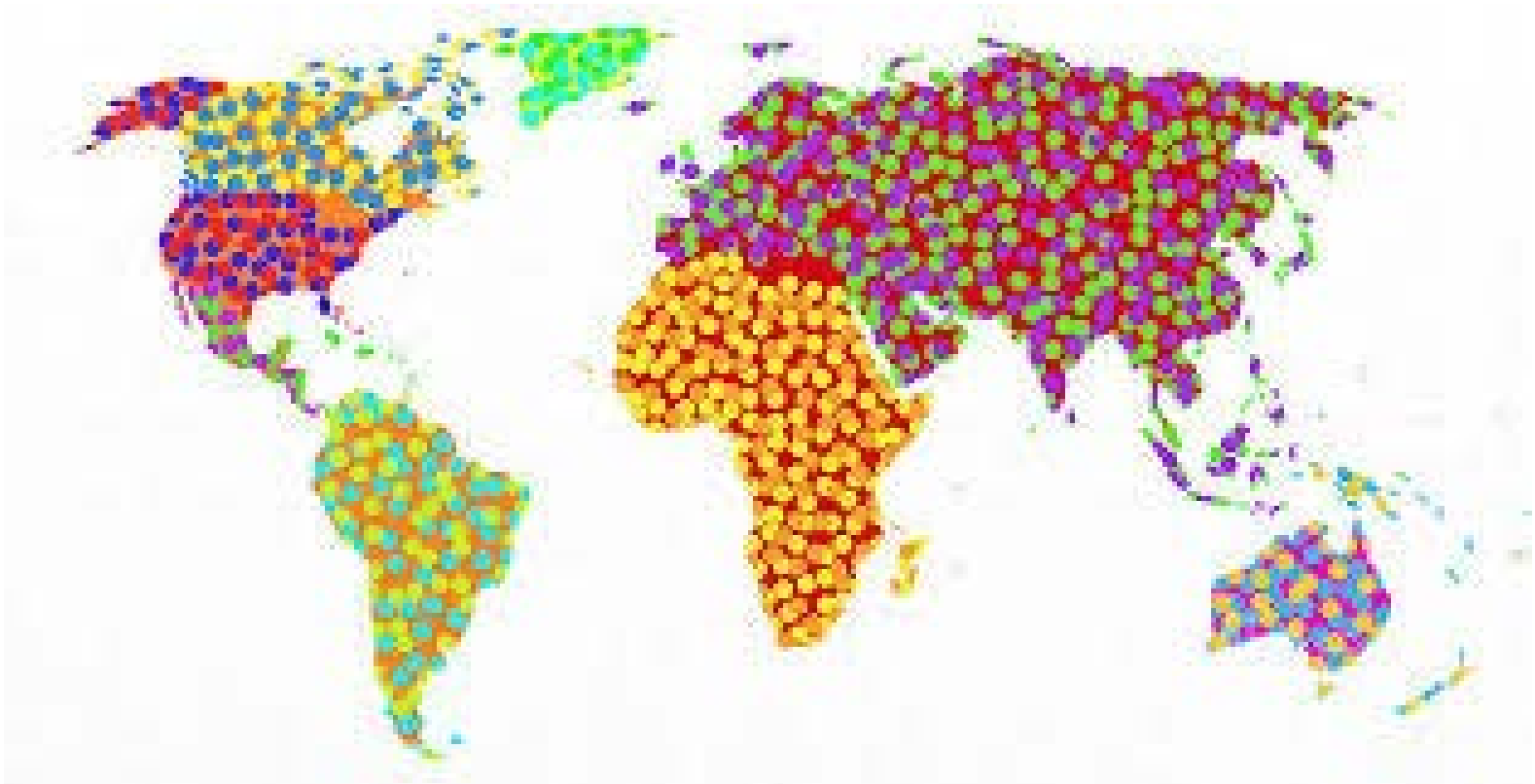
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- Multinational companies of tremendous importance to world economy
  - 1/3 of global trade is conducted intra-firm, between MNC subsidiaries
  - Another 1/3 is between a multinational and an unaffiliated party
  - MNCs widely believed / expected to bring financial resources and technological know-how to developing countries
  
- What role for MNCs given financial frictions and GVCs?
  - MNCs less financially constrained than domestic firms but not unconstrained
  - Do MNCs mitigate the effect of credit constraints on trade?
  - How do financial frictions affect MNCs' operations?

# Pointillism

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insights about the **WORLD** from colorful anecDOTes



# Why Exporters Require External Finance

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- ❑ Firms routinely rely on external capital to cover upfront costs that cannot be financed out of retained earnings or cash flows from operations
  
- ❑ Exporting even more dependent on external finance than manufacturing for the home country
  1. Additional up-front costs specific to export activities
  2. Cross-border shipments take 30-90 days longer to process
  3. International transactions are riskier

# Sources of Finance

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## Domestic firms

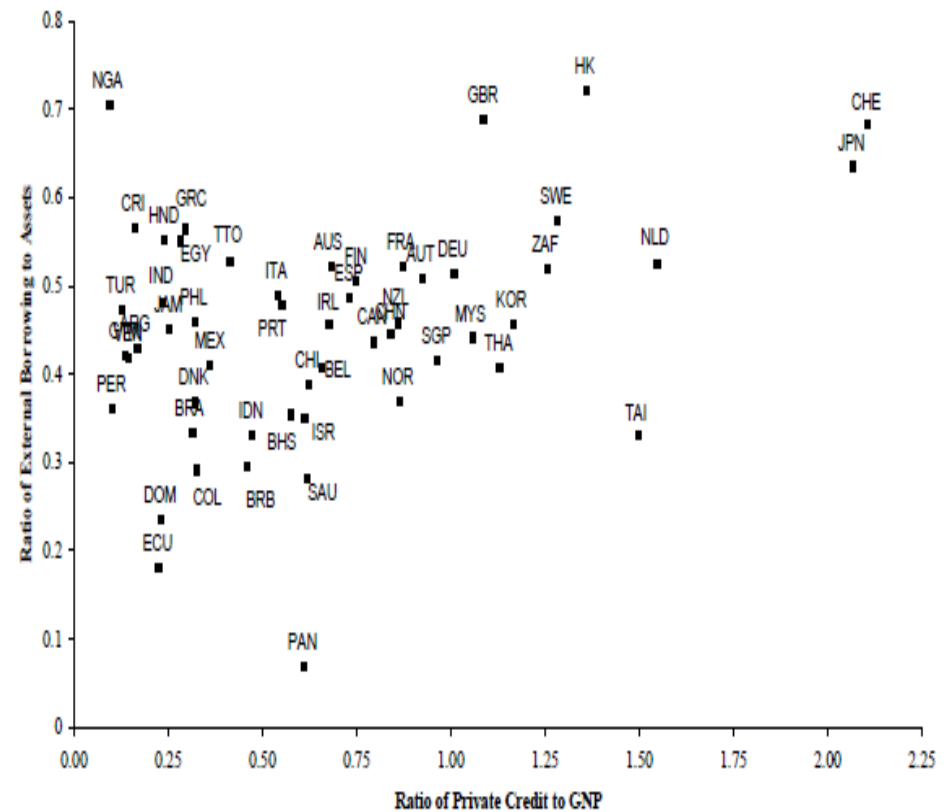
- ❑ Internal
  - Cash flows from operations
  - Retained earnings
  
