

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

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Kalina Manova

University of Oxford, NBER and CEPR

Zhihong Yu

University of Nottingham

Links: Kalina Manova's [webpage](#) and [research portfolio](#), [this paper](#), and [these slides](#)

Motivation

- ❑ Decline in transportation costs and policy barriers in recent decades has revolutionized global trade: fragmentation of production across borders
 - Rise in trade in intermediate inputs for further processing and assembly relative to trade in final consumer goods
 - Worldwide, 60 mil workers are employed in 3,500 processing zones spanning 130 mostly developing countries (ILO)

- ❑ This splicing of global production chains raises new policy questions
 - How should trade policy be designed under trade in intermediates?
 - What are the welfare consequences of such trade flows and policies?
 - How is the transmission of shocks across nations affected?

This paper: Study how firms choose their position in global value chain and how this choice affects their performance

Institutional Context

- We exploit two unique institutional features of China's trade 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
- These institutional features introduce wedges between the costs and returns associated with different trade modes

Main Findings

- ❑ Profitability varies systematically across trade strategies
 - Profits, profits-to-sales ratios, and value added are higher for firms that pursue more ordinary relative to processing trade and more import-and-assembly relative to pure assembly

- ❑ Limited access to capital determines exporters' choice of trade regime
 - Across firms, financially healthier firms pursue more ordinary relative to processing trade and more import-and-assembly relative to pure assembly
 - Across sectors within firms, firms perform more OT than PT and more PI than PA in financially less vulnerable sectors
 - Within firms over time, improvements in financial health are followed by reallocations of trade activity towards regimes with higher working capital needs
 - Within firms over time, financial health prior to exogenous MFA reform determines export mode for first-time export entry after reform

Implications for Trade Organization

- ❑ Credit constraints affect the organization of production across firm and country boundaries
 - Which stages of the value chain (input sourcing, final good production, foreign distribution) are integrated under the control of different trade parties
 - Financially underdeveloped countries potentially stuck in low value-added stages of global production chains

(Antràs, Desai & Foley 2009; Manova, Wei & Zhang 2009; Carluccio and Fally 2010; Costinot, Vogel & Wang 2011; Antràs & Chor 2011; Feenstra & Hanson 2003; Feenstra et al. 2011)
- ❑ Financial frictions influence the design of international trade contracts
 - Pure assembly as a codified form of trade credit (Antràs & Foley 2011)
- ❑ Removing firms' liquidity constraint in China would increase aggregate profits by 5.5bil RMB (1.3%) and real value added by 15.2bil RMB (0.7%)

Implications for Trade Policy

- ❑ Facilitating access to imported materials can boost export performance
 - Foreign inputs of superior quality enable firms in developing countries to expand product scope and upgrade product quality
(Kugler & Verhoogen 2009, 2012; Goldberg, Khandelwal, Pavcnik & Topalova 2010; Manova & Zhang 2012)

- ❑ Trade policies can have differential effects across heterogeneous firms
 - Processing regime allows more firms to share in the gains from trade?
 - Imperfect financial markets justify government regulation of trade flows?

- ❑ Multilateral tariff reductions can encourage trade in intermediates
 - Complementarities in trade policies across countries (Antràs & Staiger 2012)

Broader Contributions

- ❑ Growing evidence that credit constraints impede trade activity in normal times and during crisis episodes
 - Manova 2007; Berman & Héricourt 2010; Chor & Manova 2012; Bricongne et al. 2012; Amiti & Weinstein 2011; Minetti & Zhu 2011; Feenstra et al. 2011...

- ❑ Global production chains and their role in the transmission of shocks across countries during recent financial crisis
 - Levchenko et al. 2010; Johnson 2011; Bems et al. 2011; Johnson & Noguera 2012; Antràs & Chor 2011; Fally 2011...

