

Firm Exports and MNC Activity Under Credit Constraints

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Kalina Manova

University of Oxford, NBER and CEPR

Shang-Jin Wei

Columbia University and NBER

Zhiwei Zhang

Nomura Asset Management

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

Motivation

- ❑ Growing evidence that credit constraints severely hamper trade activity
 - The strength of countries' financial institutions is an important determinant of the volume and sectoral composition of their export flows
 - Corroborative findings at the level of the firm
 - Credit tightening contributed to the collapse in trade during the 2008-2009 crisis

- ❑ The role of financial frictions in trade has important policy implications
 - Many financially underdeveloped countries rely on trade for economic growth
 - Presumption that foreign direct and portfolio investment can offset the detrimental consequences of financial underdevelopment

- ❑ But limited direct evidence on the effect of credit constraints on firm exports and the potential mitigating role of cross-border capital flows
 - Little interaction between literatures on finance and trade and on MNCs' production and organizational decisions

This Paper

- ❑ An integrated analysis of the role that financial frictions play in:
 - Constraining firms' export participation
 - Shaping the spatial and sectoral composition of MNC activity

- ❑ Identification strategy: exploit the variation in export performance across sectors at different levels of financial vulnerability and across firms of different ownership types
 - Use rich customs data on the universe of Chinese exporting firms
 - Isolate a causal effect of credit constraints on firms' extensive and intensive margin of trade
 - Identify how financial considerations impinge on MNC decisions

Main Findings

- ❑ Foreign affiliates and joint ventures outperform private domestic firms, especially in sectors at higher levels of financial vulnerability
 - Advantage particularly strong when firms face high export costs
 - Evidence that credit constraints restrict firms' export activity and affect the organizational decisions of multinational enterprises
 - Impact of financial considerations comparable to other determinants of MNC activity (cost minimization, innovation, contractual imperfections)

- ❑ Financial frictions hamper firms' extensive and intensive margin of trade
 - Firms face binding constraints in the financing of both fixed and variable costs
 - Limited access to capital distorts trade flows more than domestic activities
 - This has implications for the role of credit constraints in the adjustment to trade reforms, exchange rate movements and other cost or demand shocks

Contribution to the Literature

- ❑ Country- and firm-level evidence on the detrimental effects of financial frictions on trade
 - Beck 2002,2003, Becker-Greenberg 2007, Manova 2007, Greenaway et al. 2007, Muûls 2008, Berman-Héricourt 2008, Amiti-Weinstein 2009, Minetti-Zhu 2010, Bricongne et al. 2010
- ❑ Recent work on MNC activity under financial frictions
 - Desai-Foley-Forbes 2008, Antràs-Desai-Foley 2009, Chor-Foley-Manova 2007, Buch et al. 2009
- ❑ Evidence on the role of foreign equity flows in alleviating the impact of credit constraints on trade
 - Harrison-McMillan-Love 2004, Manova 2008
- ❑ Literature on the importance of financial integration in promoting growth, investment and entrepreneurship in host countries
 - Alfaro-Charlton 2007, Alfaro et al. 2009

Outline

1. Theoretical background
2. Data
3. Empirical results
 1. Baseline
 2. Sensitivity analysis
 3. Intensive and extensive margins
 4. Additional evidence
4. Conclusion

Why Exporters Require External Finance

- ❑ 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
 - Additional upfront costs specific to export activities
 - Cross-border shipments take 30-90 days longer to process
 - International transactions are riskier
- ❑ Very active market for the financing and insurance of international transactions, worth \$10-\$12 trillion in 2008
 - 90% of world trade relies on some form of trade finance

