

Finance and international trade: A review of the literature

Abstract

The aim of this paper is to review the literature on the link between finance and international trade. First, export performance is shown to strongly depend on sectors' or firms' external finance dependence. More vulnerable firms or sectors export less than others. Moreover, insufficient financial development and financial crises harm exports to a greater extent when firms or sectors are dependent on external finance. Second, trade finance plays a key role in financing trade and provides a powerful transmission channel for financial shocks, which affect international trade to a greater extent than domestic activities. Moreover there is a reciprocal causality between trade and finance. Finally, financial reforms and trade liberalization appear to be complementary, indicating that trade openness reforms are more effective in promoting GDP growth when financial systems are well developed.

JEL classification: F10, F14, G20, G21

Key words: international trade, financial constraint, financial development, trade finance, institutional complementarities and substitutabilities

1 Introduction

The great trade collapse experienced in 2009 is one of the most striking phenomenon observed in recent years. According to the World Trade Organization (WTO), the volume of world trade fell by 12% in 2009. The decline in merchandise export volumes was particularly severe in North America (-15%) and Europe (-15%) compared to South America (-8%) and Asia (-11%)¹. As emphasized by Francois and Woerz (2009), the decline in trade flows was more dramatic for manufactured products (-15.5%), especially in durable goods such as automotive products (-32%) and industrial machinery (-29%), than for agricultural goods (-3%) or fuel and mining products (-4.5%). More interestingly, the slump in world trade appears much stronger than the contraction in Gross Domestic Product (GDP), which amounted to -4.6% in 2009². The recent drop in export volumes was steeper than those witnessed in 1965 (-7%), 1982 (-2%) and 2001 (-0.2%), known as the three main previous episodes of declining trade. It was also more severe than the fall in world trade observed during the Great Depression of the 1930s (Almunia, Bénétrix, Eichengreen, O'Rourke and Rua, 2010). While the decline in trade experienced during the Great Depression is largely due to the implementation of trade barriers, the 2009 trade collapse cannot be attributed to increased protectionism.

The main explanation for the magnitude of the trade collapse, heavily emphasized by the WTO (Auboin, 2009; Auboin 2011), relates to the key role of the recent crisis that affected financial systems worldwide³. The 2007-2008 financial crisis has multiple dimensions. First, a large number of banks suffered liquidity and solvency problems, inducing failures or massive state bailouts. In addition, a global credit crunch occurred, especially after the bankruptcy of Lehman Brothers (Aisen and Franken, 2010). The crisis also affected financial markets. Suffering from a crisis of confidence, investors fled stock markets for less risky markets, notably sovereign bond markets. According to the World Bank, world stock market capitalization declined by 30 000 billions dollars in 2008 (a decline representing nearly 50% of the global GDP). Do these aspects of the financial crisis help to explain the trade collapse observed in 2009? Beyond its cyclical dimension, this issue also relates to more structural aspects, such as the impact of financial systems on trade specialization and export performance. Moreover, investigating whether finance matters for international trade has important normative implications, particularly with respect to the financial reforms and trade policies implemented in developed and in developing and emerging countries. For these reasons, it seems particularly interesting to explore the financial underpinnings of international trade.

The goal of this paper is precisely to present a review of the theoretical and empirical literature dedicated to this issue. It is organized as follows. In Section 2, we provide rationales for the causal effects of finance on trade and present theoretical and empirical contributions demonstrating that trade patterns are highly dependent on sectors' and firms' external financial dependence. However, these contributions do not investigate through which channel international trade is affected by external finance. Therefore, in Section 3, we examine this channel and we emphasize the role played by trade finance. In Section 4, we extend the analysis beyond the direct causal effect of finance on trade and investigate the more complex relationships between the two variables. We address the issue of causal direction issue and the existence of institutional

complementarities and substitutabilities between financial reforms and trade policies. Section 5 concludes.

2 Does international trade depend on external finance?

In this section, we demonstrate that external finance is a key determinant of international trade. We first explain how financial dependence is introduced into classical models of international trade. We then present empirical evidence concerning the effect of external financial dependence on firms' exports.

2.1 Financial dependence in models of international trade

This subsection addresses external financial dependence in international trade models. We first reveal how comparative advantages can result from differences in external financial dependence at the sector level. We then refine the analysis by examining how firms' external financial dependence can be addressed in international trade models with firm heterogeneity.

2.1.1 External financial dependence and comparative advantages

The literature initially introduces the notion of finance dependence in the Heckscher-Ohlin-Samuelson's international trade model. Using two-country two-sector models, this approach reveals that differences in financial development give rise to comparative advantages and mutual gains from specialization and trade, even when countries have identical endowments, consumer preference and technologies. The crucial aspect of these theoretical contributions is the assumption that, in each country, the two sectors differ in financial needs and degrees of financial dependence.

The model developed by Bardhan and Kletzer (1987) focuses on an important function of financial systems, that consists to mobilize savings and to allocate funds to investors. The authors assume that in each country, one sector produces an intermediate good while the other produces a final good. Producing the final good requires the use of the intermediate good as an input and committing this resource one period before the output becomes available. The final good sector thus requires external funds to finance working capital. However, due to information asymmetries between firms and funders, external financing entails moral hazard problems. In this context, a weakly developed financial system is unable to alleviate information asymmetries and implies rationing. Conversely, a highly developed financial system makes it possible to reduce frictions and finance working capital more efficiently. As the intermediate good sector does not require outside financing, financial development is only beneficial to the final good sector. Finally, the relatively more financially developed country has a comparative advantage in the final good while the relatively less financially developed country specializes in the intermediate good. Beck (2002) extends this analysis by showing that trade patterns depend on differences in financial development even when both sectors rely on external financing. In his model, one

of the two sectors (the manufacturing sector) exploits increasing returns to scale while the other (the food sector) is characterized by constant returns to scale. Moreover, savers are assumed to face search costs when attempting to channel their funds to investors. A well developed financial system makes it possible to mitigate search costs and to allocate a larger share of funds to productive activities. As the manufacturing sector exploits increasing returns to scale, it profits from a large volume of external financing to a greater extent than the food sector. Consequently, a relatively high level of financial development is associated with exporting manufacturing-goods while a relatively low level of financial development is associated with exporting food-goods.