Outline

1. Motivation
2. Conceptual framework
3. Empirical evidence
 1. Cross-section
 2. Dynamics
 3. Financial vulnerability
4. Conclusions

Conceptual Framework

□ Set up

- Chinese firm faces foreign demand for a product
- Manufacturing and selling the product requires multiple activities (product design, input sourcing, input assembly, marketing, distribution)
- Each activity entails up-front costs incurred before payoffs realized
- Not all required inputs available domestically

□ Chinese firm can choose OT, PI or PA trade regime

- With OT, Chinese firm operates completely independently and captures all profits
- With PT, Chinese firm and foreign trade partner make relationship-specific investments in product design, input sourcing, assembly, and distribution

Firm Profits

- ❑ Profit sharing determined by ex-post Nash bargaining
 - Bargaining weight plausibly increases with contribution to total costs

- ❑ Trade regime ranking
 - Profits: $PA < PI < OT$
 - Liquidity needs: $PA < PI < OT$

- ❑ Other factors
 - Liquid firm chooses OT only if it is more profitable than PI (revealed preference)
 - OT firms can choose to use domestic inputs if that is more profitable
 - Imperfect contractibility generates moral hazard in production so that trade partners may underinvest under PI and PA

Trade Regime Choice

Stark prediction

- Most financially constrained exporters choose PA and earn low profits.
 - Less financially constrained exporters choose PI and earn higher profits.
 - Least financially constrained exporters choose OT and earn highest profits.
- Smoothing this prediction: firms pursue mixed export strategies if they manufacture multiple products with different cost and revenue structures

Hypothesis 1 Across sectors within a firm, the share of processing exports in total exports and the share of pure assembly in processing exports increase with sectors' financial dependence.

Hypothesis 2 Across firms, financially healthier firms have lower shares of processing exports in total exports and of pure assembly in processing exports.

Hypothesis 3 Across firms, profits fall with both shares.

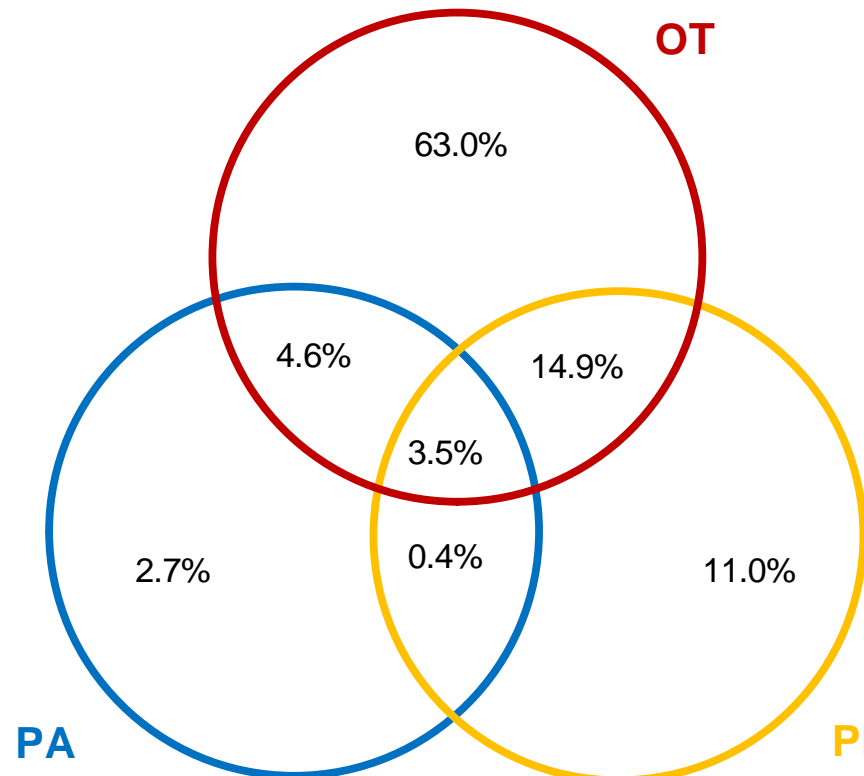
Data Overview

- ❑ Chinese Customs Records matched to Census of Manufacturers, 2005
 - Merge based on firm names and contact information (Wang and Yu 2011)
 - Balance sheet data for 44% of all exporters and trade data for 67% of census manufacturers with positive exports
 - Large and representative matched sample: 50,606 firms

- ❑ Considerable variation in performance and trade activity across firms
 - Profits / Sales : avg 0.03, st dev 0.20
 - $(PA+PI) / (PA+PI+OT)$: avg 0.27, st dev 0.41
 - $PA / (PA+PI)$: avg 0.24, st dev 0.41

Choice of Export Regimes

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



Estimation Strategy I

- Document the conditional correlation between firms' performance and export trade regime choices

$$\text{Profitability}_f = \alpha + \beta \cdot \text{TradeShare}_f + \Gamma \cdot Z_f + \varphi_p + \varphi_i + \varphi_{\text{own}} + \varepsilon_f$$

- Profitability_f: total profits, profits-to-sales ratio
- TradeShare_f: trade regime composition of firm exports
- Z_f: firm size (log employment)
- φ_p, φ_i : province and industry FE; 31 regions and 475 sectors
control for differences in factor costs, factor intensities, trade costs, demand shocks, financial market development, institutional frictions...
- φ_{own} : ownership FE; SOE, JV, MNC
control for differences in average productivity, managerial talent, worker skill, tax treatment, total external finance...

