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Trade Credit, International Trade Costs and Exports: Cross-Country Firm-Level Evidence

Xiao Wang*

Abstract

This paper finds that firms' trade credit, the financing provided by upstream input suppliers along the supply chain, plays an important role in determining firms' exportation. In a panel data set of manufacturing firms in 25 Eastern European and Central Asian countries between 2001 and 2007, we employ international trade cost shocks to identify the causal impacts of trade credit on firms' exportation. We find that when trade costs decline, firms with less trade credit increase their exports disproportionately more because of the alleviation of their financing burdens. Results are robust after controlling for bank and other financing channels, country financial development, and the endogeneity of trade credit. Our findings contribute to the empirical identification of financial frictions on firms' exports, and to the role of trade credit on firms' performance.

JEL Classifications: F12, F14, F15, F36, G30

Keywords: Trade Credit, Export, Trade Liberalization, Financial Frictions

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1 Introduction

Opening to international markets can help host countries improve productivity and speed up economic growth. These facts stimulate the increasing need to understand export-accelerating channels. A number of studies find that firms' financing conditions have impacts on their exportation.¹ This paper investigates the impacts of a specific financing channel, trade credit, which is the financing provided by upstream input suppliers along the supply chain.

We assume that firms are heterogenous in productivity and face export costs, and that firms face financial frictions. Therefore, firms export if their productivity is above the zero-export-profit threshold. The productivity threshold is higher for firms with less trade credit because these firms have more financing difficulties. We propose that decreases in export costs will have disproportionate impacts on firms with less trade credit, because these firms' financing burdens are alleviated asymmetrically more.

We employ a panel data set of manufacturing firms in 25 Eastern European and Central Asian countries from 2001 to 2007 in the World Bank Enterprise Surveys, combined with industry-level international trade cost data from the United Nation Comtrade database. Enterprise Surveys data set has two advantages. First, it has trade credit measures at the firm level. Second, countries in the data are similar in economic background but have experienced various export cost changes, which allows us to observe firms' differentiated export behavior.

Several findings stand out. First, we focus on firms' probability of exportation and find that the impacts of decreased trade costs are disproportionately high for firms with less trade credit, because trade liberalizations reduce their burdens in financing export costs systematically more. Second, we find similar impacts on trade volume for exporters. We employ the Heckman model to correct for the possible bias caused by firms' self-selection of export. Finally, our results are robust after incorporating firms' financing from banks and other channels and the country's financial development, and after controlling for the possible endogeneity of trade credit.

This paper first contributes to the empirical identification of the impacts of financial frictions on firms' exports. As pointed out by Manova (2008), regressing firms' financial conditions on their exportation may only indicate the correlation, not the causality. Manova (2008) uses the exogenous equity market liberalization to control for the endogeneity of firms' financing conditions. Employing the exogenous changes in export costs, this paper finds that firms with less trade credit increase their exports disproportionately more after trade liberalization, which identifies the causal impacts of financial frictions on exportation. Second, this paper contributes to the literature of trade credit.

A series of finance papers have examined the reasons for the provision of trade credit by upstream

¹See Berman and Hericourt (2010) and Manova (2008).

suppliers.² This paper examines the role of trade credit in financing firms' exportation.

The remainder of paper is organized as follows. Section 2 describes the data and constructs the empirical framework. Section 3 displays benchmark results and robustness checks. Section 4 concludes.

2 Data and Empirical Framework

Data

The data set consists of two parts. The first part includes 1,620 firm-year observations in 11 manufacturing industries in 25 Eastern European and Central Asian countries from 2001 to 2007, collected by the World Bank Enterprise Surveys.³ The World Bank has surveyed each firm two (three) times every three years in every country and the data set is a balanced panel. On average, exporters are more productive, larger, older, have higher shares of foreign ownership, and have more trade credit.

