



Global Value Chains: Finance, Quality and Management

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Global Value Chains

- ❑ Increasing fragmentation of production across countries a key trend in international trade over last few decades
 - Extensive trade in intermediates and multinational activity
 - 60mil workers in 3,500 processing zones in 130 developing countries
- ❑ This phenomenon raises new policy questions
 - What is optimal trade and development policy design?
 - What are the welfare consequences for gains from trade, technology transfer and economic growth?
 - What are the distributional effects across firms and workers?
 - How is the transmission of shocks across nations affected?

Firms in GVCs

- ❑ Important to understand how and why firms engage in global production sharing to inform policy questions
 - Determinants of firms' GVC participation
 - Effects of GVC participation on firm performance
- ❑ GVCs create new challenges and opportunities for firms
 - Positioning in global value chains
 - Financing operations
 - Managing production stages and product quality

Characterizing GVC Activity

- ❑ A challenge: conceptually identifying and empirically measuring relevant dimensions of firms' GVC participation
- ❑ Three key aspects of GVC activity:
 - Value added
 - Upstreamness
 - Network position
- ❑ Implicit and important:
 - Nature of production activity
 - Ownership and organization of production

Three Insights

- ❑ Global production line position evolves over firm lifecycle with firm size and productivity
(Chor, Manova & Yu in progress)
- ❑ Financial frictions constrain firms to lower value-added, less profitable GVC activities
(Manova & Yu JIE forthcoming)
- ❑ Effective management improves firms' GVC performance by enabling more efficient production of higher-quality goods
(Bloom, Manova, Van Reenen, Sun & Yu 2016)

“Growing Like China: Firm Performance and Global Production Line Position”

(Chor, Manova & Yu in progress)

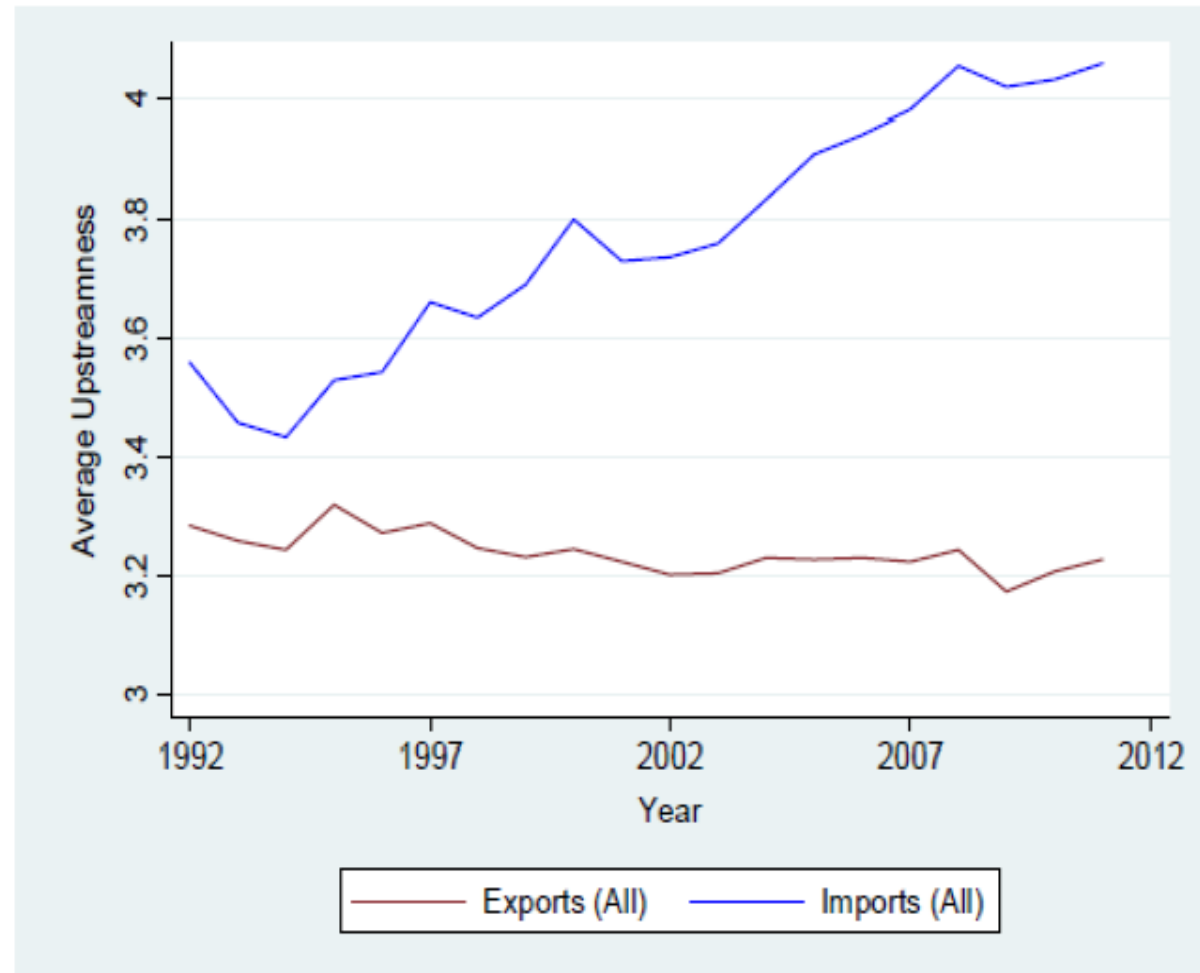
- ❑ Understand the relationship between global value chains and firm growth processes
- ❑ China an ideal economic context for studying how and why firms operate along the global production chain
 - GVC participation a driving force behind China's rise as world's largest exporter
 - Government policy actively encourages firms' GVC engagement

What is Upstreamness ?