The theoretical literature also considers another function of financial systems: the diversification of risk. In Baldwin's (1989) model, one of the two sectors in each country is assumed to face demand shocks while the other sector does not. Unlike the latter, the former thus requires access to the financial system to diversify risk. Because it allows for a decreased risk premium, a high level of financial development primarily benefits the risky sector. Therefore, the pattern of trade between the two countries crucially depends on differences in financial development. Having a relatively well developed financial system allows a country to specialize in the risky good while having a weakly developed financial system leads to specialize in the non risky good.

2.1.2 External financial dependence and firms' heterogeneity

The principal drawback of classical models of international trade is that they adopt a representative firm approach. Because they do not allow for firm heterogeneity, they fail to account for the observation that, within each sector, only a small proportion of firms (the most productive) participate in international trade. We thus enrich the analysis by examining how the notion of external financial dependence can be introduced into trade models with heterogeneous firms. To do so, the literature generally refers to the "new new trade theory", in the line of the Melitz's (2003) model. In this approach, firms differ in their productivity level such that, when trade is opened, a selection effect occurs: only firms with a sufficient level of productivity export. Financial frictions are introduced by assuming that exporters face specific costs. On the one hand, exporting induces upfront costs, due to advertising, gathering information on foreign customers, administrative procedures, translation, organizing foreign distribution networks etc. On the other hand, exporting firms face variable transport costs, which depend on shipping time and export volume. As fixed and variable costs must be financed, exporting activities crucially depend on the intensity of firms' financial constraints. While the financing available for sunk fixed costs determines firms' export decisions, i.e., extensive margins of trade, the financing available for variable costs affects the level of firm exports, i.e., the intensive margins of trade⁴.

Chaney's (2008) contribution is based on the notion that firms' productivity plays a key role in firms' decision to export. Productivity does not only affect firms' competitiveness on foreign markets. It also determines the amount of profit earned from domestic activities and firms' ability to cover upfront export costs⁵. The author thus distinguishes three categories of firms. Firms with a very low productivity do not export because they are not competitive enough to

sell abroad. Conversely, as they are competitive and generate large profits from their domestic activities, high-productivity firms export whatever the level of available external finance. Finally, firms with an intermediate level of productivity are potentially viable in foreign markets. But as they do not generate enough profit to cover upfront costs, they cannot export due to financial constraint. At the aggregate level, export flows thus decrease with the amount of liquidity available for constrained firms and increase with the number of constrained firms in the economy.

Although it refers to the same firm heterogeneity framework, Manova's (2013) paper differs from Chaney's (2008) model in two ways. First, it explicitly examines the structure of financial contracts between firms and funders. Second, it considers heterogeneity not only across firms but also across sectors. As in Chaney (2008), it is assumed that high productivity (in a given sector) implies large profits. This allows firms to offer high returns to external funders. For this reason, they can more easily borrow and finance fixed export costs. Hence, the level of firms' productivity crucially determines intensive margins. The authors show there exists a productivity threshold such that low-productivity firms, which cannot obtain external funds to cover fixed costs, do not sell abroad while high-productivity firms, which face no financial constraint, export. Moreover, Manova (2013) finds that financial frictions also affect extensive margins as financially constrained firms decrease the volume of their exports to reduce their variable costs and borrowing. Finally, aggregate exports increase with the quality of contract enforcement in the domestic economy. They also decrease with the level of sector's vulnerability, proxied by the proportion of fixed costs which have to be covered by external finance and the level of pledgeable tangible assets.

2.2 Empirical evidence on the impact of external financial dependence on exports

The theoretical arguments presented in the previous section have two main empirical implications. First, financial constraint should negatively affect exports. Second, financial constraints should magnify the effect that the macroeconomic financial conditions have on exports. In this section, we successively explore both testable assumptions.

2.2.1 Does external financial dependence reduce exports?

The relationship between financial vulnerability and export performance has been widely explored in the literature. When analyzing firm-level data, empirical studies assess the degree of external financial dependence by relying on a wide range of indicators.

One empirical approach relies on financial and accounting ratios to proxy for the degree of firms' financial vulnerability or health, while controlling for other characteristics such as size or productivity. The most widely considered dependent variable in econometric estimates is the extensive margin (under various forms: the firm's likelihood of exporting, the probability of beginning to engage in exporting, the probability of continuing exporting activities, the likelihood that the firm ceases exporting, the number of newly served export destinations or the number

of stopped destinations). However, some papers also address the intensive margin (i.e., the level of exporting).

Few empirical contributions find that a firm's financial ratios do not affect the extensive or intensive margins. Employing a data set on UK firms between 1993 and 2003, Greenaway et al. (2007) estimate a Generalized Method of Moments (GMM) model and find that exporters exhibit a lower leverage ratio (short-term debt over current assets) and a higher liquidity ratio (current assets minus current liabilities divided by total assets) than non-exporters. However, they demonstrate that this is primarily the result of favorable impact of exports on firms' ex-post financial health than improved ex-ante financial health among exporting firms⁶. Moreover, Stiebale (2011), who focuses on a sample of French firms between 1998 and 2005, and Lancheros and Demirel (2012), who consider a data set on Indian firms over the period 1999-2007, find that size and productivity are more important in explaining firms' export performance than financial variables.