Trade Regimes and Firm Profitability

- Profitability and value added increase as firms re-orient foreign sales from pure assembly to processing with imports to ordinary trade
 - Reallocating 10% exports from PT to OT (from PA to PI) is accompanied by 1.5% (2.8%) rise in profits

Outcome variable:	(PA+PI)/(PA+PI+OT)		PA/(PA+PI)	
	All Exporters	Pure Exporters	All Exporters	Pure Exporters
(Log) Profits	-0.151***	-0.221***	-0.275***	-0.289***
Profits/sales	-0.016***	-0.023***	-0.013***	-0.019***
(Log) Total sales	-0.063***	-0.199***	-0.451***	-0.584***
(Log) Value added	-0.108***	-0.149***	-0.229***	-0.227***
Size; Own, Prov, Ind FE	Y	Y	Y	Y

Estimation Strategy II

- Examine the determinants of trade regime choices: firms' financial health

$$\text{TradeShare}_f = \alpha + \beta \cdot \text{FinHealth}_f + \Gamma \cdot Z_f + \varphi_p + \varphi_i + \varphi_{\text{own}} + \varepsilon_f$$

- TradeShare_f : trade regime composition of firm exports
- FinHealth_f : firm's liquidity or leverage ratio lagged by 1 year
- φ_p, φ_i : province and industry FE
- φ_{own} : ownership FE
- β identified from the variation across firms

Firms' Financial Health

☐ Liquidity

- $(\text{current assets} - \text{current liabilities}) / \text{total assets}$
- Avg 0.09, st dev 0.32
- Captures firms' availability of liquid capital

☐ Leverage

- short-term debt / current assets
- Avg 0.99, st dev 1.28
- More financial obligations in the short run imply less freedom in managing cash flows and greater difficulty in raising additional capital

☐ Expect firms with high liquidity and low leverage to be less constrained

☐ Lag by 1 year to alleviate concern with reverse causality

Trade Regimes and Firm Financial Health

- Firms with low liquidity and high leverage conduct relatively more processing trade and pure assembly in particular
 - One st dev improvement in liquidity (leverage) would generate 1-1.5% decline in $(PA+PI)/(PA+PI+OT)$ and up to 1% drop in $PA/(PA+PI)$

Dependent variable	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity		
Lag liquidity	-0.044*** (-8.72)	-0.020*** (-2.73)
R^2	0.42	0.23
# Observations	46,573	20,555
Panel B. Leverage		
Lag leverage	0.005*** (3.50)	0.007** (2.00)
R^2	0.42	0.23
# Observations	46,557	20,545
Own, Prov, Ind FE	Y	Y

Trade Regimes and Firm Financial Health

- Results robust to controlling for firm productivity and variables related to firms' production technology (age and factor intensity)

Dependent variable	Productivity, size control		Full control	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity				
Lag liquidity	-0.012** (-2.18)	-0.015** (-2.03)	-0.011* (-1.96)	-0.017** (-2.21)
Lag productivity	-0.017*** (-9.42)	-0.018*** (-6.71)	-0.024*** (-11.57)	-0.015*** (-5.12)
Lag log employment	0.068*** (41.35)	-0.011*** (-4.47)	0.069*** (38.03)	-0.014*** (-5.21)
R^2	0.44	0.23	0.45	0.23
# Observations	43,125	19,145	43,103	19,134
Own, Prov, Ind FE	Y	Y	Y	Y
Age; K, H, M intensity	-	-	Y	Y

Trade Regimes and Firm Financial Health

- Results robust to controlling for firm productivity and variables related to firms' production technology (age and factor intensity)