- ❑ Characterize a sector's upstreamness with the weighted average number of production stages between its output and final demand
 - Recursive use of direct requirement coefficients from aggregate input-output tables (Fally 20012, Antràs et al. 2012)
- ❑ Construct the upstreamness of Chinese firms' exports and imports as a value-weighted average of industry upstreamness
 - 2000-2011: firm level
 - 1997-1999: city level
 - 1992-1996: province level

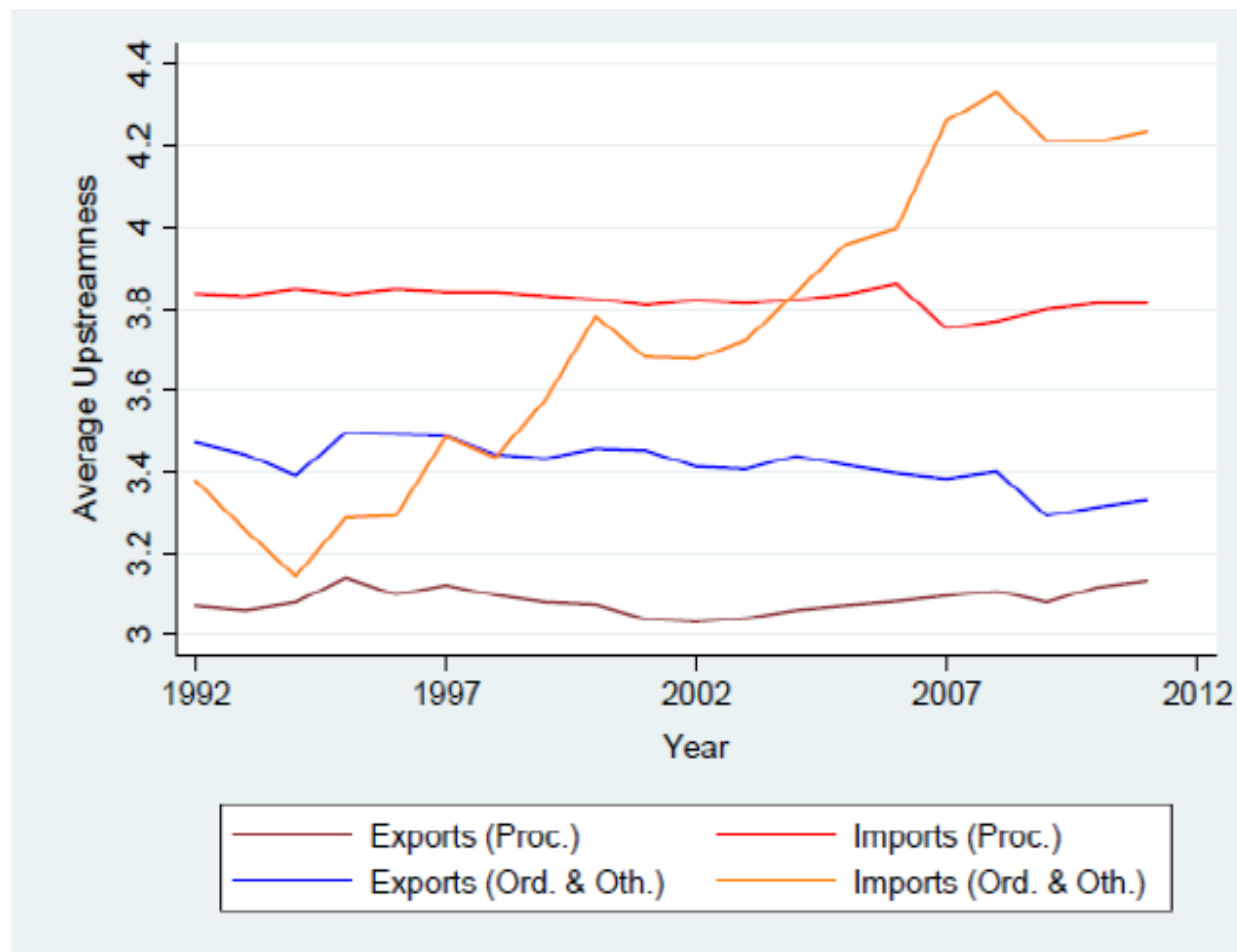
China's Production Line Position 1992-2011

- ❑ Exports systematically more downstream than imports
- Export upstreamness stable over time
- Import upstreamness rising fast