However, the main findings of most papers is that firms' financial characteristics affect export activities. More precisely, they are shown to affect extensive to a greater extent than intensive margins. Berman and Héricourt (2010) consider three measures of financial health: the liquidity ratio (cash-flow over total assets), the inverse leverage ratio (total assets over total debt)⁷ and the ratio of tangible assets to total assets, which proxies for the level of collateralizable assets. Using a sample of 5 000 firms in 9 developing countries over the period 2000-2005, they report that the three proxies have very little impact on the level of exports but a significant and positive effect on a firm's probability of being an exporter. More interestingly, while they have a weak effect on the probability of continuing exporting, these proxies significantly increase the probability that a firm will begin exporting. This last result is in line with the findings of Bellone et al. (2010) who measure firms' financial health by constructing a composite index, based on a wide range of cash-flow, net worth, repayment ability and profitability ratios. Focusing on French firms over the period 1993-2005, the authors find that firms with good financial health are more likely to begin exporting. Engel et al. (2013) demonstrate that financial constraints also affect firms' decision to cease exporting. Exploiting a sample of French firms over the period 2000-2002, they report that having a high (short-term or long-term) leverage ratio or a low cash-flow ratio increase the probability that a firm will cease exporting. Finally, some papers consider the number of export destinations. In estimations conducted using a sample of Italian firms over the period 1995-2003, Forlani (2010) finds that liquidity (measured by cash stock) increases the number of newly served exporting destinations. This result is corroborated by Muûls (2012) who concentrates on Belgian firms over the period 1999-2005. She employs the COFACE score, which evaluates the intensity of default risk (ranging from 3 for the highest default risk to 19 for the lowest). Using probit and Ordinary Least Square (OLS) approaches, she establishes that although the score does not affect the level of exports, high-scoring firms are more likely to export and serve a larger number of destinations. Using a data set of French firms over the period 1996-2005, Askénazy et al. (2011) consider 4 financial vulnerability indicators: the leverage ratio, the inverse trade credit ratio (turnover over accounts payable to suppliers), the equity to asset ratio (because equity is not eligible as security on a loan) and a dummy variable that equals 1 if the firm defaulted to its trade creditors. Their estimates reveal that the four indicators not only negatively affect the

number of new exporting destinations, but also raise the number of exits from existing exporting markets.

Among the countries considered in the empirical literature, China appears particularly interesting because it exhibits high export performance despite important financial constraints. Based on a set of Chinese firms between 2000 and 2008, Feenstra et al. (2012) estimate a probit model and find that the ratio of tangible assets increases the likelihood that a firm will export as well as the export share. According to Manova et al. (2011), firms that are affiliated with a foreign-owned multinational or a joint-venture should benefit from a privileged access to external financing. Therefore, they should face lower financial constraints than other firms belonging to the same sector. What distinguishes Manova et al.'s (2011) paper from those mentioned above is that it focuses on sector-level rather than firm-level financial health. In addition to using the ratio of tangible assets, the authors exploit three proxies for a sector's financial vulnerability: a ratio of external financial dependence inspired by the Rajan and Zingales' (1998) seminal paper (denoted "RZ" below and computed as the amount of capital expenditure minus cash flows from operations as a share of capital expenditures), the ratio of inventories to sales (which represents the working capital necessary to cover the duration of the production process) and the ratio of R&D expenses to total sales (which accounts for liquidity needs). Finally, being affiliated with a foreign-owned multinational or a joint-venture is demonstrated to increase the level of a firm's exports to a greater extent when the value of the proxy for the sector's financial health proxy and sector's financial vulnerability indicators are high. Interestingly, these findings contradict those of the papers mentioned above, which find no (or a very weak) effect of financial constraints on the intensive margin. This suggests that sector-level financial vulnerability and firm-level financial health do not have exactly the same impact on firms' exporting behavior.

A second (and less frequent) empirical approach consists of matching firm- and bank-level data to construct measures of banking credit rationing. This literature confirms the adverse impact of financial vulnerability on export involvement. However, in contrast to the literature presented above, both the extensive and intensive margins are affected by rationing. Relying on a dataset of Italian firms for 2001, Minetti and Zhu (2011) exploit a survey conducted by the Italian banking group Capitalia. A firm is considered subject to rationing in 2000 if it had wished to obtain more credit at the market rate and it demanded more credit than it ultimately obtained. The authors demonstrate that rationed firms' probability of exporting is 39% lower than that of non-rationed firms. Rationing is also shown to reduce exports by more than 38%. In the same vein, Paravisini et al. (2011) match a panel of Peruvian firms with credit data from banks between July 2007 and June 2009. They report that a 10% decline in the credit supply leads to a reduction of 2.3% in the annual export volume. In addition, a 10% increase in the credit supply increases the probability that the firm will continue exporting in a given market by 3.6%.

The results obtained in the firm-level empirical literature presented above are summarized in Table 1. The table indicates the sign of the effect of firms' financial vulnerability (or health) on export variables: the probability of exporting ($p[\text{export}]$), the probability to begin exporting ($p[\text{start}]$), the probability to continue exporting ($p[\text{continuu}]$), the probability to cease exporting

(p[stop]), the number of newly served exporting destinations (Nb new dest) and the number of lost exporting destinations (Nb lost dest). Except for a few exceptions, the empirical literature is consistent with theoretical predictions, identifying a negative (positive) impact of firms' financial vulnerability (health) on firms' export involvement. These findings suggest that export performance could be improved by alleviating financial frictions in financial markets and by facilitating the access to external finance for the most vulnerable firms.