The second part constructs industry-level export costs. Following Bernard et al.(2006), we proxy the ad valorem export costs as the sum of tariffs and transportation costs at the industry level, which is the most disaggregated level given the data limitation. Tariffs are extracted from the World Bank Consolidated Tariff Schedules database. Transportation costs are measured as the ratio of the cost-insurance-freight over free-on-board values for bilateral trade pairs from the United Nation Comtrade database. For every country-industry-year triplet, we average its export costs across different destinations. The average trade costs for all countries have decreased from 19.1% in 2001, to 14.2% in 2004, and to 12.0% in 2007.

Hypotheses and the Empirical Framework

We propose hypotheses based on two trends of literature: (i) only the productive firms export. Melitz (2003) assumes that firms are heterogeneous in productivity and pay fixed and variable costs to export. In the equilibrium, firms export if their productivity is above a zero-export-profit threshold. (ii) In an imperfect financial market, firms that are able to finance their export costs can export, as in Manova (2008). Fisman and Love (2003) point out that trade credit may ease firms' financing difficulties. Following the two trends in the literature, we postulate that declines in export costs will increase export profits, reduce the productivity threshold for exporting, and therefore increase firms' exports. These effects are more pronounced for firms with lower trade credit, because their financing burdens are alleviated more. We propose Hypotheses 1 and 2, which predict firms' export probability

²See Fisman and Love (2003), Cunat (2007) and Klapper et al. (2012).

³25 countries are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak, Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan. 11 manufacturing industries include food, textiles, garments, chemicals, plastics and rubber, non-metallic mineral products, basic metals, fabricated metal products, machinery and equipment, electronics, and other manufacturing.

and volume respectively.

Hypothesis 1 Declines in international trade costs increase firms' export probability; these effects are more pronounced for firms with lower trade credit.

Hypothesis 2 Declines in international trade costs increase export volume for existing exporters; these effects are more pronounced for firms with lower trade credit.

In order to test Hypothesis 1, we estimate:

$$p_{ijct} = \mathbf{1}[\alpha_p + \beta_p tcost_{jct} + \gamma_p tcredit_{ijct} + \delta_p tcost_{jct} \times tcredit_{ijct} + \lambda_p Z_{ijct} + d_j + d_c + d_t + \nu_{ijct} > 0], \quad (1)$$

where p_{ijct} is a dummy which equals 1 if firm i in industry j in country c in year t exports, 0 otherwise. $tcost_{jct}$ is the export cost. $tcredit_{ijct}$ is the trade credit measured by a share of intermediate goods financed by delayed payments from suppliers. The control vector Z_{ijct} includes employment, firm age, labor productivity relative to industry mean⁴, and a foreign ownership dummy which equals 1 if a firm has at least 10% of foreign ownership and 0 otherwise, as in Javorcik (2004). d_j , d_c , and d_t are industry, country, and year dummies respectively, and ν_{ijct} is the error term. Following Berman and Hericourt (2010), we estimate (1) by the random-effects panel logit model, because the insufficient time spanning of firms (2 or 3 observations per firm) does not allow us to include firms' fixed effects.

The coefficients we focus on are β_p , γ_p and δ_p . We expect that $\beta_p < 0$ because lower export costs result in more exporting firms, $\gamma_p > 0$ because trade credit may help to finance export costs, and $\delta_p > 0$ because the impacts of trade costs are disproportional large for firms with less trade credit.

Following Melitz et al. (2008), we test Hypothesis 2 by estimating a Heckman model in Heckman (1979), which corrects for firms' self-selection bias. Specifically, the export volume v_{ijct} is observed only when firms export: $p_{ijct} = 1$. If the error term for trade volume, μ_{ijct} , is correlated with ν_{ijct} in (1): $E(\mu|\nu) = a\nu$, firms' self-selection of exportation will affect the estimation of export volume. Then the Heckman model is:

$$E[\ln(v_{ijct})|p_{ijct} = 1] = \alpha_v + \beta_v tcost_{jct} + \gamma_v tcredit_{ijct} + \delta_v tcost_{jct} \times tcredit_{ijct} + \lambda_v Z_{ijct} + d_j + d_c + d_t + a\Xi_{ijct}, \quad (2)$$

where Ξ_{ijct} is the inverse Mills ratio that summarizes the self-selection effect.⁵ We estimate the Heckman model in two stages. In the first stage, we re-estimate (1) with two additional variables that

⁴Results are robust if using total factor productivity but the number of observations is reduced by 60% because of missing capital.