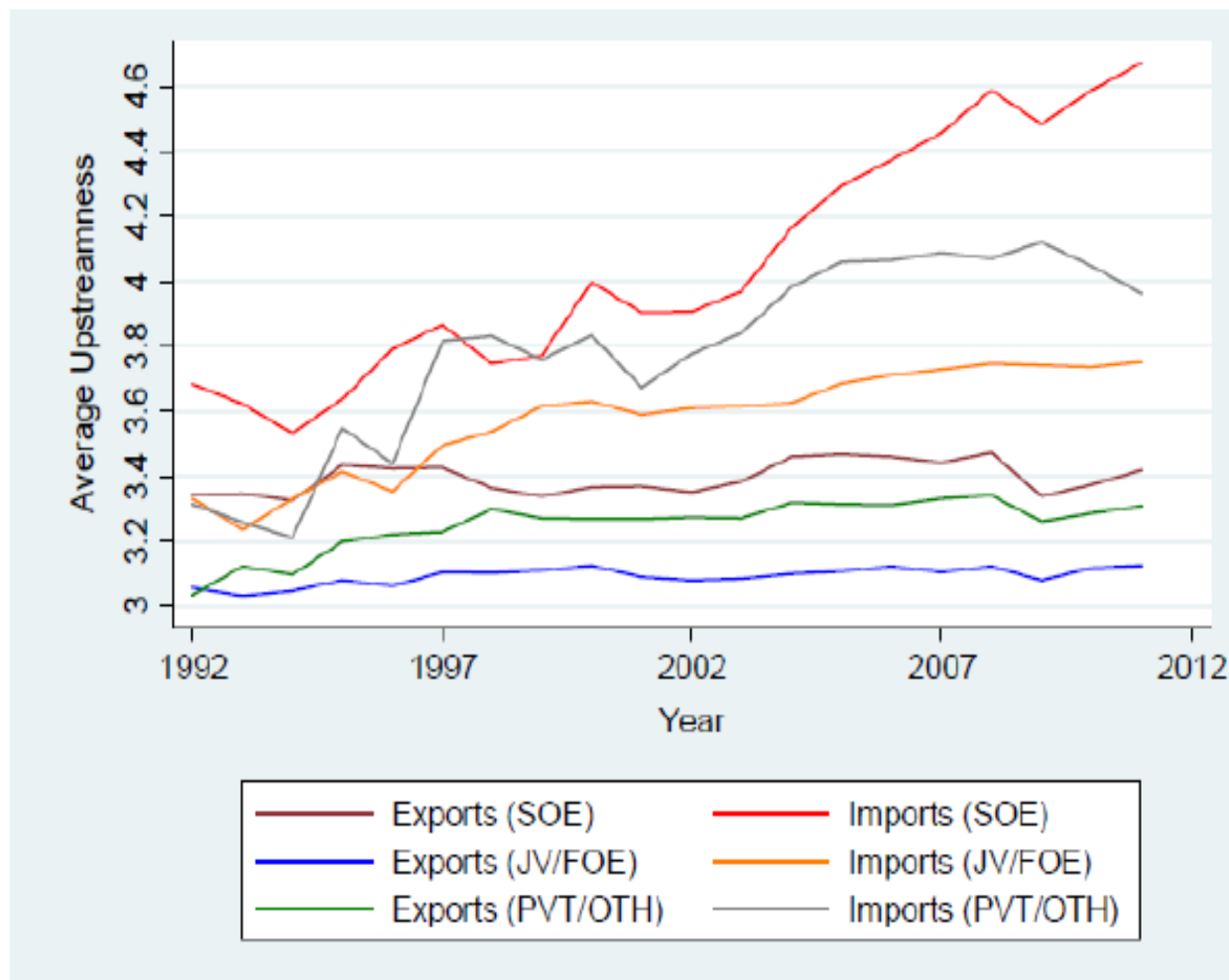
Broad Trends by Trade Regime

- ❑ Aggregate trends driven by ordinary trade rather than processing trade
- ❑ Firms that pursue more processing trade export more downstream, import more upstream and conduct more production stages in China



Broad Trends by Ownership Type

- ❑ SOEs operate more upstream than private domestic firms
- ❑ Private domestic firms operate more upstream than foreign affiliates



Upstreamness over the Firm Lifecycle

- ❑ Regression analysis indicates systematic patterns in the evolution of import and export upstreamness within firms over time
 - Export entrants export more upstream than continuing exporters
 - Import entrants import more downstream than continuing importers
 - As surviving firms age, export upstreamness declines moderately while import upstreamness rises sharply

Upstreamness over the Firm Lifecycle

- ❑ Within firms over time, larger size, higher productivity, higher capital intensity and lower skill intensity associated with:
 - more upstream imports
 - (weakly) more downstream exports
 - more production stages in China

- ❑ Chinese companies conduct more production stages within China as they grow and become more experienced in global trade
 - In progress: in-house production vs. domestic outsourcing

Firm 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]	-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]
Observations	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008
R ²	0.0925	0.5785	0.9555	0.0775	0.3022	0.7969	0.1079	0.3057	0.8253
Log Output	0.0014 [0.0026]	-0.0031* [0.0017]	-0.0032* [0.0019]	-0.0265*** [0.0022]	-0.0138*** [0.0018]	0.0159*** [0.0033]	0.0279*** [0.0026]	0.0107*** [0.0022]	-0.0191*** [0.0037]
Observations	215,888	215,888	215,888	215,888	215,888	215,888	215,888	215,888	215,888
R ²	0.0876	0.5783	0.9556	0.0779	0.3026	0.7969	0.1083	0.3059	0.8252
Log Employment	-0.0516*** [0.0032]	-0.0240*** [0.0021]	-0.0049* [0.0027]	-0.0596*** [0.0026]	-0.0325*** [0.0022]	0.0131*** [0.0046]	0.0079** [0.0031]	0.0085*** [0.0027]	-0.0181*** [0.0051]
Observations	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008	216,008
R ²	0.0920	0.5790	0.9555	0.0828	0.3040	0.7968	0.1069	0.3056	0.8251
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

