

Credit Constraints, Technology Choice and Exports - A Firm Level Study for Latin American Countries

Syed Hasan and Ian Sheldon

Ohio State University

December 17, 2013

Research Motivation

- ▶ Trade liberalization benefits are not fully realized by firms in developing countries

Research Motivation

- ▶ Trade liberalization benefits are not fully realized by firms in developing countries
- ▶ Technology lag and imperfect financial markets in developing countries

Research Motivation

- ▶ Trade liberalization benefits are not fully realized by firms in developing countries
- ▶ Technology lag and imperfect financial markets in developing countries
- ▶ Quantify Credit constraints faced by manufacturing firms
 - ▶ Investment in capital goods
 - ▶ Cost of foreign market participation

Theoretical Background

- ▶ Within Industry Firm Level Heterogeneity

Theoretical Background

- ▶ Within Industry Firm Level Heterogeneity
- ▶ More productive firms—more likely to export Clerides et al. (1998)

Theoretical Background

- ▶ Within Industry Firm Level Heterogeneity
- ▶ More productive firms—more likely to export Clerides et al. (1998)
- ▶ Melitz (2003) model; Monopolistic competition- IRTS-heterogeneous firms—only highly productive firms are engaged in export

Theoretical Background

- ▶ Within Industry Firm Level Heterogeneity
- ▶ More productive firms-more likely to export Clerides et al. (1998)
- ▶ Melitz (2003) model; Monopolistic competition- IRTS-heterogeneous firms-only highly productive firms are engaged in export
- ▶ Assumptions: Identical fixed costs of production, Same production technology, No credit constraints

Theoretical Background

- ▶ Within Industry Firm Level Heterogeneity
- ▶ More productive firms—more likely to export Clerides et al. (1998)
- ▶ Melitz (2003) model; Monopolistic competition- IRTS-heterogeneous firms—only highly productive firms are engaged in export
- ▶ Assumptions: Identical fixed costs of production, Same production technology, No credit constraints
- ▶ Extensions; Schmidt (2010) , Monova (2008)

Extensions in Melitz Model

- ▶ Technology Choice-Schmidt (2010)

$$TC_T = \eta_T f + \frac{q}{\varphi^T}$$

$$\eta_H > \eta_M > \eta_L = 1$$

$$\varphi^H > \varphi^M > \varphi^L$$

$$\pi_h(\varphi_0^L) = p_h(\varphi_0^L) q_h(\varphi_0^L) - \frac{q_h(\varphi_0^L)}{\varphi_0^L} - f$$

$$\pi_h(\varphi_1^M) + \pi_f(\varphi_1^M) = \frac{(1+\tau^{1-\sigma})}{\rho} E(P\rho)^{\sigma-1} (\varphi_1^M)^{\sigma-1} - \eta_M f - f_x$$

Fixed Cost Relevance for Export

- ▶ f Enter the market Production cost-Determines productivity-Investment in level of technology

Fixed Cost Relevance for Export

- ▶ f Enter the market Production cost-Determines productivity-Investment in level of technology
- ▶ f_x Foreign market entry cost- Establishment of foreign market distribution network, information gathering

Fixed Cost Relevance for Export

- ▶ f Enter the market Production cost-Determines productivity-Investment in level of technology
- ▶ f_x Foreign market entry cost- Establishment of foreign market distribution network, information gathering
- ▶ Optimal investment decision -solve the profit maximization problem

Model Setup

- ▶ Two time periods t_0 and t_1

Model Setup

- ▶ Two time periods t_0 and t_1
- ▶ Introduce technology choice and credit constraints in Melitz (2003) model

Model Setup

- ▶ Two time periods t_0 and t_1
- ▶ Introduce technology choice and credit constraints in Melitz (2003) model
- ▶ Determine the credit required to upgrade technology

$$C(\varphi_0^L) = (E\alpha)^{\frac{1}{\beta}} \left[\frac{\sigma - 1}{\sigma} \right]^{\frac{\sigma}{\beta}} [P\varphi_0^L]^{\frac{\sigma-1}{\beta}} \left[\frac{\delta}{1 + \tau^{1-\sigma}} \right]^{\frac{1}{\beta}} \left[\frac{1}{R(\varphi_0^L, \cdot)} \right]^{\frac{1}{\beta}}$$

Data

Table : Countries and Share in Sample

Country	Firms	Percent
Argentina	594	29.2
Bolivia	132	6.49
Chile	388	19.08
Colombia	368	18.09
Mexico	314	15.44
Peru	238	11.70
Total	2034	100

Data Source: Enterprise Survey by World Bank;2006-2010

Hypotheses

- ▶ Extensive Margin of Trade: Credit availability increases the likelihood of export by a firm.