⁵Assume ν in (1) follows a distribution $\Phi(\nu)$, $E(\mu|\nu, p = 1) = aE(\nu|\nu > -\beta x) = a\phi(\beta x)/\Phi(\beta x) = a\Xi$.

affect fixed cost of export, and therefore the export probability only. One is whether firms have a quality certificate, another is whether firms use emails and web sites, and both affect fixed export costs from information barriers. The second stage estimates (2). Standard errors are clustered at the firm level. We are interested in coefficients β_v , γ_v and δ_v , and expect $\beta_v < 0$, $\gamma_v > 0$ and $\delta_v > 0$ as in (1).

3 Results

Benchmark Results

Table 1, columns 1 and 2 display the estimation of (1). Results confirm that firms with less trade credit engage disproportionately more into exportation because trade liberalizations lessen their financing difficulties more. Table 2, columns 1 and 2 display the results for firms' export volume in estimating (2). Take column 2 for instance, facing one percentage point decrease in trade costs, a firm with no trade credit will increase export by 1.57% more than a firm with the trade credit ratio of 50%.

Robustness Check 1: Financing from Banks and Other Channels and Financial Development

Besides trade credit, firms may also acquire financing from banks and other channels. We add three variables to control for alternative financing channels—the first is a dummy of whether firms consider access to finance as a moderate to major obstacle, following Eck et al. (2012), the second is firms' loans from banks divided by total sales, and the third is a dummy of whether firms have financing from their buyers through cash in advance.⁶ Similarly, a country's financial development may also impact firms' export. We measure financial development as the ratio of private credit over GDP from Beck et al. (2010), and add its interaction with trade credit in regressions. Columns 3 and 4 in Tables 1 and 2 respectively confirm that the benchmark results still hold after controlling for firms' bank financing and the aggregate financial development.

Robustness check 2: The Endogeneity of Trade Credit

Firms's trade credit may not be fully determined by input suppliers but may also be affected by their relationship with input suppliers and their financial conditions, as in Klapper et al. (2012). We employ the instrument variable method to correct for the possible endogeneity. Specifically, we choose two instruments that are correlated with firms' trade credit but not with their export decisions. The first instrument is firms' sales prior to three years, which is not correlated with firms' current shocks that may affect exportation, but correlated firms' need for trade credit as in Cunat (2007). The second instrument is firms' share of internal funds in financing investment, which measures their liquidity. Cunat (2007) finds that firms with lower liquidity obtain more trade credit. Columns 5 and 6 in Tables 1 and 2 show that benchmark results are qualitatively the same after controlling for the

⁶Due to data limitation, the dummy of financing from buyers is for firms' general sales.

endogeneity of trade credit. The Cragg-Donald F statistics pass the weak instrument test and the Sargan statistics indicate that the excluded instruments are uncorrelated with the error term.

4 Conclusion

This paper finds that declines in trade costs induce exports disproportionately more for firms with less trade credit, which implies that trade credit is an important determinant of firms' exports through the financing channel. Our results are robust after incorporating firms' financing from banks and other channels and the country's financial development, and after correcting for the possible endogeneity of trade credit. Even though we focus on the decrease in export costs, our results also imply that firms with more trade credit can perform better with higher trade costs, because they have more financing channels to cushion sudden cost shocks. Our results suggest that policy makers may focus on policies that can provide firms broader and cheaper channels of financing in order to foster export growth.