11

 Page 11 of 11

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]	0.0003 [0.0011]	0.0071*** [0.0025]	0.0103*** [0.0020]	0.0062*** [0.0021]	0.0263*** [0.0028]	0.0063*** [0.0024]	-0.0059** [0.0023]
Observations	206,978	206,978	206,978	206,978	206,978	206,978	206,978	206,978	206,978
R ²	0.0910	0.5825	0.9566	0.0760	0.3034	0.7999	0.1083	0.3078	0.8284
Levinsohn-Petrin	-0.0173*** [0.0026]	-0.0023 [0.0017]	-0.0007 [0.0011]	-0.0420*** [0.0022]	-0.0120*** [0.0018]	0.0072*** [0.0021]	0.0247*** [0.0025]	0.0097*** [0.0022]	-0.0079*** [0.0023]
Observations	206,851	206,851	206,851	206,851	206,851	206,851	206,851	206,851	206,851
R ²	0.0901	0.5821	0.9566	0.0797	0.3036	0.8000	0.1085	0.3078	0.8284
Levinsohn-Petrin (by ownership type)	-0.0092*** [0.0026]	-0.0012 [0.0017]	-0.0006 [0.0011]	-0.0259*** [0.0022]	-0.0114*** [0.0018]	0.0074*** [0.0020]	0.0167*** [0.0026]	0.0103*** [0.0022]	-0.0080*** [0.0023]
Observations	206,851	206,851	206,851	206,851	206,851	206,851	206,851	206,851	206,851
R ²	0.0897	0.5821	0.9566	0.0774	0.3036	0.8000	0.1080	0.3079	0.8284
Other controls:									
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

From CCTS: Export processing trade share; Ownership dummies
From NBS: Log(1+age); Log capital per worker; Log average wage

26

Policy Implications ?

- ❑ More work is needed to understand how global value chains interact with firm growth in order to inform policy
- ❑ In progress: theory and more empirics
 - Primitive firm attribute (productivity) determines firm choices and outcomes
 - Firm choices: global production line position, production technology (trade regime, factor intensity), production inputs (labor, domestic & foreign inputs)
 - Firm outcomes: output, exports, value added, profits

“How Firms Export: Processing vs. Ordinary Trade with Financial Frictions”

(Manova & Yu JIE forthcoming)

- ❑ Financial frictions severely impede international trade at firm and aggregate levels, especially during crises (Foley & Manova 2015)
 - Firms use a variety of internal and external sources of finance to support their trade operations
 - Exporters are more dependent on external finance than domestic producers
- ❑ How do financial frictions affect firms' GVC position and thereby firm performance?

Institutional Context

- ❑ Matched data on firm-level production and transaction-level trade flows, China 2000-2006
- ❑ Two institutional features make China interesting economic environment
- 1. Since mid 1980s, China has waived import duties on materials imported for further processing and re-exporting as a means of export promotion
 - In 2005, 32.7% of exporters and 54.6% of exports in processing trade
 - Helped make China a key link in global supply chains
- 2. Processing exporters operate under two distinct regimes
 - Pure assembly: receive foreign inputs at no cost directly from trade partner
 - Processing with imports: source and pay for foreign inputs

He Who Pays the Piper Calls the Tune

- ❑ Spanning bigger segment of the supply chain increases profits and value added but also requires more working capital
 - pure assembly < import & assembly < ordinary trade
- ❑ Credit constraints restrict Chinese firms to less profitable activities
 - Across firms, more credit constrained firms perform more PT and PA
 - Within firms, trade strategy changes when financial health changes
 - Within firms, more PT and PA in financially more dependent sectors
 - Bigger effects for financially less developed provinces and financially more advanced destinations

Some Examples



Pure assembly:

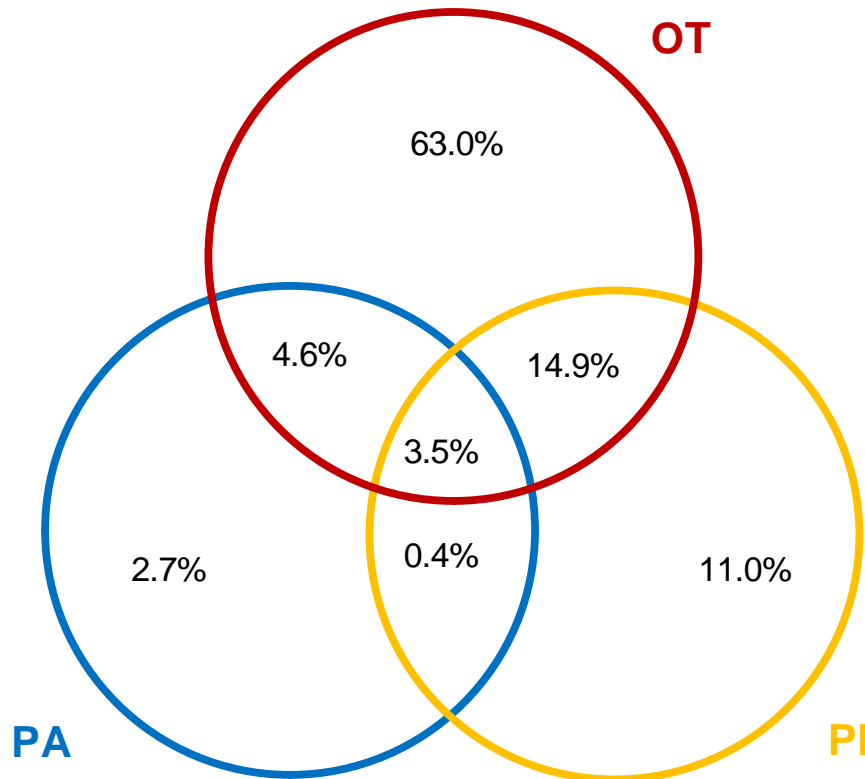
Apple outsources assembly to **FoxConn** in China, providing customized inputs at no cost from Japan and Korea