Hypotheses

- ▶ Extensive Margin of Trade: Credit availability increases the likelihood of export by a firm.
- ▶ Intensive Margin of Trade: The volume of exports by a firm is likely to increase with the availability of credit.

Hypotheses

- ▶ Extensive Margin of Trade: Credit availability increases the likelihood of export by a firm.
- ▶ Intensive Margin of Trade: The volume of exports by a firm is likely to increase with the availability of credit.
- ▶ Credit availability and likelihood of Capital investment

Hypotheses

- ▶ Extensive Margin of Trade: Credit availability increases the likelihood of export by a firm.
- ▶ Intensive Margin of Trade: The volume of exports by a firm is likely to increase with the availability of credit.
- ▶ Credit availability and likelihood of Capital investment
- ▶ Investment in Capital goods and likelihood of export

Regression Model



$$y_{it} = \beta_0 + \beta_c \text{Credit}_{it} + \gamma Z_i + \mu_{it}$$

Regression Model



$$y_{it} = \beta_0 + \beta_c \text{Credit}_{it} + \gamma Z_i + \mu_{it}$$

- ▶ The dependent variable is export decision, export share in sales and capital investment

Regression Model



$$y_{it} = \beta_0 + \beta_c \text{Credit}_{it} + \gamma Z_i + \mu_{it}$$

- ▶ The dependent variable is export decision, export share in sales and capital investment



$$\text{Export}_{it} = \beta_0 + \beta_c \text{Invest}_{it} + \gamma Z_i + \mu_{it}$$

Robustness Checks

- ▶ Endogeneity of Credit

Robustness Checks

- ▶ Endogeneity of Credit
- ▶ Heteroskedasticity

Robustness Checks

- ▶ Endogeneity of Credit
- ▶ Heteroskedasticity
- ▶ Instrumental Variables/2SLS,GMM

Robustness Checks

- ▶ Endogeneity of Credit
- ▶ Heteroskedasticity
- ▶ Instrumental Variables/2SLS,GMM
- ▶ Semi-parametric maximum likelihood estimation (Klein Spady,1993)

Regression Results for Hypothesis (i)-(iii)

VARIABLES	(1)	(2)	(3)
Credit	0.19*	-0.42	0.68***
	(0.10)	(0.28)	(0.22)
Skilled Labor	0.01	-0.001	0.03
	(0.01)	(0.09)	(0.02)
Support Staff	0.01	-0.06	0.016
	(0.022)	(0.161)	(0.039)
Conglo	0.013	-0.208*	0.018
	(0.038)	(0.070)	(0.059)
N	1733	591	1933
R-sq	0.012	0.056	0.16
Country/Ind FE	Yes	Yes	Yes
Sargan Stat	0.15	0.464	0.334

Table: Regression for Export and Investment

MODEL	Panel XTIV
INVEST	0.144**
	(0.0645)
LABEMP	0.0749
	(0.0664)
CONGLO	0.0401
	(0.0553)
Observations	788
R-squared	0.281
Sargan Test Stat.	0.152

Credit Constraints, Technology Choice and Exports - A Firm Level Study for Latin American Countries

- ▶ Conclusion and Policy Implications

Credit Constraints, Technology Choice and Exports - A Firm Level Study for Latin American Countries

- ▶ Conclusion and Policy Implications
- ▶ Credit is positive and significant for export and investment

Credit Constraints, Technology Choice and Exports - A Firm Level Study for Latin American Countries

- ▶ Conclusion and Policy Implications
- ▶ Credit is positive and significant for export and investment
- ▶ Prospective exporters can grab foreign market share

Credit Constraints, Technology Choice and Exports - A Firm Level Study for Latin American Countries

- ▶ Conclusion and Policy Implications
- ▶ Credit is positive and significant for export and investment
- ▶ Prospective exporters can grab foreign market share
- ▶ Divert resources from trade subsidies to credit for potential exporters