



Financial shocks and exports

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ABSTRACT

This study examines empirically and theoretically how credit tightness impacts the extensive margin (variety of goods) and intensive margin (production of each existing good) of exports. Panel regressions show that worsening financial conditions discourage exports by reducing both the variety of goods exported and the export volumes of individual goods. This study also develops a DSGE model to clarify this finding, featuring financial shocks, enforcement constraint, and firm entry. In the event of a credit crunch, worsening financial conditions would reduce firm borrowing capability, forcing firms to decrease production, and thus, decrease firm profit and firm value. As exporters face larger fixed costs in production, they are more sensitive to financial constraints. Consequently, a credit crunch reduces individual firm exports and discourages potential entrants from entering the export market, which in turn decreases aggregate exports. The proposed model can also explain the phenomenon of trade decreasing more than GDP, as observed in the most recent financial crisis.

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1. Introduction

A growing body of research has examined the potential causal link between financial frictions and exports. The financial crisis of 2008 has further led researchers to ask whether financial friction had an important role in the trade collapse relative to GDP.¹ This study investigates how financial frictions affect firms' exporting behavior in different margins, that is, the extensive and intensive margins. The extensive margin denotes a change in the number of firms or products, and the intensive margin represents a change in the trade value involving existing firms or products. Recent trade theory research has stressed this distinction because of its implications for welfare gains achieved through trade and resource allocation. By analyzing the sources

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¹ Kletzer and Bardhan (1987), Beck (2002), and Matsuyama (2005) have argued that credit market imperfections adversely affect exporters needing more finance, and hence, influence international trade patterns. Beck (2002) provided country-level evidence to this theoretical finding. This concept was reignited by Chaney (2005) in a Melitz (2003) setting, in which liquidity-constrained exporters must have sufficient liquidity to finance entry costs to access foreign markets. Manova (2008) implemented the Chaney idea, showing that credit constraints affect exporting firms in various countries and industries differently because of fixed costs. Amiti and Weinstein (2011), using a matched database between Japanese listed firms and their main banks, found trade finance to be important in the earlier Japanese financial crisis of the 1990s. The financial crisis of 2008 has further led researchers to ask whether financial frictions had a role in the trade collapse relative to GDP. Feenstra et al. (2011) argued that larger working capital needed and greater risk faced by exporters induced tighter credit constraints on exporters than on purely domestic firms, and found that financial crisis reduced China's exports substantially. Chor and Manova (2012) showed that countries experiencing higher growth in interbank loan rates during the 2008 crisis tended to decrease exports to the United States, which was more pronounced in sectors of higher external finance dependence. Berman (2009) and Iacovone and Zavacka (2009) provided historical evidence that exports in financially vulnerable sectors were hit harder during banking crises. Firm level studies also report that financially constrained firms had greater adverse effects on exports (See Muuls (2008), Berman and Héricourt (2010) for historical evidence; Bricongne et al. (2012) and Paravisini et al. (2011) for the latest crisis).

of export adjustments caused by financial friction, this study illuminates the influences of credit conditions on individual firm choices and aggregate trade.

This study first documents a new stylized fact in trade data on the influences of financial friction on exports. We used Four-digit SITC disaggregated export data to assign variety differences to the extensive margin of exports, and adopted the export margin measure used by [Hummels and Klenow \(2005\)](#). The variation in interbank lending rates was used as a tightness measure of the financial condition in each country. The data set covered the years 1994–2008, and panel regressions indicated that a worsening financial condition adversely affects both the extensive and intensive margins of exports. Although [Chor and Manova \(2012\)](#) also found negative effects of credit tightness on trade, this work extends their study to how trade volume is affected through the extensive and intensive margins.

To understand the mechanism through which a worsening financial condition affects the previously identified trade margins, this study builds a two-country DSGE model. Two ingredients of the model are critical in capturing the stylized fact, as follows: (1) the ability of a firm to borrow is limited by an enforcement constraint, which is subject to random financial shocks, defined by [Jermann and Quadrini \(2012\)](#),² and (2) exporters face larger fixed costs and larger sunk entry costs than non-exporters because exporters require more working capital and face higher default risk.³ Because exporters must pay a higher fixed cost, they need a larger sales volume per firm, and hence more loan, in order to generate the same amount of profit as a domestic firm, all else equal. However, with the presence of enforcement constraint, the loans are limited by firm value. This means that to generate the same amount of profit as a domestic firm, the exporter faces a more binding financial constraint. Thus, exporters are more sensitive to financial conditions. This work assumes that a potential entrant would not enter the market unless its expected post-entry firm value is sufficient to cover the sunk entry cost. Forward-looking firms thus formulate entry and export decisions based on their expectations of future market conditions that will affect their expected firm value.