Financial Vulnerability Across Sectors

- ❑ 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

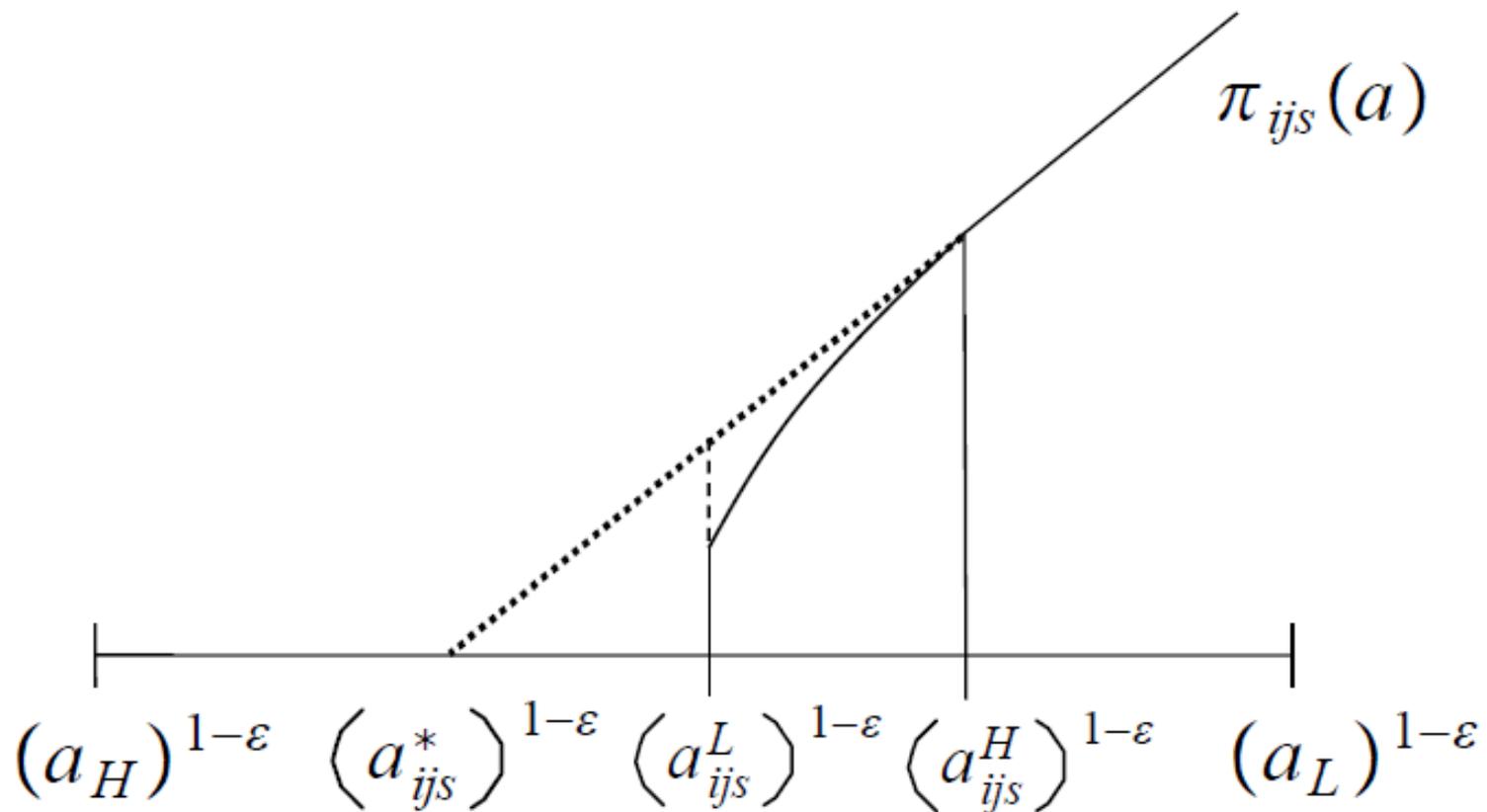
- ❑ Two measurable dimensions of sectors' financial vulnerability:
 - Liquidity needs: requirements for external finance (Rajan-Zingales 1998)
 - Availability of collateral: asset tangibility (Braun 2003, Claessens-Laeven 2003)

Theoretical Background

- ❑ Setup: exporters require external capital which they can raise by pledging collateral (Manova 2013)
 - More productive firms less credit constrained because they can offer investors higher repayment when contract is enforced