Reference and sample	Firms' financial vulnerability (V) or health (H) indicator	Impact on extensive margin					Impact on intensive margin	
		p[export]	p[start]	p[continuu]	p[stop]	Nb new dest	Nb lost dest	Impact on intensive margin
Financial vulnerability or health indicators measured from firms' data								
Greenaway et al. (2007) (UK, 1993-2003)	Leverage ratio (V)		0					
	Liquidity ratio (H)		0					
Harris and Li (2011) (UK, 1997-2003)	Leverage ratio (H)				-			
Engel et al. (2013) (France, 2000-2002)	Current liability ratio (V)		0		+			
	Non-Current liability ratio (V)		-		+			
	Cash-flow (H)		0		-			
Askenazy et al. (2011) (France, 1995-2007)	Leverage ratio (V)					-	+	
	Inverse trade credit ratio (V)					-	+	
	Equity to asset ratio (V)					-	+	
	Payment incident (V)					-	+	
Stiebale (2011) (France, 1998-2005)	Leverage ratio (V)		0					0
	Liquidity ratio (H)		0					0
Bellone et al. (2010) (France, 2005)	Composite index (H)		+					
Mutils (2012) (Belgium, 1999-2005)	Coface scores (H)		+				+	0
Forlani (2010) (Italy, 1995-2003)	Cash stock (H)		+a				+	
Berman and Héricourt (2010) (9 developing countries, 2000-2005)	Ratio of total assets over debt (H)		+			0		+
	Cash-flow ratio (H)		+			0		0
	Ratio of tangible assets (H)		+			+		+
Feenstra et al. (2012) (China, 2000-2008)	Ratio of tangible assets (H)		+				+	
Manova et al. (2011) (China, 2003-2005)	Belonging to a foreign-owned multinational (H)							+ ^b
	Belonging to a joint venture (H)							+ ^b
Lancheros and Demirel (2012) (India, 1999-2007)	Short-term leverage ratio (V)		0				0	0
	Long-term leverage ratio (V)		0				0	0
Firms' financial vulnerability or health indicators measured by matching firms' and banking data								
Minetti and Zhu (2011) (Italy, 2001)	Being rationed by Capitalia (V)		-					-
Paravisini et al. (2011) (Peru, 2007-2009)	Credit squeeze (V)		0			-		-

^a Only for firms identified as financially constrained.

^b This effect is amplified when the indicator is interacted with a measure of the sector's financial vulnerability (the ratio of external financial dependence, the ratio of inventories to sales or the ratio of R&D expenses to total sales) and reduced when the indicator is interacted with a measure of the sector's financial health (ratio of tangible assets).

Table 1. The impact of firm financial vulnerability (or firm financial health) on firms' export: main results of firm-level studies

2.2.2 Does financial dependence amplify the impact of macroeconomic financial conditions on exports?

We now examine whether financial dependence magnifies the effect of macroeconomic financial conditions on exports.

First, macroeconomic conditions can be considered from a structural perspective, focusing on the level of financial development. Using a data set on 56 countries between 1980 and 1989, Beck (2002) considers several proxies for financial development inspired by the literature on “growth and finance”. The first, which is a ratio of the credit provided to the private sector by commercial banks and other financial institutions, measures the importance of intermediated finance. The second, the ratio of market capitalization to GDP, accounts for the size of market-based finance. The third, which is calculated as the sum of the two previous indicators, represents the overall size of the financial system. The author finds that the financial development proxies have a significant and positive effect on industry-level exports (alternatively measured by a ratio of exports to GDP or a ratio of trade balance to GDP), especially for industries that heavily rely on outside finance, in the sense of the RZ indicator. In line with his theoretical contribution, Beck (2003) focuses on manufacturing sectors, which are assumed to be particularly dependent on external financing. Employing a data set on 65 countries between 1966 and 1995, he estimates a dynamic GMM model and establishes that financial development, measured by the ratio of credit to GDP described above, has a significant positive impact on the ratio of manufactured exports to GDP, the ratio of manufactured exports to total exports and the trade balance ratio of manufactured goods to GDP. Moreover, financial development is shown to have a significant negative effect on the ratio of manufactured imports to total imports⁸. The key role of financial development is also highlighted when the intensity of external financial dependence is measured by the size of fixed costs. Becker et al. (2013) consider annual bilateral trade flows among a sample of more than 170 countries between 1970 and 1998. Fixed exports costs are successively proxied by the degree of standardization of the exported product, the distance between the exporting and importing countries, the existence of a common border and the existence of a common language between two countries. Using OLS regressions, the authors find that financial development (proxied by the quality of accounting) fosters exports and this effect is more powerful when up-front costs are high. Overall, these findings indicate that financial development provides a comparative advantage for externally financial dependent sectors. They suggest that export promotion strongly depends on policies designed to develop and modernize financial systems.

The impact of macroeconomic financial conditions can also be addressed from a more cyclical point of view, with a particular focus on the financial crisis. Chor and Manova (2012) explore whether the adverse impact of external financial dependence on a sectors’ exports is affected by global credit tightening (identified by high interbank rates) and the 2008 financial crisis (proxied by a dummy variable that equals 1 in september 2008 and thereafter). Relying on monthly US import data over the period 2006-2008, they demonstrate that countries with high interbank rates exports less to the US⁹, particularly in sectors that are highly reliant on external financing.

This effect is amplified during the financial crisis. This result is corroborated by Bricongne et al. (2010) for France over the period 2000-2009. They demonstrate that financially dependent firms exhibit a lower export growth rate, especially during a banking crisis. Berman et al. (2012) reach the same conclusion by measuring the intensity of financial frictions using time-to-ship. In periods of financial crisis, time-to-ship raises not only increases the cost of working capital, but also the probability that an importer will default. Relying on a sample of countries between 1950 and 2009 and on a sample of French exporting firms over the period 1995-2005, they show that firms reduce their exports when the destination country is affected by a financial crisis, and this effect is more pronounced when the time-to-ship is long¹⁰. Finally, as underlined by Iacovone and Zavacka (2009), these patterns are not specific to the recent financial crisis. Based on a data set of developing and developed countries covering a total of 23 banking crises between 1980 and 2006, they conclude that banking crisis magnify the adverse effect of external financial dependence on sectors' export growth rates.