- ❑ External
  - Domestic capital markets
  - Buyer-supplier trade credit

## Multinational affiliates

- ❑ Internal
  - Cash flows from operations
  - Retained earnings
  - Parent financing
  
- ❑ External
  - Domestic capital markets
  - Buyer-supplier trade credit
  - Foreign capital markets
  - Global supply chains

# MNCs' Financing Practices

- MNC affiliates employ internal capital markets opportunistically to overcome frictions in external capital markets (Desai-Foley-Hines 2004)
- Affiliates use less external finance in host countries with underdeveloped capital markets or weak creditor rights
- Lending from parent compensates  $\frac{3}{4}$  of reduced external debt





# MNCs' Comparative Advantage

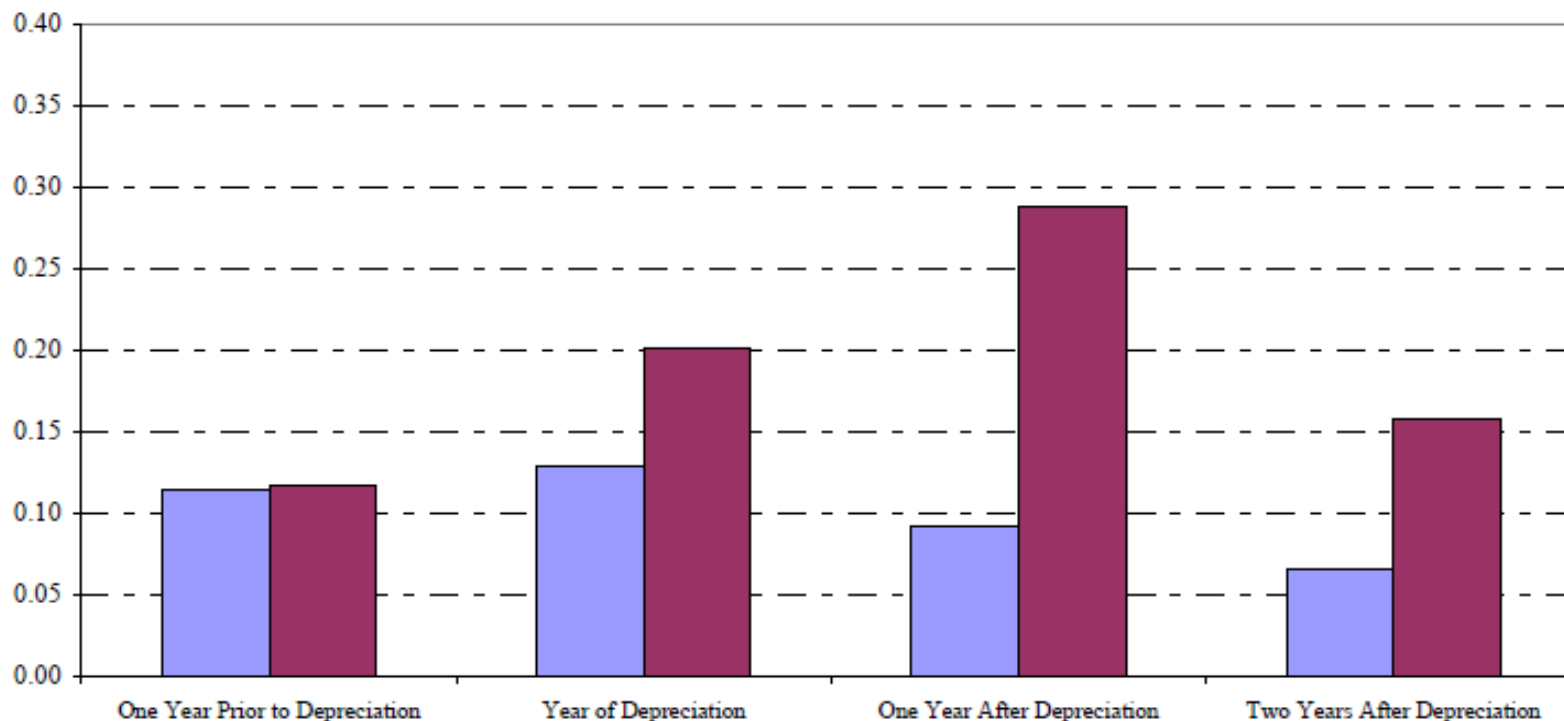
- Foreign affiliates and joint ventures export more than domestic firms, especially in financially vulnerable sectors (Manova-Wei-Zhang 2015)
  - Advantage stronger when firms face higher trade costs or weaker bank sector

Firm Type	All Firms	State-Owned	Private Domestic	Joint Ventures	Foreign-Owned
Total Exports	531.36	9.8%	12.9%	26.3%	51.0%
<b>Panel A. Classifying sectors by external finance dependence</b>					
Low	173.47	14.9%	23.4%	29.4%	32.3%
High	357.89	7.3%	7.8%	24.8%	60.1%
<b>Panel B. Classifying sectors by inventories ratio</b>					
Low	94.01	19.9%	18.8%	32.1%	29.2%
High	437.35	7.6%	11.6%	25.1%	55.7%
<b>Panel C. Classifying sectors by asset tangibility</b>					
Low	423.04	6.2%	9.9%	25.9%	58.0%
High	108.32	23.8%	24.4%	28.1%	23.7%
<b>Panel D. Classifying sectors by trade credit intensity</b>					
Low	285.63	4.9%	7.5%	24.8%	62.8%
High	245.73	15.5%	19.1%	28.1%	37.3%

# MNCs' Response to Export Opportunities

- After large RER devaluations, MNC affiliates expand sales and investment more than domestic companies (Desai-Foley-Forbes 2008)
  - Expansion funded by parent company