The theoretical model indicates that a negative realization of financial shocks reduces exports in both the extensive and intensive margins, which corresponds well to our empirical findings. As financial conditions worsen, lenders reduce loans to producers, increasing the credit tightness induced by enforcement constraint. Under monopolistic competition, firms reduce production, which decreases the amount of home produced and exported goods for each of the existing firms, indicating a drop in the intensive margin of exports. Demand at home for foreign exports also drops because of balanced trade assumption, which, together with the drop in local demand, leads to a decrease in home aggregate consumption. Worsening financial conditions also discourage potential entrants to the export market and reduce the number of exporters in the next period, indicating a decrease in the extensive export margin. Because negative financial shocks reduce firm profits and firm value, potential exporters who do not have sufficient liquidities to cover entry costs do not enter the export market. In response to adverse financial conditions, fewer firms enter the export markets and existing firms export less, causing the total number of exports to shrink. Negative financial shock also transmits to foreign countries because of balanced trade, such that foreign country also experiences a smaller but similar recession.

The proposed model also shows that exporter total export sales drop more than that of non-exporters in response to a worsening financial condition. This finding is consistent with those of the recent financial crisis. [Baldwin \(2009\)](#), [Eichengreen and O'Rourke \(2009\)](#), and [Cheung and Guichard \(2009\)](#) documented that trade tends to fall more than proportionally with GDP, with an elasticity of trade to GDP in the order of about 3.5. This phenomenon can be explained by introducing financial shocks into the model.

The remainder of this paper is structured as follows: [Section 2](#) documents the empirical methodology and stylized facts; [Section 3](#) introduces the DSGE model; [Section 4](#) provides a discussion on the simulation results; and [Section 5](#) concludes.

2. Empirical findings

This section examines the influence of credit conditions on the extensive margin of exports. The current study uses a panel data set comprising exports at an annual frequency from 1994 to 2008.⁴ Four-digit Standard International Trade Classification (SITC) disaggregated export data are used to assign variety differences to the extensive margin of exports. The measurement of export margins used in this study is in accordance with those used by [Hummels and Klenow \(2005\)](#). This measure is based on [Feenstra \(1994\)](#), and measures the extensive margin in a manner consistent with consumer price theory, which weighs categories of goods according to their overall importance in exports to a given country. The extensive margin of exports from country j to country m , denoted by EM_m^j , is defined as

$$EM_m^j = \frac{\sum_{i \in I_m^j} X_{m,i}^W}{X_m^W},$$

² [Jermann and Quadrini \(2012\)](#) interpreted these shocks as capturing countrywide “liquidity of firm assets”. When market conditions worsen, loan lenders might have a low probability of finding a buyer or low bargaining power in liquidating firms’ remaining assets once firms default. [Monacelli, Quadrini, and Trigari \(2011\)](#) documented that, by the end of 2008, all major industrialized countries experienced extraordinarily large and synchronized contractions in real and financial aggregates, including aggregate measures of the growth rate of business credit.

³ [Amiti and Weinstein \(2011\)](#) argued that exporters face a longer time-lag between production and receipt of sales revenue, and also face inherently more risk because it is more difficult to enforce payment across country boundaries.

⁴ Information on trade volumes prior to 1984 is unavailable. Combining financial and GDP data yields an unbalanced panel data set covering 68 countries during 1984–2008. The benchmark model uses a balanced panel for 35 countries from 1994 to 2008, which contains the largest number of observations among the balance panels. The sampled countries include Canada, the United States, Japan, Jordan, Lebanon, Hong Kong, Indonesia, Malaysia, Singapore, Thailand, Belgium-Luxembourg, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, the United Kingdom, Austria, Finland, Iceland, Norway, Sweden, Switzerland, the Czech Republic, Hungary, Lithuania, Poland, Slovakia, Slovenia, Australia, and New Zealand.

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