Overall, the literature presented in this section shows that international trade is highly dependent on external financing. From a theoretical perspective, the need to finance fixed and variable costs associated with exporting activities provides a potential explanation for why international trade is significantly affected by external financial conditions. The theoretical results are confirmed by the empirical literature, which provides evidence that financial constraints decrease exports and amplify the adverse effect of poor financial development or a financial crisis on international trade¹¹.

3 Through which channel does finance affect international trade?

In Section 2, we explained that international trade strongly depends on external finance. But it is crucial to refine the analysis by exploring through which channel finance affects international trade. The aim of this section is to examine this issue by concentrating on trade finance. We first present theoretical arguments concerning the role played by trade finance. We then provide empirical evidence about the trade finance channel.

3.1 The trade finance theory

In this subsection, we present the trade finance theory. We first define the concept of trade finance. We then explain the role it plays in the transmission of financial shocks.

3.1.1 What is trade finance?

According to Auboin (2009), 90 % of international trade involves trade finance. A substantial literature has recently been developed regarding this concept, defined as the set of tools used to

finance world trade.

The first form of trade finance is called trade credit. This corresponds to credit one firm granting another. Cash-in-advance (CIA) consists of a buyer (importer) paying a seller (exporter) in advance. Symmetrically, open account (OA) consists in a seller (exporter) allowing a buyer (importer) to delay payment. Both CIA and OA also exist in the case of domestic activities. However users of CIA and OA face two main difficulties, which are amplified in the case of international trade. First, one of the two partners (the importer or the exporter) requires working capital to cover the delay between the payment for the delivery of goods. Second, enforcement problems and default risk are more substantial in the case of international trade, as a foreign partner is particularly difficult to monitor (Elligsen and Vlachos, 2011). For these reasons, OA is used when the financial cost is low in the exporter country (and the enforcement framework in the importer country is robust) while CIA is more attractive when the financial cost is low in the importer country (and the enforcement framework in the exporter country is robust) (Schmidt-Eisenlohr, 2013). Moreover, for financially constrained exporting firms, OA also acts as a positive signal of firm quality, facilitating the firm's efforts to obtain bank credit (Eck, Engemann and Schnitzer, 2011).

Exporting firms also resort to intermediated trade finance, which involves a third party (e.g., a bank, an insurance company) between the importer and the exporter. Letters of credit are the primary tool of intermediated trade finance, which represents approximately 47% of trade finance compared to 26% for OA transactions and 27% for CIA transactions (International Monetary Fund-Bankers Association on Finance and Trade/International Financial Services Authority, 2011). Amiti and Weinstein (2011, p. 7) provide a clear description of this device: *“The terms of the sales contract often require the importer to ask its ‘issuing bank’ to issue a letter of credit guaranteeing payment for the imports upon certification that the exporter has met the terms of the contract. [...] using the letter of credit as collateral, the exporter will often obtain a working capital loan from its bank (often called the advising bank) to cover the production costs of the goods. The third step in the process involves the transfer of the goods to the carrier and the title of the goods to importers’s issuing bank. Assuming all documents are in order, the issuing bank will issue a ‘bankers’ acceptance’ to the exporter guaranteeing payment at a future time, often around 90 days after the goods arrive.”* Letters of credit thus solve the working capital issue. Moreover, as the transaction is transferred to the exporter's and importer's banks, letters of credit also alleviate the enforcement problem. Consequently, a letter of credit is preferred to CIA and OA when the financial cost of working capital is high in both the exporting and importing countries and the enforcement frameworks in both countries are weak (Schmidt-Eisenlohr, 2013)¹².

Another type of intermediated trade finance device, which is particularly popular in Europe, is an export credit guarantee (Egger and Ulr, 2006; Van der Veer, 2010). The guarantee is provided by public export credit agencies or private insurers, such as Euler Hermes, Atradius or Coface, which are known as the "Big Three" (Van der Veer, 2010). As underlined by Auboin and Engemann (2012), trade credit insurance can be used in the case of OA or letters of credit. In the

first case, the insurer compensates the exporter if the importer fails to pay while in the second one, the insurer protects the importer's and the exporter's banks against any default. By reducing the risk for trading partners, insurance contracts increase international trade. According to Van der Veer (2010), they also have a multiplier effect by providing information to non-insured firms. For example, improvements by a given importing firm or importing country is likely to encourage non-insured firms to export to this firm or this country.

3.1.2 Trade finance and the transmission channel for financial shocks

The recent financial crisis and the trade collapse that followed in 2009 have attracted particular attention to trade finance. The WTO was been one of the first to stress the importance of trade finance as a key driver of the dramatic decline in international trade. According to Auboin (2009), 10-15% of the decrease in international trade could have been due to a decline in trade finance. As depicted in Figure 1, real imports and insured trade credit presented similar trends over the period 2005-2011. They both exhibit a sharp decline during 2008. In addition, the reduction in trade finance has been particularly important in emerging countries. Auboin (2009) reports that spreads on 90-days letters of credit issued by emerging or developing countries rose from 10-16 bp to 250-500 bp during 2008. These facts suggest the need to explore the theoretical transmission channels from trade finance shocks to trade in greater detail.