*Panel A: Sales Growth*



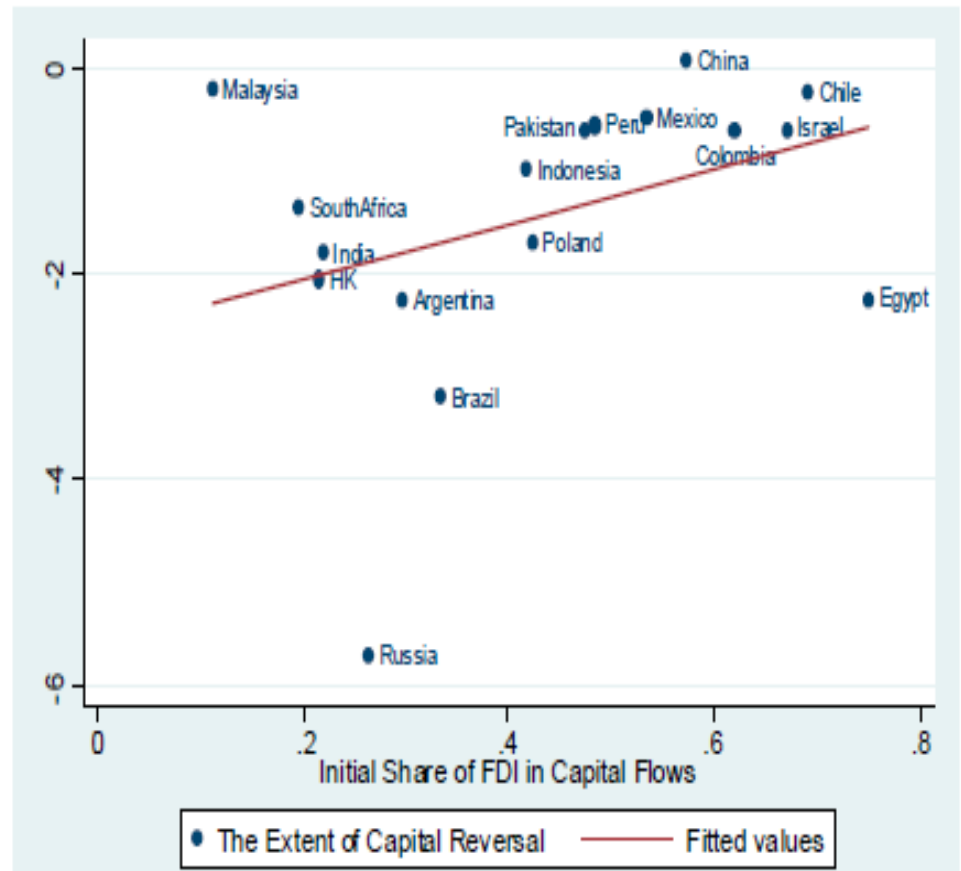
# MNCs' Response to Financial Crises

- MNC affiliates maintained higher sales than domestic establishments during 2008-2009 financial crisis (Alfaro-Chen 2012)
  - MNC subsidiaries with stronger vertical production and financial linkages with parent were more resilient

	(1)	(2)	(3)
	Crisis	Non-crisis	Diff.
Performance difference b/w	0.03***	0.002*	0.028**
MNC subsidiaries and local matches	(0.01)	(0.001)	(0.01)
Number of matched pairs	43,513	43,513	43,513

# FDI vs. Other Capital Flows during Crises

- Volume of foreign capital flows irrelevant for effect of 2008-2009 crisis on firms' liquidity constraints and stock market price (Tong and Wei 2010)
- Higher share of FDI in foreign capital inflows pre crisis alleviated credit crunch and trade collapse during crisis
- Did MNCs quicken spread of demand and supply shocks across countries?



# MNCs and Global Value Chains

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- ❑ If MNCs are less financially constrained than domestic firms, then how do financial considerations affect MNCs' global operations?
  - Production location decision: choice of host countries
  - Integration decision: in-house vs. arm's length off-shoring
  - Network decision: horizontal vs. vertical vs. export-platform
  
- ❑ How do firms choose their position in the global value chain?
  - Domestic firms vs. foreign affiliates
  - Value added vs. production stages

# Some Examples



**Intel** assembles its microchips in wholly-owned subsidiaries in China, Costa Rica, Malaysia, Philippines



**Nike** subcontracts manufacturing to independent producers in Thailand, Indonesia, Cambodia and Vietnam



**Apple** outsources assembly to FoxConn in China, providing customized inputs at no cost from Japan and Korea



**Ralph Lauren** subcontracts to Youngor in China, who sources and pays for all foreign materials

# MNCs' Global Operations

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## Location and Integration

- ❑ MNCs emerge endogenously in response to credit constraints
  - Headquarters optimally integrate credit constrained suppliers in financially underdeveloped countries to directly fund their activities and incentivize local financiers by providing monitoring (Antràs-Desai-Foley 2009)
  - Less credit constrained firms self-select into becoming arm's-length suppliers for MNCs (Javorcik-Spatareanu 2009)

## Location and Network

- ❑ Structure of MNC global operations respond to host-country financial conditions (Bilir-Chor-Manova 2013)
  - MNCs more likely to locate affiliates in financially developed countries because of access to local finance
  - Affiliates in financially more advanced hosts face more competition by local firms → sell less locally and more to home country and third markets

# Global Value Chain Position

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Manova-Yu 2011

- ❑ Spanning bigger segment of the supply chain increases profits and value added but requires more financial capital
  
- ➔ Financially constrained Chinese firms restricted to low value added, low profit GVC segments
  - Profits & value added: pure assembly < import & assembly < ordinary trade
  - More credit constrained firms perform more processing trade on behalf of a foreign buyer and more often use buyer-provided inputs
  - ... especially when home province less financially developed and destination country more financially advanced



# Global Production Line Position

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Chor-Manova-Yu 2014

- ❑ Characterize Chinese firm's global production line position using detailed firm-level customs data, balance sheets and I-O tables
  - GPLP = upstreamness of firms' exports and imports
  - Upstreamness = # production stages b/w output industries & final consumers
  
- ❑ Uncover novel stylized facts about Chinese firms' GPLP to inform theory
  - Aggregate evolution during 1992-2011 and over firms' life cycle
  - Variation across ownership types and trade regimes
  - Correlations with key firm characteristics: productivity, age, size, capital and skill intensity, total sales and exports

# Data

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- ▶ **Trade data (Chinese Customs Transaction Statistics)**
  - ▶ Value and quantity of exports and imports
  - ▶ Firm-level data 2000-2011 (firm, country, HS8 product, regime)
  - ▶ City-level data 1997-1999 (city, country, HS8 product, regime)
  - ▶ Province-level data 1992-1996 (province, country, HS6 product, regime)
  
- ▶ **Balance sheet data (Annual Survey of Industrial Firms)**
  - ▶ All state-owned enterprises and all private companies with sales >5mil Chinese Yuan, 1999-2007
  - ▶ Firm attributes (age, ownership, primary GBT4 industry), size (output, employment), inputs to production (wage, fixed assets, interm inputs)

# Data

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- ▶ **Matched CCTS-ASIF data, 2000-2007**
  - ▶ Match on firm names and contact information (Wang and Yu 2012)
  - ▶ Large and representative matched sample: ~220,000 firm-year observations (exporter-importers) and ~70% of exports in ASIF
  