Processing with imports:

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

How Chinese Firms Export

- Share of firms exporting under ordinary trade (**OT**), processing with imports (**PI**) and/or pure assembly (**PA**)



Firm Profitability

- Profitability and value added increase as firms orient exports from pure assembly to processing with imports to ordinary trade

Dep Variable:	(log) Profit	Profit/Sales	(log) Value Added
Panel A. Processing Trade vs. Ordinary Trade			
(PA + PI) / (PA + PI + OT)	-0.151*** (-5.94)	-0.016*** (-6.65)	-0.108*** (-7.19)
(log) Employment	0.905*** (116.61)	0.007*** (8.68)	0.896*** (182.28)
R-squared	0.39	0.03	0.55
# observations	39,784	50,498	49,717
Panel B. Pure Assembly vs. Import & Assembly			
PA / (PA + PI)	-0.275*** (-7.14)	-0.013*** (-3.42)	-0.229*** (-10.74)
(log) Employment	0.892*** (77.63)	0.008*** (7.81)	0.909*** (125.99)
R-squared	0.44	0.05	0.58
# observations	16,603	22,063	21,704

Financial Health across Firms

- Firms with lower liquidity and higher leverage conduct more processing trade, especially pure assembly

Dep Variable:	Baseline		Productivity, Size Control		Full Control		Bilateral Trade Share	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Liquidity								
Lag Liquidity	-0.044*** (-8.72)	-0.020*** (-2.73)	-0.012** (-2.18)	-0.015** (-2.03)	-0.011* (-1.96)	-0.017** (-2.21)	-0.011* (-1.68)	-0.029** (-2.21)
Lag Productivity			-0.017*** (-9.42)	-0.018*** (-6.71)	-0.024*** (-11.57)	-0.015*** (-5.12)	-0.023*** (-7.45)	-0.023*** (-6.02)
Lag Log Employment			0.068*** (41.35)	-0.011*** (-4.47)	0.069*** (38.03)	-0.014*** (-5.21)	0.070*** (27.37)	-0.002 (-0.59)
R-squared	0.42	0.23	0.44	0.23	0.45	0.23	0.43	0.22
# observations	46,573	20,555	43,125	19,145	43,103	19,134	379,941	126,489

Export Dynamics

- ❑ Firms adjust trade regimes following improvements in financial health
 - Financial health prior to export entry affects trade regime upon entry
 - Financial health prior to MFA reform affect trade regime after reform

Dep Variable:	Full 2002-2006 Panel				Export Entry in 2002-2006 Panel				Export Entry after MFA Reform	
	Binary Bilateral Trade Share		Binary Bilateral Trade Share by ISIC		Binary Bilateral Trade Share		Binary Bilateral Trade Share by ISIC		Binary Bilateral Trade Share	
	$\frac{PA+PI}{PA+PI+OT}$	$\frac{PA}{PA+PI}$	$\frac{PA+PI}{PA+PI+OT}$	$\frac{PA}{PA+PI}$	$\frac{PA+PI}{PA+PI+OT}$	$\frac{PA}{PA+PI}$	$\frac{PA+PI}{PA+PI+OT}$	$\frac{PA}{PA+PI}$	$\frac{PA+PI}{PA+PI+OT}$	$\frac{PA}{PA+PI}$
Panel A. Liquidity										
Lag Liquidity	-0.007** (-2.50)	-0.005* (-1.92)	-0.008** (-2.17)	-0.008** (-2.55)	-0.035*** (-2.82)	-0.070** (-2.50)	-0.042*** (-3.27)	-0.066** (-2.29)	-0.052* (-1.89)	-0.075* (-1.91)
R-squared	0.82	0.89	0.70	0.85	0.35	0.40	0.32	0.42	0.44	0.40
# observations	1,427,114	507,415	1,868,108	619,636	78,194	13,465	94,691	14,996	3,731	1,339

Fin Vulnerability across Sectors within Firms

- Firms conduct relatively more processing trade and pure assembly in financially more vulnerable sectors

Dep Variable:	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Working Capital Requirement: Inventories Ratio				
Inventories Ratio	0.497*** (23.43)	0.201*** (2.77)	0.538*** (20.90)	0.084** (1.99)
R-squared	0.86	0.97	0.83	0.94
Panel B. Long-Run Investment Needs: External Finance Dependence				
Ext Fin Dependence	0.050*** (21.82)	-0.0001 (-0.03)	0.049*** (18.23)	-0.002 (-0.46)
R-squared	0.86	0.97	0.83	0.94
# observations	252,296	59,263	1,142,871	264,585