- ❑ Key implications:
 - Financial frictions reinforce the selection of only the most productive firms into exporting and preclude potentially profitable firms from exporting
 - If firms require external finance for variable costs, credit constraints also restrict the volume of firms' exports
 - With repeated fixed costs of exporting at the destination-product level, credit constraints limit firms' export product scope and trade partner intensity
 - Bigger distortions in financially dependent sectors

Credit Constraints and Firms' Export Activity



MNCs and Internal Capital Markets

- Relative to domestic firms, the affiliates of foreign multinationals have access to additional financing via internal capital markets
 - Headquarters can fund affiliate operations when they cannot raise sufficient capital in local financial markets
 - Conditional on foreign ownership, expect MNC affiliates to enjoy a comparative advantage in financially vulnerable sectors

- MNCs' integration decisions are endogenous (Antràs-Desai-Foley 2009)
 - In the presence of financial frictions, headquarters more likely to integrate affiliates in financially vulnerable sectors
 - Foreign ownership alleviates credit constraints either directly through parent financing or indirectly by providing monitoring to incentivize local financiers

Multi-Sector Firms

- ❑ Credit constraints can also affect the activities of multi-sector firms
 - Firms with limited access to external finance will direct resources towards sectors with lower requirements for outside capital and sectors with greater endowments of collateralizable assets
 - This adjustment is not only optimal for given total availability of external credit, but can also improve firms' ability to raise outside finance

- ❑ Testable implications
 - Relative to domestic firms, MNCs will earn higher export revenues from more products and destination markets in more financially vulnerable sectors, even controlling for firm fixed effects

Other Effects of Credit Constraints

- ❑ Limited access to external finance can constrain a firm's export activity at any level of firm export potential

- ❑ But credit constraints can also directly affect firms' export potential by...
 - ...curtailing productivity upgrading via investment in superior production technologies
 - ...precluding improvements in product quality via the use of better intermediate inputs and more skilled workers

- ❑ Our empirical analysis captures the total effect of credit constraints on firm export performance, via all three channels
 - Data limitations make it difficult to separately evaluate each mechanism
 - Evidence from quantity and price data suggest capacity constraints important

Chinese Trade Data

- Detailed customs records on the universe of Chinese trading firms (Manova-Zhang 2008)
 - Firm-level data on exports by product and trade partner
 - Firm ownership types: private domestic, SOE, joint venture, MNC affiliate
 - 96,522 exporters, 6,908 HS-8 products, 231 destinations
 - Annual data for 2005

Note: We exclude wholesalers that serve as intermediaries between foreign and domestic firms but do not manufacture

Note: We exclude SOEs as the Chinese government exerts considerable pressure over their activities and sectoral orientation

Sectors' Financial Vulnerability

- ❑ Four commonly used indicators of sectors' technologically-determined level of financial vulnerability
 - Reliance on external finance: external finance dependence, inventories-to-sales ratio
 - Availability of collateral: asset tangibility
 - Alternative sources of external capital: trade credit intensity

- ❑ Use the first principal component of external finance dependence and asset tangibility as a summary measure of financial vulnerability

Sectors' Financial Vulnerability

- ❑ Measures constructed from data on all publicly-traded US-based companies from Compustat (Kroszner-Laeven-Klingebiel 2007)
 - Standard practice in the literature
 - Median firm's value of 1980-1999 average across firms in a sector
 - Measures and sector ordering stable over time

- ❑ Three advantages to constructing measures from US firm-level data
 1. Sophisticated financial systems, so that the measure reflect firms' optimal choice over external financing and asset structure
 2. Sector measures are not endogenous to countries' level of financial development (possible downward bias)
 3. Identification requires that ranking of sectors, not levels, remain stable across countries

Sectors' Financial Vulnerability

- ❑ Measures capture firms' overall financing decisions and asset composition and are not specific to international trade activities
- ❑ However, these measures reflect technological characteristics that shape both domestic and cross-border production and sales
 1. Manufacturing costs same for home and foreign market and large part of total export costs
 2. Products that entail a lot of R&D, marketing research and distribution costs at home plausibly also require similarly large fixed costs for product customization, marketing and distribution networks in foreign markets
 3. Compustat firms are typically large exporters
- ❑ Identification requires only that ranking of sectors similar for domestic production and exporting