- ▶ **Chinese Input-Output table**
  - ▶ 135 IO sectors in 2007

# Industry Upstreamness

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- ▶ Following Fally (2012) and Antras et al. (2012), the upstreamness of industry  $i$  is defined as

$$U_i = 1 \times \frac{F_i}{Y_i} + 2 \times \frac{\sum_{j=1}^N d_{ij} F_j}{Y_i} + 3 \times \frac{\sum_{j=1}^N \sum_{k=1}^N d_{ik} d_{kj} F_j}{Y_i} + 4 \times \frac{\sum_{j=1}^N \sum_{k=1}^N \sum_{l=1}^N d_{il} d_{lk} d_{kj} F_j}{Y_i} + \dots$$

- ▶  $Y_i$  = gross output of industry  $i$
- ▶  $F_i$  = final output use of industry  $i$
- ▶  $d_{ij}$  = value of  $i$  needed to produce one yuan worth of  $j$ 's output
- ▶  $d_{ij}$  scaled by  $\frac{Y_i}{Y_i - X_i + M_i - NI_i}$  (trade openness, inventory adjustments)
- ▶ Mean 3.16, st dev 1.12, range 1.00-5.86

# 10 Most and Least Upstream Industries

Social welfare (IO129)	1
Public administration and social organizations (IO135)	1.026
Construction (IO95)	1.058
Sports (IO133)	1.060
Public facilities management (IO123)	1.074
Education (IO126)	1.212
Convenience food manufacturing (IO18)	1.269
Health (IO127)	1.269
Software industry (IO107)	1.275
Resident services (IO124)	1.382

Nonferrous metal alloying and smelting (IO61)	4.877
Pipeline transportation (IO101)	5.023
Coking (IO38)	5.095
Ferrous metal mining industry (IO8)	5.114
Chemical fiber manufacturing (IO47)	5.162
Scrap waste (IO91)	5.256
Coal mining and washing industry (IO6)	5.345
Basic chemical raw materials manufacturing (IO39)	5.375
Oil and gas exploration industry (IO7)	5.508
Nonferrous metal mining industry (IO9)	5.861

# Firm-level Upstreamness

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- ▶ Measure the upstreamness of each firm's exports and imports as weighted average of industry upstreamness

$$U_{ft}^X = \sum_{i=1}^N \frac{X_{fit}}{X_{ft}} U_i, \quad U_{ft}^M = \sum_{i=1}^N \frac{M_{fit}}{M_{ft}} U_i,$$

- ▶  $X = \text{exports}$  ,  $M = \text{imports}$
- ▶  $f = \text{firm}$  ,  $i = \text{industry}$ ,  $t = \text{year}$
- ▶  $U_i = \text{industry upstreamness}$
- ▶ Mean (St Dev):  $U_{ft}^X$  3.29 (0.78),  $U_{ft}^M$  3.61 (0.84)

# Firm-level Upstreamness

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- ▶ Also measure the difference between each firm's export and import upstreamness

$$U_{ft}^X - U_{ft}^M = \sum_{i=1}^N \left( \frac{X_{fit}}{X_{ft}} - \frac{M_{fit}}{M_{ft}} \right) U_i,$$

- ▶ Capture span of production stages conducted by Chinese firms within China
- ▶ These production stages may not necessarily take place within firm boundaries
- ▶ production stages  $\neq$  value added

# China's Production Line Position 1992-2011

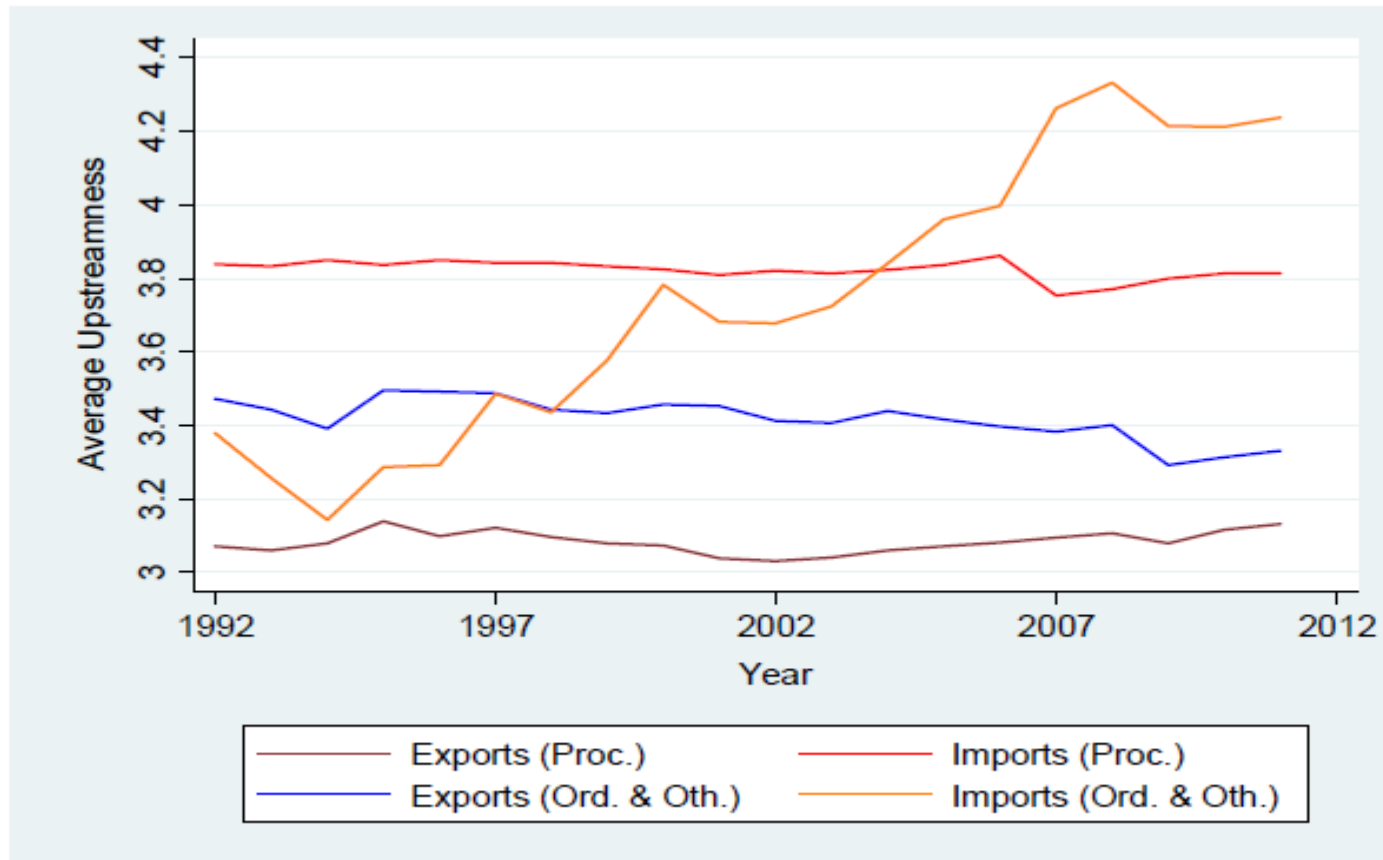
- ▶ Exports systematically more downstream than imports
  - ▶ Export downstreamness stable over time, import upstreamness rising fast