Because they are crucial in financial during periods of crisis, the literature devotes particular attention to letters of credit. In line with the hierarchy proposed by Schmidt-Eisenlohr (2013), a particular characteristic of letters of credit is that their use crucially depends on the financial conditions in both the importer' and exporter's countries. As explained above, letters of credit are preferred to OA and CIA when financial costs are low and enforcement frameworks are weak in both countries. Thus, if a global financial crisis prompts an increase in financial costs in both countries, it becomes impossible to resort to letters of credit. Moreover, there is no available alternative for exporters and importers to finance their international activity, as OA is used when financial costs are low in the exporter country while CIA is more attractive when financial costs are low in the importer country. This results in a sharp decline in world trade. As underlined by Ahn (2011), the strong sensitivity of world trade to financial shocks are also due to their interbank dimension, as two banks, the exporter' and the importers's, are involved in the device. Financing of international trade thus crucially depends on the intensity of informational asymmetries between banks. In the event of a global banking crisis, interbank frictions are accentuated and the cost of letters of credit rise (and/or their availability declines), thus harming international trade. Finally, Amiti and Weinstein (2009) refer to the "financial accelerator" to explain how financial shocks are amplified and ultimately alter real economic performance. According to this view, when banks face difficulties in raising funds on the interbank or financial markets, they tighten credit (Bernanke and Gertler, 1989). The effect of credit rationing is stronger for bank-dependent firms (typically small- and medium-sized firms) because they have no alternative to finance their investment. Interestingly, this reasoning can be transposed to the case of international trade. As exports are particularly sensitive to letters of credit and bank financing, financial crisis have a particularly pronounced adverse effect on international trade,

compared to domestic activities.

Figure 1. The relation between imports and insured trade credits in million US\$ (averaged over all countries)



Source: Eck and Engemann [2012]

3.2 Assessing the empirical validity of the trade finance theory

We now turn to the empirical assessment of the theory of trade finance. We first determine whether trade finance promotes world trade. We then examine the extent to which banking crisis are particularly harmful for international trade.

3.2.1 Does trade finance increase international trade?

The first testable assumption derived from trade finance theory is that trade financing boosts international trade.

The primary difficulty in empirical investigations is to ensure that the trade credit used in econometrical estimates only relates to exporting activities and not to domestic ones. For example, Levchenko et al. (2009b) find that neither the amount of credit extended to firms by suppliers nor the amount of credit extended by firms to customers can explain the observed decline in international trade. However, their trade credit indicators are obviously biased because they not only refer to international but also to domestic trade. Similarly, Eck, Engemann and Schnitzer (2012) and Eck (2012) exploit a survey conducted by the European bank of Reconstruction and Development and the World Bank. Estimating linear probability and OLS models using a sample of German firms in 2004, Eck et al. (2012) show that CIA had a favorable impact on the extensive and intensive margins. Based on a larger sample of firms from 27 countries from European and Central Asia in 2005 and 2009, Eck (2012) also finds that CIA promoted international trade, especially during the recent financial crisis. Employing OLS regressions, the author reveals that CIA increases firm export probabilities and this impact is stronger in 2009 than in 2005. In addition, CIA is shown to boost firms' intensive margins in 2009 but not in 2005. However, the data set used in these two papers does not indicate whether CIA is used for domestic or international activities.

Because, by definition, trade insurance only applies to export activities, restricting the analysis to this specific form of trade finance allows us to address measurement issues. Auboin and Engemann (2012) employed data from Berne Union, which comprises private and public members representing approximately 10% of the world trade, for approximately 100 countries during the period 2005-2011. The authors demonstrate that insured trade credit extended for exports to a given country promotes imports in this country. Focusing on private export insurance, Van der Veer (2010) estimate a gravity model on a sample of 25 countries over the period 1992-2006. He finds that a rise in the number of privately insured exporters in a given country significantly increases the intensive margin for this country. He also reports a favorable effect of private insurance on the intensive margin, but only for a subsample of very risky countries. Finally, Felbermayr and Yalcin (2013) examine the role played by public export insurance provided by the German government (through the Hermes guarantees) between 2000 and 2009. Analyzing sector-level data, the authors demonstrate that public guarantee fosters exports. Egger and Url (2006) report similar results for public export insurance in Austria during the period 1996-2002. Overall, these results support the view that trade finance, notably trade insurance, is a driver of world trade. They provide a rationale for voluntary policies intended to promote trade finance, notably those implemented by the WTO (Auboin, 2011), regional development banks (Beck et al., 2011) and Berne Union (Morel, 2011).

3.2.2 Are banking crises particularly detrimental to international trade?

As the importer' and exporter' banks are highly involved in the use of letters of credit, it also follows from the theory of trade finance that banking crises (in both the importing and the exporting countries) should be particularly harmful to international trade. This assumption is illustrated by Mora and Powers (2009) who demonstrate that the great trade collapse in 2009 followed the deterioration of banks' external position, as a result of the failure of Lehman Brother's in 2007 (see Figures 2 and 3).

Figure 2. Global merchandise exports, 2007:Q1 to 2009:Q2

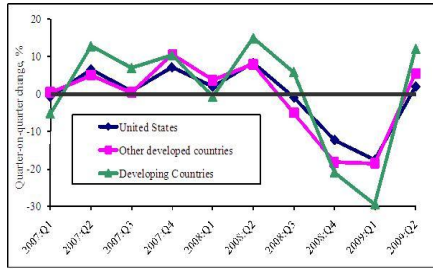
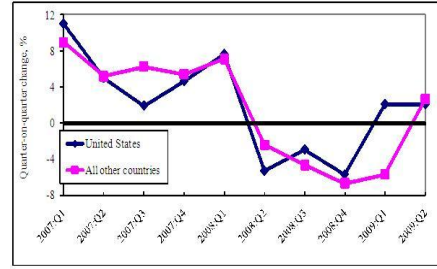


Figure 3. External positions of banks, 2007:Q1 to 2009:Q2



Source: Mora and Powels (2009) from IMF's international financial statistics

Econometric studies provide further support for this view. Berman and Martin (2012) concentrate on exports by countries in Sub-Saharan Africa (SSA) between 1976 and 2002. Controlling for variations in the importers' GDP, the authors perform OLS estimates and report that a banking crisis in the importing country had a negative effect on exports from countries in SSA one year, two years and three years after the crisis. The average deviation from the level of imports predicted by a gravity model lies between -8% and -16% depending in the specification. Similarly, estimating Generalized Least Square (GLS), Instruments Variables (IV) and GMM models using a sample of 10 emerging countries in crisis (Malaysia, Philippines, Thailand, Indonesia, Korea and Russia in 1997-1998, Brazil in 1998-1999, Argentina and Turkey in 2000-2001 and Mexico in 1994-1995), Ronci (2006) shows that 6% of the decline in imports and 10% of the drop in exports is explained by a domestic banking crisis. Focusing on the duration of export relationships rather than on the volume of exchange flows, Beverelli et al. (2011) obtain the same result. Based on a data set of exports from 157 countries to the United States between 1996 and 2009, they estimate a Cox proportional hazard model and finally demonstrate that a banking crisis in the exporting country increases the probability that a trade relationship is interrupted by approximately 11 %.