A First Glance at the Data

- Foreign affiliates and joint ventures mediate a bigger share of Chinese exports in financially vulnerable sectors relative to private domestic firms

Firm Type	All Firms	State Owned	Private Domestic	Joint Ventures	Foreign Owned
Total exports	531.36	9.8%	12.9%	26.3%	51.0%
A. Classifying sectors by external finance dependence					
Low	173.47	14.9%	23.4%	29.4%	32.3%
High	357.89	7.3%	7.8%	24.8%	60.1%
B. Classifying sectors by inventories ratio					
Low	94.01	19.9%	18.8%	32.1%	29.2%
High	437.35	7.6%	11.6%	25.1%	55.7%

A First Glance at the Data

- Foreign affiliates and joint ventures mediate a bigger share of Chinese exports in financially vulnerable sectors relative to private domestic firms

Firm Type	All Firms	State Owned	Private Domestic	Joint Ventures	Foreign Owned
Total exports	531.36	9.8%	12.9%	26.3%	51.0%

C. Classifying sectors by asset tangibility

Low	423.04	6.2%	9.9%	25.9%	58.0%
High	108.32	23.8%	24.4%	28.1%	23.7%

D. Classifying sectors by trade credit intensity

Low	285.63	4.9%	7.5%	24.8%	62.8%
High	245.73	15.5%	19.1%	28.1%	37.3%

Estimation Strategy

- Exploit the variation in exports across firms with different organizational structure and across sectors at different levels of financial vulnerability

$$\log Exports_{fi} = \alpha + \beta \cdot FinVuln_i \times D_f^{JV} + \gamma \cdot FinVuln_i \times D_f^{MNC} + \varphi_f + \varphi_i + \varepsilon_{fi}$$

- Industry FE control for sectors' factor costs, trade costs, demand shocks, ...
- Firm FE control for differences in size, productivity, managerial competence, labor skill composition, access to distribution networks abroad...

Credit Constraints and Firm Exports

Dependent variable: Log firm exports by sector

221,801 observations, 88,004 firms, 36 sectors

Financial Vulnerability Measure	First Principal Component	Ext Fin Dependence	Inventories Ratio	Asset Tangibility	Trade Credit Intensity
JV × Financial Vulnerability	0.54 (4.68)***	0.88 (4.09)***	6.76 (1.96)***	-2.94 (-3.05)***	-1.56 (-0.40)
MNC × Financial Vulnerability	0.67 (6.37)***	0.94 (3.40)***	7.20 (2.56)**	-4.18 (-4.69)***	-5.40 (-1.46)
Size × Financial Vulnerability	0.16 (3.42)***	0.21 (1.84)*	2.93 (3.35)***	-1.16 (-3.96)***	-0.72 (-0.76)
Sector FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
R^2	0.52	0.51	0.51	0.52	0.51

Results below always use first principal component (FPC) as financial vulnerability measure

The Advantages of Foreign Ownership

- ❑ Foreign affiliates and joint ventures export more than domestic firms, and this advantage is systematically bigger in financially vulnerable sectors
 - MNC affiliates (joint ventures) outperform private Chinese firms by 31% (29%) more in sectors highly dependent on external capital relative to sectors with low dependence on outside finance
 - Corresponding numbers are 84% (59%) for sectors intensive in soft assets relative to sectors with high asset tangibility and 62% (50%) for sectors more financially vulnerable (measured by FPC)

- ❑ Sectoral composition of firms' exports tends to vary monotonically with the share of foreign ownership
 - Consistent with parent companies providing more internal financing at higher levels of foreign ownership because of greater monitoring rights or managerial control

Firm Selection into Exporting

- ❑ Credit constraints are predicted to both reduce firms' export capacity and deter the least productive firms from exporting

- ❑ Replacing firm fixed effects with ownership dummies reduces the estimates of β and γ by 46% and 19%
 - New estimates capture the combined effect of credit constraints on firm-level exports and on firm selection into exporting
 - Foreign affiliates have lower cutoff productivity especially in financially vulnerable sectors, which reduces the average exports of foreign-owned firms relative to local companies in financially more dependent industries