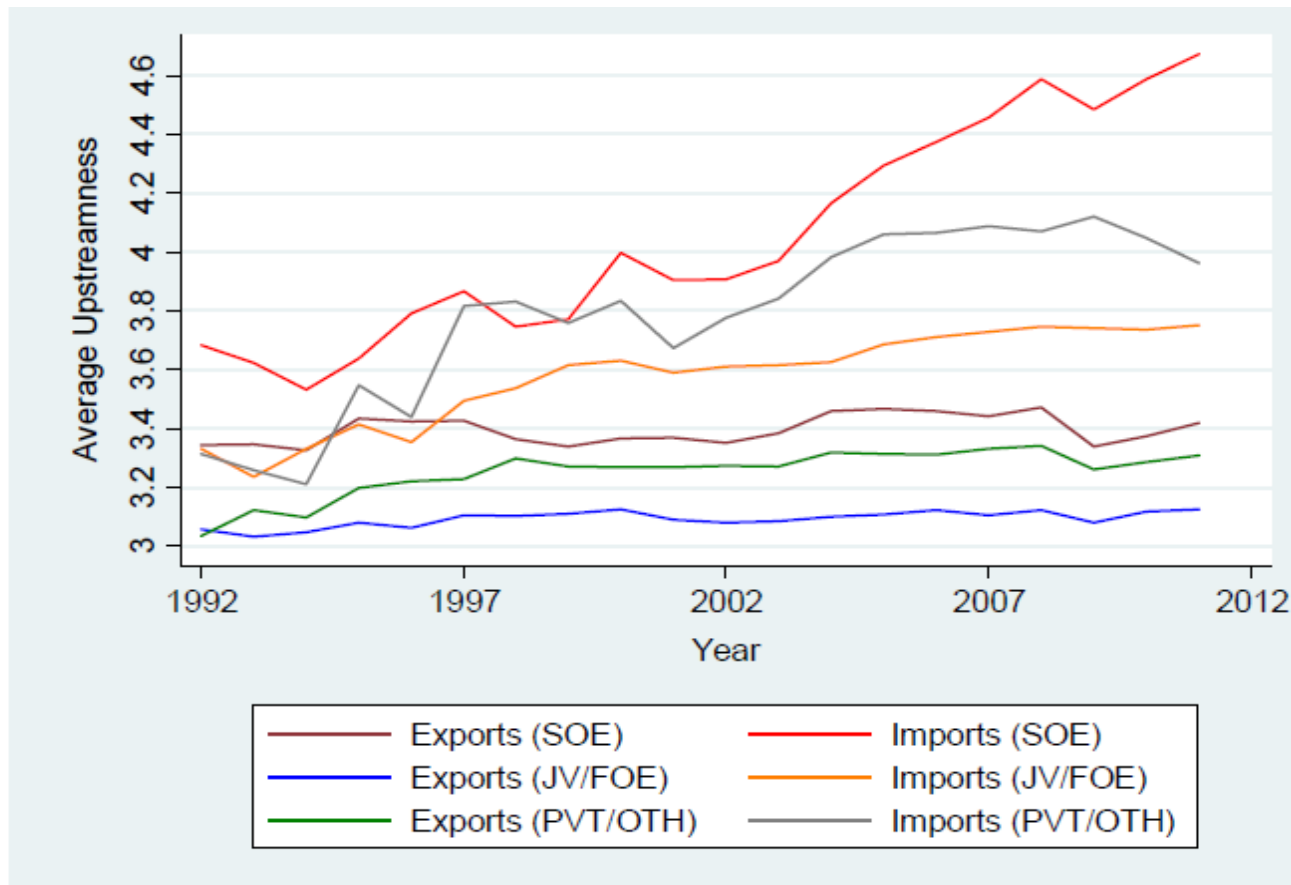
# Broad Trends by Trade Regime

- ▶ Aggregate trends driven by ordinary trade rather than processing trade



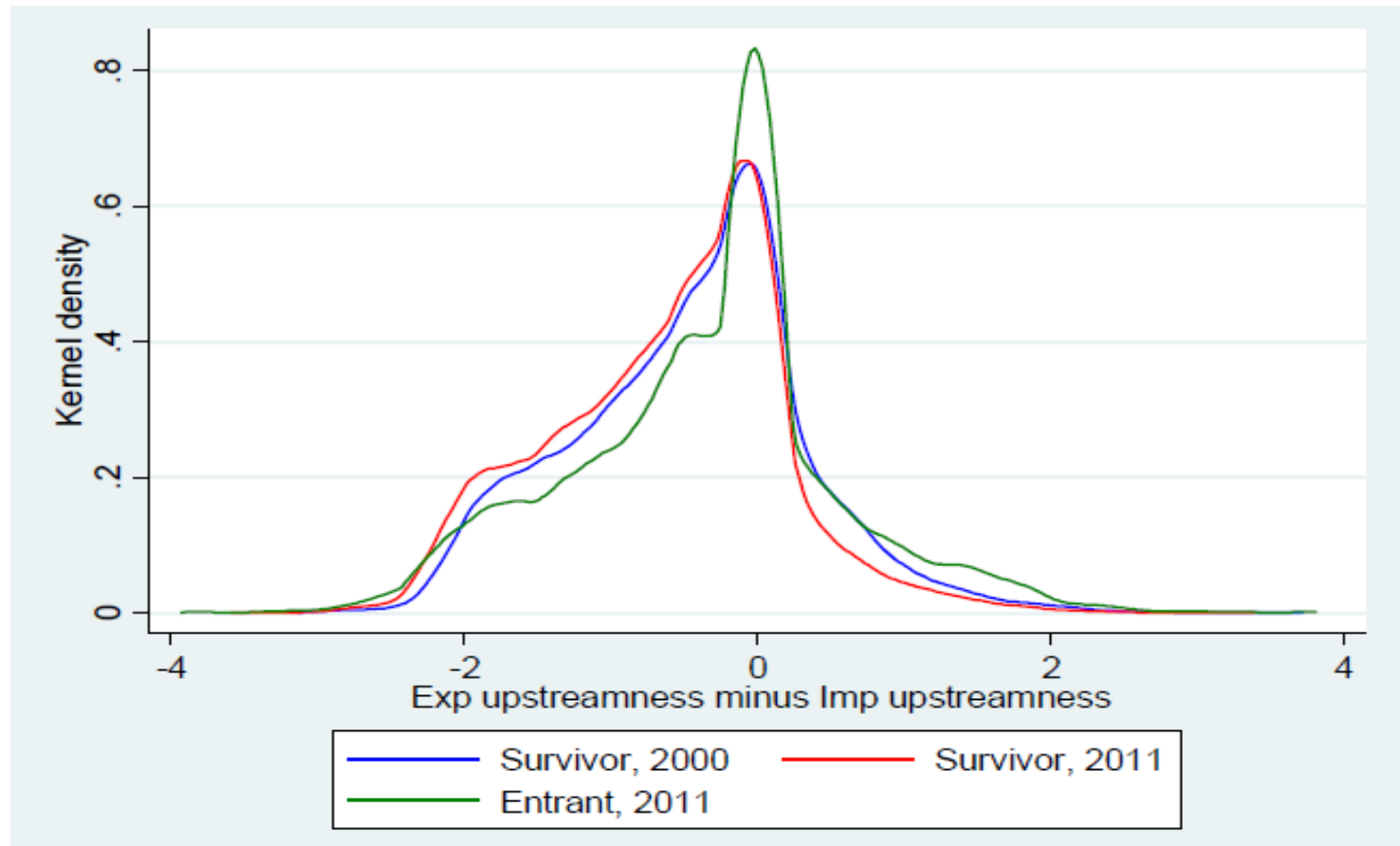
# Broad Trends by Ownership Type

- ▶ Export and import upstreamness higher for SOEs than for private domestic companies than for foreign-owned firms