However, these contributions do not provide clear evidence that the adverse effects of a banking crisis are more severe with respect to world trade than domestic activities. Amiti and Weinstein (2011) address this issue. Their study is particularly interesting for at least two reasons. First, the authors focus on Japan, which is one of the largest exporters in the world despite having faced numerous banking crises since the 1990s. Second, while many contributions are based on aggregate measures of firms' financial conditions, the authors match a sample of Japanese firms with a bank data set for the period 1990-2010 to explore the impact of bank health (measured by the bank's market-to-book ratio) on firms' exports. Their estimates provide evidence that a decline in a bank's financial health implies a reduction in exports for its customers. More interestingly, the authors reveal that when firms' exports are replaced by domestic sales in the estimation, the effect of banks' financial health is weaker. Their findings corroborate the theoretical prediction that banking crisis have a more substantial effect on international trade

than domestic activities. This explains why the 2009 collapse in trade was so severe compared to the decline in GDP.

Finally, this section emphasizes trade finance as a determinant of world trade and a powerful transmission channel for financial shocks. Moreover, as trade finance (notably letters of credit) is generally intermediated by banks, this section highlights the key role played by banking crises in determining international trade patterns, compared to domestic activities.

4 Beyond the causal effect of finance on international trade: extensions and developments

The aim of this section is to propose certain extensions and developments beyond the effect of finance on trade studied in the previous sections. We first address the finance-trade causality issue. We then consider the existence of institutional complementarities and substitutabilities between trade openness and financial reforms.

4.1 International trade as a driver of finance

The primary objective of the literature presented in previous sections is to examine the impact of finance on international trade. In this subsection, we consider empirical and theoretical arguments suggesting that trade could also drive finance. After some micro-level considerations regarding the effect of exports on firms' financial constraints, we adopt a macro-level approach and explore the extent to which international trade increases financial development.

4.1.1 Does export involvement alleviate firms' financial constraint?

At the micro-level, investigating the existence of a causal link running from international trade to finance consists in examining whether being involved in export activities mitigates firms' financial constraint.

Several theoretical arguments suggest that export participation allows firms to lessen the severity of their financial constraint (Greenway et al., 2007). First, exports may facilitate firms' access to international financial markets and provide them with the opportunity to better diversify their risk and sources of financing. Second, provided that national financial conditions are not perfectly correlated, export participation could make firms less dependent on the domestic business cycle. Finally, being present in a foreign markets can also be interpreted as a favorable signal concerning the productivity of the firm and its ability to face export-specific costs. This may improve its access to capital providers and its financial conditions.

Several papers examine the empirical relevance of these theoretical predictions. One approach distinguishes two types of firms: those exporting at a given date and those that do not. It is then

possible to estimate and compare the average level of financial vulnerability or health indicators for the two groups over the period following the considered date. Following this approach, Greenway et al. (2007) conclude that there are ex-post financial gains from exporting. The authors report that the average liquidity ratio over the period 1993-2003 is significantly higher for firms that exported in 1993 than for firms that did not. This advantage is evaluated at 5.6%. Symmetrically, the average leverage ratio over the same period is 8.2% weaker for exporters in 1993 compared to non-exporters. However, these results seem to lack robustness as some other papers do not find any impact of exporting activities on firms' financial constraints. Forlani (2010) finds no effect of being an exporter on ex-post cash-flow or debt equity ratios. In the same vein, Bellone et al. (2010) document that exporting does not affect the ex-post liquidity ratio nor the ex-post composite financial health index.

Another approach consists in estimating investment (or inventory) equations augmented with a financial variable for exporters and non-exporters, in line with the empirical literature on the financial accelerator (Fazzari, Hubbard and Petersen, 1988). As the sensitivity of investment (or inventories) to the financial indicator is interpreted as a measure of financial constraint, the concept is to compare this sensitivity across both types of firms. Shaver (2011) estimates a random effects Tobit model using a sample of Spanish firms between 1990 and 1998. He shows that the ratio of investment over sales becomes more responsive to cash-flow (measured by the ratio of margin over sales) when the firm does not export than when it does. Guariglia and Mateut (2010) obtain similar findings using a data set of UK firms over the period 1993-2003. Employing a GMM approach, they report that non-exporting firms exhibit greater sensitivity of inventory growth to the financial variable (measured as the ratio of short-term debt, primarily bank loans, over the sum of short-term debt and supplier credit) than exporting firms. These results suggest that export participation makes financial constraints less binding.

Finally, rather than considering investment or inventories, Görg and Spaliara (2014) focus on firms' failure probabilities. Another novelty of their study, based on a sample of French and UK firms between 1998 and 2005, is that they distinguish four types of exporters: starters (that begin exporting during the sample period), exiters (that cease exporting but continue to participate in the domestic market), continuers (that export continuously over the sample period) and switchers (that start and stop exporting more than once). The authors find that the leverage ratio raises the firm's probability to fail. Moreover, this effect is amplified for starters and exiters but mitigated when the firm is a continuer or a switcher. These findings refine the results obtained when restricting the analysis to comparing exporters and non-exporters. They suggest that the upfront costs induced by export participation are particularly large when firms enter export markets and some firms have to cease exporting due to the severity of their financial constraints. However, when a firm is able to continue, the favorable effects of export participation mentioned above are at play, thus reducing the responsiveness of the failure probability to the financial variable.