Endogeneity of Foreign Ownership

- ❑ Concern 1: MNCs may have greater incentives to pursue greenfield FDI or integrate supplier in financially vulnerable sectors
 - Ensure constrained suppliers can make relationship-specific investments
 - Less competition in local market for specialized inputs and in output markets
 - Both consistent with financial frictions affecting firm exports and MNC activity

- ❑ Concern 2: MNCs may outperform domestic firms on average if they intentionally integrate firms with bigger export potential
 - But this cannot rationalize systematic variation across sectors
 - If MNC headquarters specifically target better Chinese firms in financially vulnerable sectors, they plausibly do so precisely because they have a comparative advantage in such sectors due to binding credit constraints

- ➔ Endogeneity not a concern for the interpretation of the results

Sensitivity Analysis

- ❑ Sample selection
 - Point estimates identical with higher statistical significance when omitting single-sector firms (due to firm FE)
 - Results robust to adding SOEs to the sample

- ❑ Sector measures of financial vulnerability may be correlated with other sector characteristics that affect MNC activity
 - Vertical integration more likely than arms-length outsourcing in capital, R&D and contract intensive sectors because of relationship-specific investments or risk of expropriation of intellectual property
 - MNCs may have a comparative advantage in technologically sophisticated products (although this may reflect easier access to external financing)
 - Results robust to including the interactions of firm size and the ownership dummies with sectors' physical/human capital, R&D, or contract intensity

Sensitivity Analysis

- ❑ Foreign-owned firms could face either more or less severe agency problems than domestic firms
 - MNCs from countries with stronger corporate governance institutions than China may better handle conflicts
 - If MNCs are larger on average and have more dispersed shareholders that are less effective at monitoring managers, they may suffer worse agency problems

- ❑ No evidence of this alternative governance explanation
 - Index of industries' corporate governance intensity not significantly correlated with industries' financial vulnerability
 - Adding interactions of firm size and ownership with sectors' governance intensity does not affect the results
 - No evidence that financially more vulnerable sectors attract more MNCs from countries with superior corporate governance institutions or that MNCs from such countries enjoy a comparative advantage in financially sensitive sectors

The Intensive Margin of Firm Exports

- Two dimensions of firms' intensive margin of exports:
 - Export revenues by sector and destination
 - Export revenues by product and destination

- Exploit the variation in exports across firms with different organizational structure, across sectors at different levels of financial vulnerability, and across different destination countries

$$\log Exports_{fdi} = \alpha + \beta \cdot FinVuln_i \times D_f^{JV} + \gamma \cdot FinVuln_i \times D_f^{MNC} + \varphi_f + \varphi_d + \varphi_i + \varepsilon_{fdi}$$

- Industry FE control for sectors' trade costs, demand shocks, etc.
- Destination FE control for trade partner's market size, trade costs, consumer income, bilateral exchange rate, etc.
- Firm FE control for firms' productivity, managerial talent, total external finance, etc.

Intensive Margin Results

Dependent Variable	(log) Exports by Firm-Sector-Destination	(log) Exports by Firm-Product-Destination
JV × Financial Vulnerability	0.47 (5.09)***	0.41 (4.56)***
MNC × Financial Vulnerability	0.62 (7.49)***	0.54 (6.60)***
Size × Financial Vulnerability	0.14 (3.98)***	0.09 (3.71)***
Sector, Firm FE	Yes	Yes
Destination FE	Yes	Yes
# Observations	978,140	1,824,950
# Firms	88,004	88,004
# Sectors	36	36
# Destinations	231	231
R^2	0.37	0.34

The Extensive Margin of Firm Exports

- Four dimensions of firms' extensive margin of exports:
 - # products, # destinations, # destination-product markets by sector
 - # products, by sector and destination