Dependent variable	Productivity, size control		Full control	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel B. Leverage				
Lag leverage	0.002** (2.40)	0.007* (1.89)	0.002** (2.39)	0.007* (1.93)
Lag productivity	-0.018*** (-9.93)	-0.018*** (-6.63)	-0.024*** (-12.03)	-0.015*** (-5.11)
Lag log employment	0.068*** (42.17)	-0.011*** (-4.45)	0.069*** (38.85)	-0.014*** (-5.21)
R^2	0.44	0.23	0.44	0.23
# Observations	43,113	19,137	43,092	19,127
Own, Prov, Ind FE	Y	Y	Y	Y
Age; K, H, M intensity	-	-	Y	Y

Bilateral Trade Shares

- Set of export destinations vary across firms, and different trade regimes might be best suited to serving different markets for reasons other than financial frictions

$$\text{TradeShare}_{fd} = \alpha + \beta \cdot \text{FinHealth}_f + \Gamma \cdot Z_f + \varphi_p + \varphi_i + \varphi_d + \varphi_{\text{own}} + \varepsilon_{fd}$$

- TradeShare_{fd} : exporter f 's trade shares by destination d
 - φ_d : destination country FE control for differences in trade costs, demand conditions, and the broader economic environment
- Alternatively, replace trade share with binary indicator for value > 0

Bilateral Trade Shares

- Qualitatively similar estimates of greater magnitudes than firm-level analysis

Dependent variable	Bilateral trade share		Binary bilateral trade share	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity				
Lag liquidity	-0.011* (-1.68)	-0.029** (-2.21)	-0.017** (-2.04)	-0.026* (-1.96)
Lag productivity	-0.023*** (-7.45)	-0.023*** (-6.02)	-0.018*** (-5.82)	-0.023*** (-5.80)
Lag log employment	0.070*** (27.37)	-0.002 (-0.59)	0.080*** (29.89)	0.0004 (0.12)
R^2	0.43	0.22	0.40	0.24
# Observations	379,941	126,489	379,941	126,489
Own, Prov, Ind FE	Y	Y	Y	Y
Age; K, H, M intensity	Y	Y	Y	Y
Destination FE	Y	Y	Y	Y

Bilateral Trade Shares

- Qualitatively similar estimates of greater magnitudes than firm-level analysis

Dependent variable	Bilateral trade share		Binary bilateral trade share	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel B. Leverage				
Lag liquidity	0.004** (2.57)	0.013*** (4.02)	0.004*** (3.25)	0.012*** (3.91)
Lag productivity	-0.023*** (-7.70)	-0.022*** (-5.98)	-0.019*** (-6.16)	-0.022*** (-5.74)
Lag log employment	0.070*** (27.97)	-0.002 (-0.72)	0.081*** (30.62)	-0.00003 (-0.01)
R^2	0.43	0.22	0.40	0.24
# Observations	379,893	126,466	379,893	126,466
Own, Prov, Ind FE	Y	Y	Y	Y
Age; K, H, M intensity	Y	Y	Y	Y
Destination FE	Y	Y	Y	Y

Multiple Products and Sectors per Firm

- Account for the fact that many exporters are active in multiple industries

$$\text{TradeShare}_{fi} = \alpha + \beta \cdot \text{FinHealth}_f + \Gamma \cdot Z_f + \varphi_p + \varphi_i + \varphi_{\text{own}} + \varepsilon_{fi}$$

$$\text{TradeShare}_{fdi} = \alpha + \beta \cdot \text{FinHealth}_f + \Gamma \cdot Z_f + \varphi_p + \varphi_d + \varphi_i + \varphi_{\text{own}} + \varepsilon_{fdi}$$