# Entrant vs. Survivor Firms

- ▶ Entrants conduct fewer production steps than incumbents
  - ▶ Survivors expand span of productions stages over time



# Estimation Approach

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- ▶ Conditional correlations between firms' GPLP and firm characteristics in the cross-section and in the time-series

$$\{U_{ft}^X, U_{ft}^M, U_{ft}^X - U_{ft}^M\} = \alpha + \sum_{t=2001}^{2011} \beta_t YEAR_t + \Gamma Z_{ft} + \delta_c CITY_c + \varepsilon_{ft},$$

$$\{U_{ft}^X, U_{ft}^M, U_{ft}^X - U_{ft}^M\} = \alpha + \sum_{t=2001}^{2011} \beta_t YEAR_t + \Gamma Z_{ft} + \delta_c CITY_c + \delta_i IND_i + \varepsilon_{ft},$$

$$\{U_{ft}^X, U_{ft}^M, U_{ft}^X - U_{ft}^M\} = \alpha + \sum_{t=2001}^{2011} \beta_t YEAR_t + \Gamma Z_{ft} + \delta_f FIRM_f + \varepsilon_{ft}.$$

- ▶  $CITY_c$  = city FE
- ▶  $IND_i$  = industry FE for firm's primary industry
- ▶  $FIRM_f$  = firm FE
- ▶  $Z_{ft}$  = firm-year characteristics
- ▶ Conservatively cluster errors by firm

# Time Trends

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year, 2001	0.0016 [0.0023]	0.0024 [0.0015]	0.0005 [0.0018]	-0.0195*** [0.0033]	-0.0251*** [0.0033]	-0.0019 [0.0034]	0.0137*** [0.0041]	0.0137*** [0.0038]	0.0024 [0.0040]
Year, 2002	0.0103*** [0.0028]	0.0054*** [0.0018]	0.0016 [0.0021]	-0.0380*** [0.0037]	-0.0448*** [0.0037]	0.0070* [0.0038]	0.0343*** [0.0046]	0.0322*** [0.0042]	-0.0011 [0.0046]
Year, 2003	0.0089*** [0.0031]	0.0039** [0.0018]	-0.0004 [0.0022]	-0.0065* [0.0038]	-0.0208*** [0.0038]	0.0503*** [0.0039]	0.0290*** [0.0048]	0.0230*** [0.0043]	-0.0276*** [0.0048]
Year, 2004	0.0171*** [0.0032]	0.0050*** [0.0018]	-0.0027 [0.0023]	0.0138*** [0.0038]	-0.0023 [0.0038]	0.0879*** [0.0040]	0.0227*** [0.0049]	0.0123*** [0.0043]	-0.0576*** [0.0049]
Year, 2005	0.0182*** [0.0032]	0.0044** [0.0018]	-0.0049** [0.0024]	0.0483*** [0.0038]	0.0248*** [0.0038]	0.1286*** [0.0041]	0.0062 [0.0049]	-0.0050 [0.0043]	-0.0869*** [0.0051]
Year, 2006	0.0187*** [0.0033]	0.0022 [0.0018]	-0.0112*** [0.0024]	0.0561*** [0.0038]	0.0362*** [0.0038]	0.1517*** [0.0042]	0.0040 [0.0049]	-0.0113*** [0.0043]	-0.1061*** [0.0052]
Year, 2007	0.0281*** [0.0033]	0.0093*** [0.0018]	-0.0064*** [0.0025]	0.0703*** [0.0038]	0.0636*** [0.0038]	0.1962*** [0.0042]	-0.0076 [0.0050]	-0.0245*** [0.0043]	-0.1388*** [0.0053]
Year, 2008	0.0225*** [0.0033]	0.0048*** [0.0018]	-0.0130*** [0.0025]	0.0793*** [0.0038]	0.0747*** [0.0038]	0.2144*** [0.0043]	-0.0196*** [0.0050]	-0.0397*** [0.0043]	-0.1630*** [0.0053]
Year, 2009	0.0257*** [0.0034]	0.0081*** [0.0018]	-0.0127*** [0.0026]	0.1047*** [0.0039]	0.0923*** [0.0039]	0.2347*** [0.0044]	-0.0230*** [0.0050]	-0.0485*** [0.0043]	-0.1802*** [0.0055]
Year, 2010	0.0310*** [0.0034]	0.0102*** [0.0018]	-0.0120*** [0.0026]	0.0830*** [0.0039]	0.0749*** [0.0039]	0.2300*** [0.0044]	0.0063 [0.0050]	-0.0239*** [0.0043]	-0.1666*** [0.0055]
Year, 2011	0.0382*** [0.0034]	0.0127*** [0.0017]	-0.0105*** [0.0026]	0.0754*** [0.0039]	0.0715*** [0.0039]	0.2339*** [0.0044]	0.0206*** [0.0050]	-0.0147*** [0.0043]	-0.1659*** [0.0056]
Constant	3.2616*** [0.0031]	3.2159*** [0.0037]	3.2926*** [0.0022]	3.5559*** [0.0033]	3.3809*** [0.0136]	3.4534*** [0.0035]	-0.4310*** [0.0043]	-0.2111*** [0.0144]	-0.3173*** [0.0043]
Fixed effects	City	City, IO	Firm	City	City, IO	Firm	City	City, IO	Firm
Observations	1,846,666	1,846,666	1,846,666	1,348,126	1,059,210	1,348,126	904,702	904,702	904,702
R <sup>2</sup>	0.0468	0.7542	0.8945	0.0445	0.1894	0.7608	0.0440	0.3191	0.7473

# Time Trends

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- ▶ **Across firms**, average export and import upstreamness increase over 2000-2011 period
  - ▶ Cumulative growth in export (import) upstreamness: 0.038 (0.075)
- ▶ **Within firms over time**, export upstreamness declines moderately, while import upstreamness rises sharply
  - ▶ Cumulative change within a representative firm is -0.015 for exports and 0.234 for imports
  - ▶ Gap between a firm's export and import upstreamness widens quickly over time