Economic Magnitudes

- ❑ Reallocating 10% exports from PT to OT (from PA to PI) is accompanied by 1.5% (2.8%) rise in profits
- ❑ One st dev improvement in firm liquidity (leverage) would generate 1%-3% decline in $(PA+PI)/(PA+PI+OT)$ and $PA/(PA+PI)$
- ❑ Increasing sector financial dependence by 20% results in 10% rise in $(PA+PI)/(PA+PI+OT)$ and 4% growth in $PA/(PA+PI)$
- ❑ Results stronger for ...
 - ... financially less developed Chinese provinces
 - ... financially more developed export destinations

Policy Implications

- ❑ Financial frictions affect the organization of production across firms and countries
 - Trade regime governs which GVC stages are performed, controlled and funded by different trade parties
 - Financial factors determine firms' GVC position and profitability
- ❑ Financially underdeveloped countries may be stuck in low value-added stages of global production chains
 - ... but processing trade can allow more firms to share in the gains from trade and gradually transition to ordinary trade
 - Justification for government regulation of trade flows?

“Managing Trade: Evidence from China and the US”

(Bloom, Manova, Van Reenen, Sun & Yu 2016)

- ❑ Examine role of management practices for export performance and participation in global value chains
 - Study world’s two largest export economies: China and the US
 - Strikingly similar patterns despite different income levels, institutional quality and market frictions

- ❑ Theoretically rationalized empirical results
 - Better managed firms are more likely to export, sell more products to more markets, and have higher export sales
 - Well managed firms efficiently produce high-quality goods, using sophisticated imported inputs and complex assembly processes

Matched Production-Management-Trade Data

- ❑ US: ~31,000 firms in 2010
 - Establishment-level production: ASM
 - Establishment-level management: MOPS
 - Transaction-level exports and imports: LFTTD

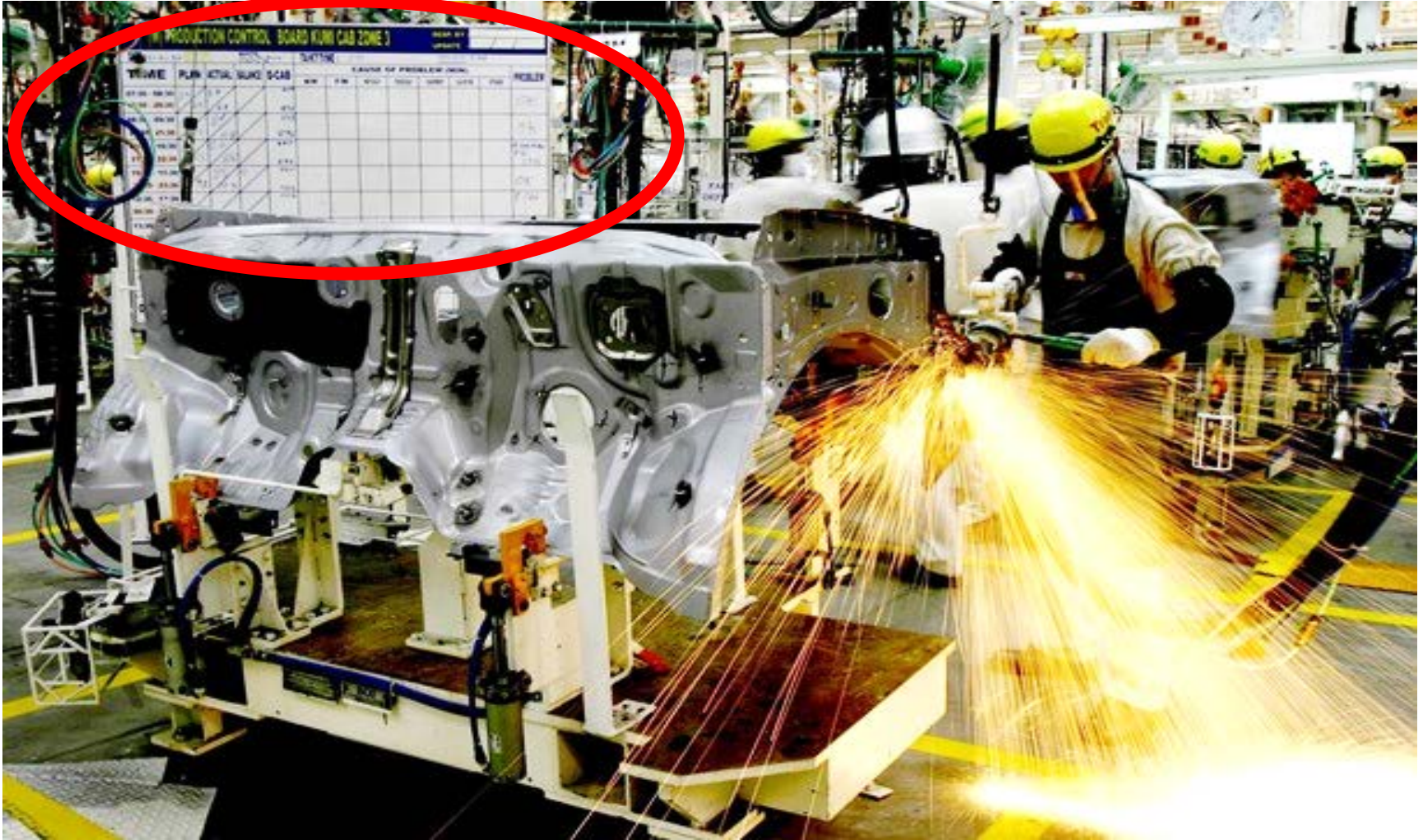
- ❑ China: 500 firms in 2000-2008
 - Firm-level production: ASIE
 - Establishment-level management: WMS
 - Transaction-level exports and imports: CCTS

What is Management Competence?