Dependent variable	Binary trade share (ISIC)		Binary bilateral trade share (ISIC)		Binary bilateral trade share (HS)	
	$\frac{\text{PA} + \text{PI}}{\text{PA} + \text{PI} + \text{OT}}$	$\frac{\text{PA}}{\text{PA} + \text{PI}}$	$\frac{\text{PA} + \text{PI}}{\text{PA} + \text{PI} + \text{OT}}$	$\frac{\text{PA}}{\text{PA} + \text{PI}}$	$\frac{\text{PA} + \text{PI}}{\text{PA} + \text{PI} + \text{OT}}$	$\frac{\text{PA}}{\text{PA} + \text{PI}}$
Panel A. Liquidity						
Lag liquidity	-0.008* (-1.68)	-0.021* (-2.37)	-0.017* (-1.70)	-0.022* (-1.72)	-0.011* (-1.67)	-0.048*** (-3.26)
R ²	0.28	0.21	0.32	0.17	0.41	0.38
# Observations	92,370	28,487	198,203	153,732	887,777	274,508
Panel B. Leverage						
Lag leverage	0.003** (2.33)	0.012*** (4.82)	0.003*** (2.63)	0.016*** (6.74)	0.004** (2.13)	0.016*** (6.36)
R ²	0.28	0.21	0.32	0.17	0.41	0.39
# Observations	92,647	28,474	498,138	453,704	887,675	274,465
Firm controls	Y	Y	Y	Y	Y	Y
Own, Prov FE	Y	Y	Y	Y	Y	Y
Destination FE	-	-	Y	Y	Y	Y
Industry FE	ISIC3	ISIC3	ISIC3	ISIC3	HS8	HS8

Endogeneity and Reverse Causality I

- ❑ Firms may sort into trade regimes for non-finance related reasons
 - Potential endogeneity if financial markets are frictionless, unlike in China
 - Even if export levels might affect firms' access to finance, less obvious how the composition of exports would

- ❑ Concern 1: with frictionless capital markets, manufacturers would raise all the funds needed to pursue their optimal export strategy
 - Variation in liquidity needs across trade modes could explain the relationship between firms' trade regime choices and observed use of external finance

- ❑ Concern 1 unlikely: substantial variation in profitability across trade regimes
 - Were Chinese exporters financially unconstrained, they would have pursued ordinary trade *ceteris paribus*

Endogeneity and Reverse Causality II

- ❑ Concern 2: with frictionless capital markets, financiers might be more willing to fund more profitable ventures
 - Trade regimes may differ in profitability for exogenous and non-finance reasons, unlike in our model
 - Exporters active in trade regimes that happen to have lower returns would record lower liquidity and higher leverage

- ❑ Concern 2 unlikely: requires very special alignment of exogenous forces
 - We nevertheless also explore multiple other sources of variation in the data to identify the causal effect of financial frictions

Estimation Strategy III

- Exploit the variation in financial health within firms over time

$$\text{TradeShare}_{f dt} = \alpha + \beta \cdot \text{FinHealth}_{f,t-1} + \Gamma \cdot Z_{f,t-1} + \varphi_f + \varphi_d + \varphi_t + \varepsilon_{f dt}$$

$$\text{TradeShare}_{f dit} = \alpha + \beta \cdot \text{FinHealth}_{f,t-1} + \Gamma \cdot Z_{f,t-1} + \varphi_f + \varphi_d + \varphi_i + \varphi_t + \varepsilon_{f dit}$$

- φ_d : destination country FE control for differences in trade costs, demand conditions, and the broader economic environment
 - φ_f : firm FE control for time-invariant firm characteristics (entrepreneurial ability, bank relationships, export experience, ownership type, ...)
- Also study how financial health prior to export entry affects trade regime choice upon export entry for new exporters in the panel
 - Endogeneity less likely with ex-ante uncertainty about export success, especially in response to exogenous export shock

Export Survivors in the Panel

- Improvements in financial health within firms over time followed by activity shifting across trade regimes

Dependent variable	Binary bilateral trade share		Binary bilateral trade share by ISIC-3	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity				
Lag liquidity	-0.007** (-2.50)	-0.005* (-1.92)	-0.008** (-2.17)	-0.008** (-2.55)
R^2	0.82	0.89	0.70	0.85
# Observations	1,427,114	507,415	1,868,108	619,636
Panel B. Leverage				
Lag leverage	0.0003* (1.67)	0.0004* (2.20)	0.0006* (1.85)	0.0004* (1.91)
R^2	0.82	0.89	0.70	0.85
# Observations	1,427,041	507,382	1,867,978	619,598
Productivity; size; age; K, H intensity	Y	Y	Y	Y
Year, Destination FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Industry FE	-	-	ISIC-3	ISIC-3

Export Entry in the Panel

- New exporters with low liquidity and high leverage enter with relatively more processing trade and pure assembly in particular