# Time Trends

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- ▶ Chinese companies **conduct more production stages** within China as they become more experienced in global trade
  - ▶ They do so by importing more upstream inputs and exporting slightly more downstream products
  - ▶ To do: adding new sectors vs. reallocation across sectors
  - ▶ To do: firms' share of imported inputs & non-exporters' upstreamness
    - ➔ more stages within firm vs. outsourcing to other Chinese firms
- ▶ Important role for the **extensive margin** of firm activity
  - ▶ Export entrants export more upstream than continuing exporters
  - ▶ Import entrants import more downstream than continuing importers

# Export Revenues, Trade Regime & Ownership

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log Total Exports	-0.0058*** [0.0005]	-0.0025*** [0.0002]	-0.0054*** [0.0004]	0.0047*** [0.0006]	0.0102*** [0.0005]	0.0232*** [0.0007]	-0.0204*** [0.0007]	-0.0139*** [0.0006]	-0.0302*** [0.0010]
Processing Trade (share in total exports)	-0.0059 [0.0042]	-0.0109*** [0.0016]	-0.0071** [0.0033]	0.2762*** [0.0041]	0.2332*** [0.0035]	0.0938*** [0.0049]	-0.2950*** [0.0049]	-0.2449*** [0.0037]	-0.1038*** [0.0059]
Foreign-Owned	-0.0943*** [0.0038]	-0.0102*** [0.0015]	---	-0.0905*** [0.0043]	-0.0504*** [0.0037]	---	0.0441*** [0.0050]	0.0467*** [0.0038]	---
Joint Venture	-0.0779*** [0.0046]	-0.0121*** [0.0016]	---	-0.0345*** [0.0050]	-0.0093** [0.0042]	---	-0.0099* [0.0060]	0.0000 [0.0044]	---
State-Owned	0.0899*** [0.0060]	0.0103*** [0.0033]	---	0.0498*** [0.0068]	0.0206*** [0.0061]	---	0.0591*** [0.0075]	0.0016 [0.0067]	---
Year dummies, Constant?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	City	City, IO	Firm	City	City, IO	Firm	City	City, IO	Firm
Observations	1,846,666	1,846,666	1,846,666	1,348,126	1,348,126	1,348,126	904,702	904,702	904,702
R <sup>2</sup>	0.0509	0.7543	0.8946	0.0522	0.2116	0.7380	0.0636	0.3305	0.7489



# Export Revenues, Trade Regime & Ownership

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- ▶ Firms with larger export revenues export more downstream, import more upstream, and conduct more production stages in China
  - ▶ Both across and within firms
- ▶ Firms that pursue more processing trade export more downstream, import more upstream, and conduct more production stages in China
  - ▶ Both across and within firms
- ▶ Foreign-owned firms operate more downstream than private domestic firms, and perform fewer production steps in China
  - ▶ SOEs operate more upstream than private domestic firms but span same number of production steps

# Age

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log Total Exports	-0.0283*** [0.0015]	-0.0079*** [0.0011]	-0.0064*** [0.0015]	-0.0139*** [0.0013]	-0.0015 [0.0011]	0.0116*** [0.0018]	-0.0144*** [0.0015]	-0.0064*** [0.0014]	-0.0179*** [0.0023]
Processing Trade (share in total exports)	0.0685*** [0.0093]	-0.0294*** [0.0061]	-0.0002 [0.0067]	0.3885*** [0.0077]	0.3174*** [0.0066]	0.1658*** [0.0104]	-0.3199*** [0.0091]	-0.3468*** [0.0081]	-0.1660*** [0.0121]
<b>Log (1+Age)</b>	<b>-0.0016</b> <b>[0.0049]</b>	<b>-0.0097***</b> <b>[0.0031]</b>	<b>-0.0062</b> <b>[0.0059]</b>	<b>0.0516***</b> <b>[0.0043]</b>	<b>0.0474***</b> <b>[0.0035]</b>	<b>0.1248***</b> <b>[0.0120]</b>	<b>-0.0532***</b> <b>[0.0050]</b>	<b>-0.0571***</b> <b>[0.0042]</b>	<b>-0.1311***</b> <b>[0.0133]</b>
Log Average wage	0.1211*** [0.0025]	0.0336*** [0.0017]	0.0001 [0.0014]	0.0029 [0.0021]	-0.0199*** [0.0018]	-0.0127*** [0.0026]	0.1183*** [0.0025]	0.0535*** [0.0023]	0.0128*** [0.0029]
Log Capital per worker	0.0111** [0.0052]	-0.0002 [0.0032]	-0.0007 [0.0017]	-0.0106** [0.0044]	-0.0120*** [0.0034]	0.0057* [0.0032]	0.0217*** [0.0049]	0.0118*** [0.0043]	-0.0064* [0.0036]
Year dummies, Constant?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ownership Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	City	City, GBT	Firm	City	City, GBT	Firm	City	City, GBT	Firm
Observations	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008
R <sup>2</sup>	0.0925	0.5785	0.9555	0.0775	0.3022	0.7969	0.1079	0.3057	0.8253

# Factor Intensity

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log Total Exports	-0.0283*** [0.0015]	-0.0079*** [0.0011]	-0.0064*** [0.0015]	-0.0139*** [0.0013]	-0.0015 [0.0011]	0.0116*** [0.0018]	-0.0144*** [0.0015]	-0.0064*** [0.0014]	-0.0179*** [0.0023]
Processing Trade (share in total exports)	0.0685*** [0.0093]	-0.0294*** [0.0061]	-0.0002 [0.0067]	0.3885*** [0.0077]	0.3174*** [0.0066]	0.1658*** [0.0104]	-0.3199*** [0.0091]	-0.3468*** [0.0081]	-0.1660*** [0.0121]
Log (1+Age)	-0.0016 [0.0049]	-0.0097*** [0.0031]	-0.0062 [0.0059]	0.0516*** [0.0043]	0.0474*** [0.0035]	0.1248*** [0.0120]	-0.0532*** [0.0050]	-0.0571*** [0.0042]	-0.1311*** [0.0133]
<b>Log Average wage</b>	<b>0.1211***</b> <b>[0.0025]</b>	<b>0.0336***</b> <b>[0.0017]</b>	<b>0.0001</b> <b>[0.0014]</b>	<b>0.0029</b> <b>[0.0021]</b>	<b>-0.0199***</b> <b>[0.0018]</b>	<b>-0.0127***</b> <b>[0.0026]</b>	<b>0.1183***</b> <b>[0.0025]</b>	<b>0.0535***</b> <b>[0.0023]</b>	<b>0.0128***</b> <b>[0.0029]</b>
<b>Log Capital per worker</b>	<b>0.0111**</b> <b>[0.0052]</b>	<b>-0.0002</b> <b>[0.0032]</b>	<b>-0.0007</b> <b>[0.0017]</b>	<b>-0.0106**</b> <b>[0.0044]</b>	<b>-0.0120***</b> <b>[0.0034]</b>	<b>0.0057*</b> <b>[0.0032]</b>	<b>0.0217***</b> <b>[0.0049]</b>	<b>0.0118***</b> <b>[0.0043]</b>	<b>-0.0064*</b> <b>[0.0036]</b>
Year dummies, Constant?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ownership Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	City	City, GBT	Firm	City	City, GBT	Firm	City	City, GBT	Firm
Observations	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008
R <sup>2</sup>	0.0925	0.5785	0.9555	0.0775	0.3022	0.7969	0.1079	0.3057	0.8253