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Table 1: The Impacts of International Trade Costs and Trade Credit on Export Probability

		Dependent Variable: Export Probability					
		Benchmark		Other Finance		Endogeneity	
	Signs	(1)	(2)	(3)	(4)	(5)	(6)
Trade Cost	–		–9.462*** (2.463)		–8.346*** (2.287)		–2.213*** (0.552)
Trade Credit	+	1.853*** (0.345)	1.348*** (0.403)	2.348*** (0.434)	1.778*** (0.488)	0.798*** (0.191)	
T. Cost*T. Credit	+		9.092* (4.805)		4.387** (2.198)		4.605*** (1.253)
Fin. Development				2.915** (1.466)	2.386 (1.496)		
Fin. Dev.*T.Credit				–4.451*** (1.475)	–4.212*** (1.493)		
Fin. Obstacle				–0.226 (0.214)	–0.189 (0.220)		
Bank Loan/Sales				3.341** (1.470)	3.121** (1.469)		
Fin. from Buyers				0.135 (0.288)	0.173 (0.292)		
Productivity		0.366*** (0.093)	0.393*** (0.095)	0.385*** (0.097)	0.393*** (0.097)	0.030 (0.022)	0.033 (0.021)
Ln(Employment)		0.831*** (0.097)	0.767*** (0.099)	0.798*** (0.101)	0.821*** (0.104)	0.101*** (0.015)	0.104*** (0.015)
Age		0.012* (0.007)	0.015** (0.007)	0.019*** (0.007)	0.019*** (0.007)	0.001 (0.001)	0.001 (0.001)
FDI Firm		0.936*** (0.319)	1.024*** (0.336)	1.141*** (0.350)	1.298*** (0.368)	0.128*** (0.047)	0.134*** (0.048)
Pseudo R-squared		0.121	0.135	0.139	0.148		
Chi-squared		129.25	130.3	128.31	124.39		
Cragg-Donald F						26.504	25.896
Sargan Stat.						0.023	0.044
Observations		1,612	1,570	1,528	1,497	927	906

The instruments in (5) and (6) are firms' sale three years before and their liquidity.

– Industry, country and year dummies are included.

– ***, **, and * denote significances at 1%, 5%, and 10% respectively.

Table 2: The Impacts of International Trade Costs and Trade Credit on Export Volume

		Dependent Variable: Export Volume					
		Benchmark		Other Finance		Endogeneity	
	Signs	(1)	(2)	(3)	(4)	(5)	(6)
Trade Cost	–		–5.149*** (0.383)		–5.105** (0.387)		–20.118*** (5.030)
Trade Credit	+	1.497*** (0.278)	0.515** (0.220)	2.348*** (0.434)	0.924* (0.571)	23.941*** (4.150)	
T. Cost*T. Credit	+		3.659** (1.819)		3.365* (1.923)		56.106*** (16.072)
Fin. Development				2.915** (1.466)	4.358*** (1.516)		
Fin. Dev.*T.Credit				–4.451*** (1.475)	–0.419 (2.294)		
Fin. Obstacle				–0.226 (0.214)	–0.511*** (0.187)		
Bank Loan/Sales				3.341** (1.470)	2.445*** (0.777)		
Fin. from Buyers				–0.104 (0.207)	0.016 (0.221)		
Productivity		0.860*** (0.092)	0.836*** (0.073)	0.385*** (0.097)	0.943*** (0.094)	1.739*** (0.517)	1.686*** (0.395)
Ln(Employment)		0.711*** (0.105)	0.700*** (0.088)	0.798*** (0.101)	0.775*** (0.133)	2.110*** (0.342)	2.589*** (0.261)
Age		–0.004 (0.007)	–0.008 (0.007)	0.019*** (0.007)	–0.006 (0.006)	0.009 (0.024)	0.022 (0.018)
FDI Firm		–0.289 (0.271)	–0.297 (0.312)	1.141*** (0.350)	–0.154 (0.305)	2.412** (1.087)	2.267*** (0.851)
Inverse Mills Ratio		–1.208** (0.511)	–0.947*** (0.489)	–1.794*** (0.332)	–0.442 (0.873)		
R-squared		0.399	0.419	0.420	0.447	0.413	0.385
Cragg-Donald F						27.686	46.676
Sargan Stat.						0.336	2.047
Observations		959	660	766	660	707	660

– In (1) to (4) Heckman models, the first stage exclusive variables are dummies of whether firms have quality certificate, and online communication tools.

– The instruments in (5) and (6) are firms' sale three years before and their liquidity.

– Industry, country and year dummies are included. Standard errors are clustered at the firm level.

– ***, **, and * denote significances at 1%, 5%, and 10% respectively.