Dependent variable	Binary bilateral trade share		Binary bilateral trade share by ISIC-3	
	PA + PI	PA	PA + PI	PA
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity				
Lag liquidity	-0.035*** (-2.82)	-0.070** (-2.50)	-0.042*** (-3.27)	-0.066** (-2.29)
R^2	0.35	0.40	0.32	0.42
# Observations	78,194	13,465	94,691	14,996
Panel B. Leverage				
Lag leverage	0.007** (2.20)	0.023** (2.17)	0.009** (2.49)	0.018* (1.68)
R^2	0.35	0.40	0.32	0.42
# Observations	78,184	13,465	94,677	14,996
Productivity; size; age; K, H intensity	Y	Y	Y	Y
Year, Destination FE	Y	Y	Y	Y
Firm FE	-	-	-	-
Industry FE	GBT4	GBT4	ISIC-3	ISIC-3

Export Entry after MFA Quota Removal

- After the removal of MFA quotas, new MFA exporters with low liquidity and high leverage enter with more processing trade and pure assembly in particular

Dependent variable	Binary bilateral trade share	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Liquidity		
Lag liquidity	-0.052* (-1.89)	-0.075* (-1.91)
R^2	0.44	0.40
# Observations	3731	1339
Panel B. Leverage		
Lag leverage	0.008*** (4.77)	0.013*** (2.96)
R^2	0.44	0.41
# Observations	3731	1339
Productivity; size; age; K, H intensity	Y	Y
Year, Destination FE	Y	Y
Firm FE	-	-
Industry FE	GBT4	GBT4

Estimation Strategy IV

- Exploit the variation in financial vulnerability across sectors within firms

$$\text{TradeShare}_{fi} = \alpha + \beta \cdot \text{FinVuln}_i + \Gamma \cdot Z_i + \varphi_f + \varepsilon_{fi}$$

$$\text{TradeShare}_{fdi} = \alpha + \beta \cdot \text{FinVuln}_i + \Gamma \cdot Z_i + \varphi_f + \varphi_d + \varepsilon_{fdi}$$

- TradeShare_{fi} : trade regime composition of firm exports by industry
- FinVuln_i : sector's financial vulnerability
- Z_i : sector's K, H and RS intensity
- φ_f, φ_d : firm FE, destination country FE
- β identified from the variation across sectors within firms

Sectors' Financial Vulnerability

- ❑ Industries differ substantially in their reliance on the financial system for technological reasons that are innate to the nature of the manufacturing process and beyond the control of individual firms

- ❑ Four commonly used indicators of sectors' financial vulnerability
 - Working capital requirement: inventories-to-sales ratio
 - Long-run investment needs: external finance dependence, R&D intensity
 - Availability of collateral: asset tangibility

Trade Regimes and Sectors' Fin Vulnerability

- Firms conduct relatively more processing trade and pure assembly in particular in financially vulnerable sectors
 - Increasing short-run liquidity needs by 20% results in 10% rise in $(PA+PI)/(PA+PI+OT)$ and 4% growth in $PA/(PA+PI)$

Dependent variable	Baseline		Bilateral trade share	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Panel A. Working capital requirements: inventories ratio				
Inventories ratio	0.497*** (23.43)	0.201*** (2.77)	0.538*** (20.90)	0.084** (1.99)
R^2	0.86	0.97	0.83	0.94
Panel B. Long-run investment needs: external finance dependence				
External finance dependence	0.050*** (21.82)	-0.0001 (-0.03)	0.049*** (18.23)	-0.002 (-0.46)
R^2	0.86	0.97	0.83	0.94
K, H, RS intensity; Firm FE	Y	Y	Y	Y
Destination FE	-	-	Y	Y
# Firms	110,018	41,041	110,018	41,041
# Observations	252,296	59,263	1,142,871	264,585

Trade Regimes and Sectors' Fin Vulnerability

- Unlike processing vs. ordinary exports, trade-off between PA and PI unrelated to the financing of long-run capital projects or to asset tangibility
 - Results robust to controlling for variation across export destinations

Dependent variable	Baseline		Bilateral trade share	
	PA + PI	PA	PA + PI	PA
	PA + PI + OT	PA + PI	PA + PI + OT	PA + PI
Panel C. Long-run investment needs: R&D intensity				
R&D intensity	0.988*** (22.81)	-0.018 (-0.24)	0.901*** (16.68)	-0.032 (-0.55)
R^2	0.86	0.97	0.83	0.94
Panel D. Access to collateral: asset tangibility				
Asset tangibility	-0.208*** (-18.05)	-0.038 (-1.12)	-0.207*** (-15.94)	-0.028 (-1.42)
R^2	0.86	0.97	0.83	0.94
K, H, RS intensity; Firm FE	Y	Y	Y	Y
Destination FE	-	-	Y	Y
# Firms	110,018	41,041	110,018	41,041
# Observations	252,296	59,263	1,142,871	264,585