# Size

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Firm Size measure:</u>									
Log Total Exports	-0.0283*** [0.0015]	-0.0079*** [0.0011]	<b>-0.0064***</b> <b>[0.0015]</b>	-0.0139*** [0.0013]	-0.0015 [0.0011]	<b>0.0116***</b> <b>[0.0018]</b>	-0.0144*** [0.0015]	-0.0064*** [0.0014]	<b>-0.0179***</b> <b>[0.0023]</b>
Observations	216,008	216,008	<b>216,008</b>	216,008	216,008	<b>216,008</b>	216,008	216,008	<b>216,008</b>
R <sup>2</sup>	0.0925	0.5785	<b>0.9555</b>	0.0775	0.3022	<b>0.7969</b>	0.1079	0.3057	<b>0.8253</b>
Log Output	0.0014 [0.0026]	-0.0031* [0.0017]	<b>-0.0032*</b> <b>[0.0019]</b>	-0.0265*** [0.0022]	-0.0138*** [0.0018]	<b>0.0159***</b> <b>[0.0033]</b>	0.0279*** [0.0026]	0.0107*** [0.0022]	<b>-0.0191***</b> <b>[0.0037]</b>
Observations	215,888	215,888	<b>215,888</b>	215,888	215,888	<b>215,888</b>	215,888	215,888	<b>215,888</b>
R <sup>2</sup>	0.0876	0.5783	<b>0.9556</b>	0.0779	0.3026	<b>0.7969</b>	0.1083	0.3059	<b>0.8252</b>
Log Employment	-0.0516*** [0.0032]	-0.0240*** [0.0021]	<b>-0.0049*</b> <b>[0.0027]</b>	-0.0596*** [0.0026]	-0.0325*** [0.0022]	<b>0.0131***</b> <b>[0.0046]</b>	0.0079** [0.0031]	0.0085*** [0.0027]	<b>-0.0181***</b> <b>[0.0051]</b>
Observations	216,008	216,008	<b>216,008</b>	216,008	216,008	<b>216,008</b>	216,008	216,008	<b>216,008</b>
R <sup>2</sup>	0.0920	0.5790	<b>0.9555</b>	0.0828	0.3040	<b>0.7968</b>	0.1069	0.3056	<b>0.8251</b>
Other controls:	From CCTS: Export processing trade share; Ownership dummies From NBS: Log(1+age); Log capital per worker; Log average wage								
Year dummies, Constant?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	City	City, GBT	Firm	City	City, GBT	Firm	City	City, GBT	Firm

# Productivity

Dependent variable:	Export Upstreamness ( $U_X$ )			Import Upstreamness ( $U_M$ )			$U_X - U_M$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Productivity measure:</u>									
Log real VA per worker	0.0334*** [0.0029]	0.0166*** [0.0018]	<b>0.0003</b> <b>[0.0011]</b>	0.0071*** [0.0025]	0.0103*** [0.0020]	<b>0.0062***</b> <b>[0.0021]</b>	0.0263*** [0.0028]	0.0063*** [0.0024]	<b>-0.0059**</b> <b>[0.0023]</b>
Observations	206,978	206,978	<b>206,978</b>	206,978	206,978	<b>206,978</b>	206,978	206,978	<b>206,978</b>
R <sup>2</sup>	0.0910	0.5825	<b>0.9566</b>	0.0760	0.3034	<b>0.7999</b>	0.1083	0.3078	<b>0.8284</b>
Levinsohn-Petrin	-0.0173*** [0.0026]	-0.0023 [0.0017]	<b>-0.0007</b> <b>[0.0011]</b>	-0.0420*** [0.0022]	-0.0120*** [0.0018]	<b>0.0072***</b> <b>[0.0021]</b>	0.0247*** [0.0025]	0.0097*** [0.0022]	<b>-0.0079***</b> <b>[0.0023]</b>
Observations	206,851	206,851	<b>206,851</b>	206,851	206,851	<b>206,851</b>	206,851	206,851	<b>206,851</b>
R <sup>2</sup>	0.0901	0.5821	<b>0.9566</b>	0.0797	0.3036	<b>0.8000</b>	0.1085	0.3078	<b>0.8284</b>
Levinsohn-Petrin (by ownership type)	-0.0092*** [0.0026]	-0.0012 [0.0017]	<b>-0.0006</b> <b>[0.0011]</b>	-0.0259*** [0.0022]	-0.0114*** [0.0018]	<b>0.0074***</b> <b>[0.0020]</b>	0.0167*** [0.0026]	0.0103*** [0.0022]	<b>-0.0080***</b> <b>[0.0023]</b>
Observations	206,851	206,851	<b>206,851</b>	206,851	206,851	<b>206,851</b>	206,851	206,851	<b>206,851</b>
R <sup>2</sup>	0.0897	0.5821	<b>0.9566</b>	0.0774	0.3036	<b>0.8000</b>	0.1080	0.3079	<b>0.8284</b>
Other controls:	From CCTS: Export processing trade share; Ownership dummies From NBS: Log(1+age); Log capital per worker; Log average wage								
Year dummies, Constant?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fixed effects	City	City, GBT	Firm	City	City, GBT	Firm	City	City, GBT	Firm

# Firm Characteristics

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- ▶ **Within firms over time**, older age, larger size, higher productivity, higher capital intensity and lower skill intensity associated with
  - ▶ More upstream imports
  - ▶ (Weakly) more downstream exports
  - ▶ Conducting more production stages in China
- ▶ Patterns sometimes reversed in the **cross-section** of firms
  - ▶ To do: explore role of firm entry and exit → sample selection vs. omitted firm characteristics?

# Next Steps

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- ▶ We establish new stylized facts about the position that Chinese firms occupy in global production chains
- ▶ Next: develop theoretical model that rationalizes results and generates further testable predictions
  - ▶ Primitive firm attribute (productivity) determines firm choices and outcomes
  - ▶ Firm choices: production technology (H and K intensity, trade regime), production inputs (L, domestic and imported inputs), GPLP
  - ▶ Firm outcomes: total sales, exports, value added, profits

# Trade, Finance and Global Value Chains

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- ❑ Financial frictions affect international trade, the organization of global production networks, and MNCs' global operation decisions
  
- ❑ Going forward
  - Value added vs. production line position
  - Interplay between MNC activity and global supply chains
  - Implications for welfare and shock transmission