- ❑ Design and use of effective management practices
 - Based on McKinsey assessment methodology

- ❑ Management score averages 18 standardized questions
 - Targets: design, integration and realism of production targets
 - Monitoring: data collection and analysis
 - Incentives: rewarding high performers and improving low performers

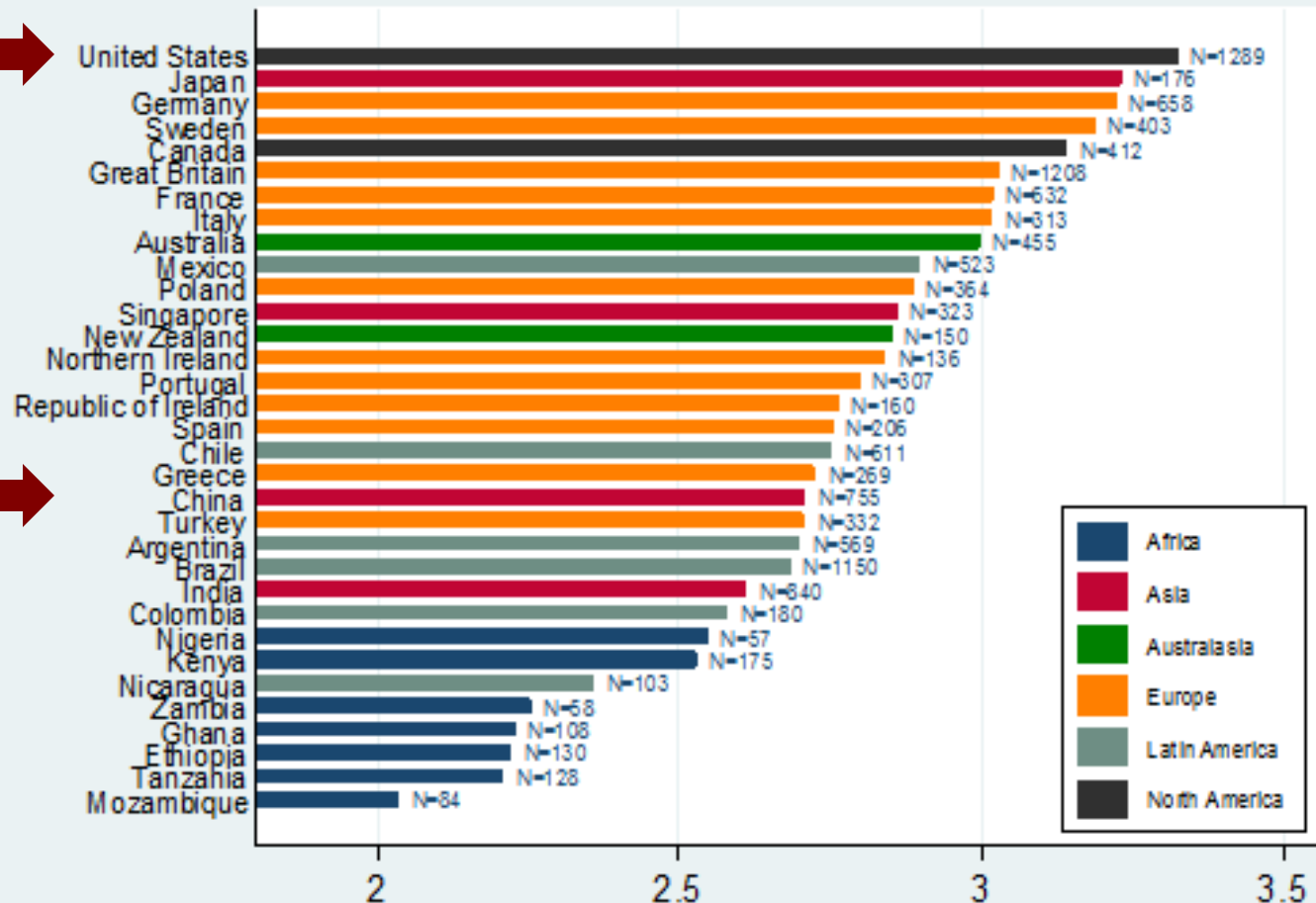
Performance Metrics: US Car Plant



No Performance Metrics: Indian Textile Plant



Global Management Disparities



Average Management Scores, Manufacturing
Note: Firms between 50 and 5000 employees