Additional Tests and Robustness

- ❑ Empirical patterns robust to series of specification checks
 - Binary trade regime shares
 - Alternative levels of clustering
 - Panel for 2002-2006 with year FE

- ❑ Additional results corroborate interpretation
 - Results stronger in Chinese regions with weaker financial development
 - Results stronger for destinations with superior financial development
 - Results stronger in sectors with more relationship specificity
 - Firms' import behavior consistent with their export strategy

Financial Devt across Chinese Provinces

- Exploit the variation in financial development across provinces

$$\text{TradeShare}_{fd} = \alpha + \beta \cdot \text{FinHealth}_f + \Gamma \cdot Z_f \\ + \delta \cdot \text{FinHealth}_f \cdot \text{HighFinDevt}_p + \varphi_p + \varphi_i + \varphi_d + \varphi_{\text{own}} + \varepsilon_{fd}$$

$$\text{TradeShare}_{fdi} = \alpha + \beta \cdot \text{FinVuln}_i + \Gamma \cdot Z_i \\ + \delta \cdot \text{FinVuln}_i \cdot \text{HighFinDevt}_p + \varphi_f + \varphi_d + \varepsilon_{fdi}$$

- HighFinDevt_p : 1 if province with financial development above the sample median
- Proxy regional financial conditions with ratio of total credit to GDP

Financial Devt across Chinese Provinces

- The export decisions of firms in financially more developed provinces are less sensitive to firms' financial health and sectors' financial vulnerability

Financial measure	Firm fin health (lagged liquidity)		Sector financial vulnerability (inventories ratio)	
	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$	$\frac{PA + PI}{PA + PI + OT}$	$\frac{PA}{PA + PI}$
Financial measure	-0.027**	-0.079***	1.252***	0.324**
× High Fin Devt	0.017*	0.081***	-0.787***	-0.220**
R^2	0.40	0.24	0.77	0.92
# Observations	379,941	126,486	1,142,871	264,585
Productivity; size; age; factor intensity	Y	Y	-	-
Own, prov, destination FE	Y	Y	-	-
K, H, RS intensity	-	-	Y	Y
Firm, destination FE	-	-	Y	Y
Industry FE	GBT4	GBT4	-	-

Firms' Import Strategies

- Firms' import behavior is consistent with their export strategy
 - Firms with more processing exports (pure assembly) also import more foreign materials under the processing regime (pure assembly)

Dependent variable: $\frac{IPA+IPI}{IPA+IPI+IOT}$

$\frac{PA + PI}{PA + PI + OT}$	0.603*** (111.97)				
Liquidity		-0.026*** (-4.51)	-0.014** (-2.33)		
Leverage				0.002* (1.95)	0.001 (0.92)
Productivity				-0.028*** (-12.00)	-0.029*** (-12.54)
R^2	0.58	0.40	0.40	0.40	0.40
# Observations	30,274	32,530	30,167	32,518	30,159

Firms' Import Strategies

- Firms' import behavior is consistent with their export strategy
 - Credit-constrained firms not only export more under processing trade (pure assembly), but also import more under processing trade (pure assembly)

Dependent variable: $\frac{IPA}{IPA+IPI}$

$\frac{PA}{PA + PI}$	0.946*** (294.23)				
Liquidity		-0.021*** (-2.86)	-0.015* (-1.94)		
Leverage				0.007** (2.02)	0.007* (1.86)
Productivity			-0.017*** (-6.33)		-0.016*** (-6.12)
R^2	0.93	0.21	0.21	0.21	0.22
# Observations	20,483	20,952	19,505	20,944	19,500

Conclusions

- ❑ Financial frictions affect the organization of production across firms and countries
 - Financial factors determine firms' GVC position and profitability
 - Firms may grow over time by gradually expanding along the value chain
 - Financially underdeveloped countries potentially stuck in low value added stages of global production chains

- ❑ Aggregate and distributional consequences of trade policy in the presence of financial frictions and global value chains

- ❑ Cross-border linkages via global production chains