- Exploit the variation in exports across firms with different organizational structure, across sectors at different levels of financial vulnerability, and across different destination countries

$$\log \#DestProducts_{fi} = \alpha + \beta \cdot FinVuln_i \times D_f^{JV} + \gamma \cdot FinVuln_i \times D_f^{MNC} + \varphi_f + \varphi_i + \varepsilon_{fi}$$

$$\begin{aligned} \log \#Products_{fdi} &= \alpha + \beta \cdot FinVuln_i \times D_f^{JV} + \gamma \cdot FinVuln_i \times D_f^{MNC} \\ &\quad + \varphi_f + \varphi_d + \varphi_i + \varepsilon_{fdi} \end{aligned}$$

Extensive Margin Results

Dependent Variable	(log) # Destination-Products by Firm-Sector	(log) # Destinations by Firm-Sector	(log) # Products by Firm-Sector	(log) # Products by Firm-Sector-Destination
JV × Financial Vulnerability	0.11 (1.93)*	0.11 (2.41)**	0.02 (0.36)	0.03 (1.50)
MNC × Financial Vulnerability	0.12 (2.00)*	0.10 (2.33)**	0.02 (0.45)	0.04 (1.78)*
Size × Financial Vulnerability	0.04 (2.84)***	0.03 (3.02)***	0.03 (2.49)**	0.02 (3.32)***
Sector, Firm FE	Yes	Yes	Yes	Yes
Destination FE	-	-	-	Yes
# Observations	221,801	221,801	221,801	978,140
# Firms	88,004	88,004	88,004	88,004
# Sectors	36	36	36	36
# Destinations	-	-	-	231
R^2	0.52	0.55	0.57	0.35

Interpreting the Results

- ❑ Credit constraints restrict firms' ability to expand export scale, to enter more markets and to broaden product scope
 - Foreign affiliates and joint ventures have higher bilateral exports and enter more destination-product markets than domestic firms, especially in financially vulnerable sectors

- ❑ Implications:
 - Exporters face binding credit constraints in the financing of both fixed and variable trade costs
 - Foreign ownership alleviates these constraints via internal capital markets
 - Credit constraints have an effect on export participation above and beyond that on domestic production

Trade Costs Across Destinations

- ❑ Credit constraints presumably restrict trade flows because firms are unable to finance the costs associated with exporting

- ❑ Trade costs vary widely across export destinations
 - Bilateral distance
 - Fixed costs of market entry
(cost, procedures or days to set up a new business, *World Bank Doing Business*)

- ❑ Result: foreign affiliates and joint ventures export relatively more than domestic firms in financially vulnerable sectors, particularly when they face high export costs
 - Confirms mechanism and corroborates interpretation above

Trade Costs Across Destinations

Trade Cost Measure	(log) Distance	(log) Import Cost	(log) Import Docs	(log) Import Days
Cost x	-0.30	-0.38	-1.25	-0.83
Financial Vulnerability	(-3.34) ^{***}	(-3.17) ^{***}	(-4.28) ^{***}	(-4.29) ^{***}
JV x Cost x	0.05	0.07	0.23	0.15
Financial Vulnerability	(5.06)^{***}	(5.10)^{***}	(4.47)^{***}	(4.13)^{***}
MNC x Cost x	0.07	0.09	0.29	0.18
Financial Vulnerability	(7.42)^{***}	(7.61)^{***}	(6.41)^{***}	(5.28)^{***}
Size x Cost x	0.02	0.02	0.06	0.04
Financial Vulnerability	(3.91) ^{***}	(3.97) ^{***}	(3.94) ^{***}	(3.88) ^{***}
Sector, Firm FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
# Observations	977,119	956,320	956,320	956,320
# Firms	88,001	87,640	87,640	87,640
# Sectors	36	36	36	36
# Destinations	210	171	171	171
R^2	0.37	0.37	0.37	0.37

Conclusions

- ❑ New firm-level evidence of the causal effect of financial constraints on firms' export performance and MNC activity
- ❑ Important policy implications for financially underdeveloped countries that depend on trade for economic growth
 - FDI may mitigate the detrimental effects of credit market frictions on growth, trade and private sector development ...
 - ... at the expense of greater volatility and exposure to global crises?