Export Activity

Dep Variable:	China				US			
	Exporter Dummy		Log Exports		Exporter Dummy		Log Exports	
Management Score	0.096** (2.30)	0.116*** (2.75)	0.638** (2.14)	0.566* (1.81)	0.042*** (13.92)	0.031*** (10.13)	0.488*** (21.72)	0.373*** (16.79)
Capital Intensity		-0.01 (-0.76)		0.145 (1.43)		-0.020*** (-6.04)		0.193*** (7.35)
Skill Intensity		-0.609*** (-3.10)		-4.231*** (-2.64)		0.027*** (7.84)		0.247*** (8.81)
Log Wage		0.041* (1.82)		0.401** (2.17)		0.106*** (9.82)		0.904*** (11.84)
Age		0.03 (1.53)		0.153 (1.01)		0.044*** (11.47)		0.411*** (13.29)
	Own, Prov, Ind, Year FE; Noise Controls				State, Ind FE; Noise Controls			
R-squared	0.41	0.43	0.40	0.43	0.26	0.27	0.33	0.37
# observations	3,233	3,123	2,236	1,935	32,000	32,000	13,000	13,000

Economic Magnitudes

- ❑ Improving management by 1 standard deviation associated with
 - 5% higher probability of exporting
 - 24% higher exports
 - 19% more destinations
 - 17% more export products
 - 22% more destination-products

Interpretation: Management as Productivity

- ❑ Firm productivity determines export activity (e.g. Melitz 2003)
 - Noise and endogeneity of measured TFPR (e.g. De Loecker 2011)
 - Black box of residual TFPR measures
 - Multiple firm attributes may matter (e.g. Hallak-Sivadasan 2013)
- ❑ Management is a less noisy, direct measure of tangible TFPQ component
 - Management and TFPR both significant in robustness checks
 - Less overlap in management distributions for exporters and non-exporters than TFPR distributions

Production Efficiency or Product Quality?

- ❑ Effective management can increase production efficiency
 - Assembling inputs more cheaply

- ❑ Effective management can increase output quality
 - Sourcing and processing high-quality inputs
 - Operationalizing more complex assembly processes

Production Efficiency & Product Quality

- ❑ Evidence indicates that effective management operates through both mechanisms
- ❑ Better managed firms ...
 - have higher export prices and quality, but lower quality-adjusted export prices
 - use more imported inputs, more expensive and higher-quality inputs, from richer countries of origin
 - import a wider range of inputs from more countries of origin

Production Efficiency & Product Quality

- Better managed firms produce higher-quality goods, more efficiently
 - Model-consistent measure of export quality : $\sigma p + q$

Dep Variable:	China			US		
	Log Export Price	Export Quality	Quality-Adj Export Price	Log Export Price	Export Quality	Quality-Adj Export Price
Management	0.335** (2.16)	1.218* (1.95)	-0.883* (-1.82)	-0.002 (-0.65)	0.048*** (2.60)	-0.045*** (-2.91)
	Province, Dest - Product, Own, Year FE; Noise + Firm Controls			State, Dest - Product FE; Noise + Firm Controls		
R-squared	0.92	0.92	0.89	0.97	0.96	0.95
# observations	58,102	58,102	58,102	290,000	290,000	290,000

Imported Input Quality

- Better managed exporters use more imported inputs, more expensive and higher-quality inputs, from richer countries of origin

Dep Variable:	China				US			
	Log $\frac{\text{Imports}}{\text{Inputs}}$	Log Imports	Log Avg Origin Income	Log Import Unit Value	Log $\frac{\text{Imports}}{\text{Inputs}}$	Log Imports	Log Avg Origin Income	Log Import Unit Value
Management	0.543* (1.86)	1.341*** (4.32)	0.113** (2.14)	0.245** (2.53)	-0.003 (0.027)	0.376*** (12.83)	0.041*** (4.27)	-0.001 (-0.21)
	Own, Prov, Ind, Year FE; Noise + Firm Controls				State, Ind FE; Noise + Firm Controls			
			Orig-Prod FE				Orig-Prod FE	
R-squared	0.50	0.56	0.38	0.81	0.27	0.29	0.21	0.97
# observations	1,778	1,778	1,780	76,626	10,000	10,000	10,000	140,000
# firms	290	290	290	290				

Assembly Complexity

- Better managed exporters use a wider range of imported inputs from more countries of origin

Dep Variable:	China			US		
	Log # Origins	Log # Import Prod	Log # Origin-Prod	Log # Origins	Log # Import Prod	Log # Origin-Prod
Management Score	0.435*** (4.47)	0.415** (2.55)	0.467*** (2.76)	0.141*** (14.99)	0.187*** (13.8)	0.209*** (14.15)
	Own, Prov, Ind, Year FE; Noise + Firm Controls			State, Ind FE; Noise + Firm Controls		
R-squared	0.52	0.58	0.60	0.33	0.30	0.32
# observations	1,778	1,780	1,780	10,000	10,000	10,000
# firms	290	290	290			

Policy Implications

- ❑ Effective management practices enhance export performance and benefits from GVC participation by enabling more efficient production of more sophisticated products
- ❑ Weak managerial talent and poor product quality may hinder trade, growth and entrepreneurship in developing countries
- ➔ Export liberalization and GVCs may generate higher welfare gains if accompanied with improvements in managerial practices

Way Forward

- ❑ Much scope for future policy-relevant research on the determinants and consequences of firm participation in GVCs
 - productivity, management, finance, ...
 - product quality, production complexity, ...
- ❑ Linkages among upstreamness, value added, network position
 - “growing up the value chain”
 - “smile face of global value chains”
- ❑ How do institutional, labor and capital market imperfections affect firms’ response to new GVC challenges and opportunities?