4.1.2 Does international trade spur financial development?

At the macro-level, the finance-trade causality issue essentially concerns investigating whether international trade increases the rate of financial development.

In their seminal paper, Rajan and Zingales (2003) adopt an "interest group" perspective to show that financial development is highly dependent on the degree of trade openness. The starting point of their analysis is the observation that many countries were more highly financially developed at the beginning and end of the 20th century than between 1913 and 1990. To explain this U-shaped pattern of financial development, the authors focus on the political power of incumbent firms and financial institutions. Let us first consider a country that is closed to trade. When the financial system develops, free access to international financial markets increases, raising the level of competition, transparency and contract enforcement. It thus becomes more difficult for financial institutions to extract profits from rents and informal connections with entrepreneurs. Therefore, financiers do not favor financial development. This is also the case for incumbent firms, as financial liberalization is likely to allow potential entrants, that previously had no privileged relationship with incumbent financiers, to be financed by foreign financial institutions. Finally, incumbent firms and financiers both have strong incentives to oppose financial development. Let us now consider a country that is open to trade. Contrary to the previous case, it can be shown that some incumbent firms now favor financial liberalization. Because the least robust industrial firms face competition from foreign firms, their rents and profits are reduced. It becomes more difficult for them to obtain financing from incumbent financiers. They thus have an incentive to advocate for stronger financial liberalization to benefit from less opaque relationships and improved financial conditions, in terms of interest rates and the availability of finance. Rajan and Zingales (2003) conclude that when trade flows are liberalized, more private interests favor financial deregulation. In this view, trade openness shapes financial development: the protectionism that prevailed during a large part of the 20th century may have created a political climate that persistently hindered financial development.

To assess the validity of their theoretical conclusion, Rajan and Zingales (2003) rely on US data from the years 1913 and 1990. They regress an indicator of financial development (successively, the ratio of equity market capitalization to GDP, the number of listed domestic companies divided by population and the ratio of securities issued to GDP) on the ratio of trade volume over GDP, an index of industrialization and interactions of these indicators. Their estimates suggest that openness not only promotes financial development but also amplifies the positive effect of industrialization on financial development.

The literature provides further empirical validation of the Rajan and Zingales's (2003) argument. Herger et al. (2008) rely on a data set containing information on during 128 countries during the 1990s. Their OLS and 2LS estimates reveal that trade openness (measured by the sum of imports and exports as a share of GDP) positively affects the ratio of private credit to GDP and the ratio of market capitalization to GDP. Baltagi et al. (2008) corroborate this result using a data set on 42 developing countries between 1980 and 2003. Finally, based on a sample of 88 countries between 1960 and 1999, Huang and Temple (2005) also conclude that

lagged openness has a positive effect on financial development, especially for the 53 lower-income countries in their sample.

The impact of international trade on finance can also be explained using a comparative advantage approach (Do and Levchenko, 2007). When trade flows are liberalized, countries that export financially intensive goods experience an increase in demand for financing because they have a comparative advantage in this sector. This induce higher financial development. Conversely, financial systems are less well developed in economies that have a comparative advantage in the weakly financially intensive, primary good sector. In this view, financial development is determined by comparative advantages and trade patterns. Do and Levchenko (2007) perform OLS estimates on panel data from 96 countries over the period 1970-1999. For each country in their data set, they construct a measure of the so-called "external finance needs of exports", defined as the sum of sector-level RZ indicators, weighted by a sector's share of exports compared to total manufacturing exports. In line with their theory, they report that external financial requirements of exporters have a significant and positive effect on financial development as measured by the ratio of private credit to GDP.

If international trade drives financial behavior, there may ultimately exist a bidirectional causality between the two phenomena. According to Ju and Wei (2011) the direction of causality between finance and trade is determined by threshold effects and closely related to the level of financial institutional quality, approximated by the cost of financial intermediation, the quality of corporate governance and the level of property rights protection. When an economy has low-quality institutions, interest rates on savings remain very low such that a share of initial capital remain unused. In this case, the initial factor endowment has weak effect on output and prices. Financial development (through improved financial intermediation efficiency) thus provides a comparative advantage to the economy and is the primary determinant of output and trade. When an economy has high-quality institutions, causal relationship is reversed. The initial endowment becomes the main determinant of production and trade, which in turn determine the level of financial development. However, according to Svaleryd and Vlachos (2002) the causality direction does not depend on the institutional environment: finance and trade affect each other simultaneously. On the one hand, trade has a positive impact on financial development, as financial markets help agents to protect against the risks that emerge from trade openness (Newbery and Stiglitz, 1984). On the other hand, the emergence of financial markets, by providing possibilities for risk sharing, encourages trade liberalization. Gathering a data set of 138 countries between 1960 and 1994, the authors confirm their theoretical argument. They demonstrate that there is not only Granger-causality from financial indicators (the ratio of liquid liabilities to GDP and the ratio of credit to private firms to GDP) to trade openness, but also from trade openness to both financial development indicators. Pham (2010) confirms this result using a smaller sample of 29 Asian countries between 1994 and 2008. Overall, the existence of a bidirectional causality between trade and finance has important implications. Notably, it implies the existence of a vicious circle when a financial crisis occurs because since the subsequent contraction in trade flows may in turn deepen the financial crisis.

4.2 Institutional substitutabilities and complementarities between financial and trade reforms

In addition to the question of the direction of their causal relationship, finance and trade may also be linked through institutional interactions that can arise between financial and trade reforms. We successively consider both forms of interactions: substitutabilities and complementarities.

4.2.1 Financial deregulation and trade liberalization as substitutes

As underlined in previous sections, as financial development alleviates the financial constraints of vulnerable firms by facilitating their access to finance, it promotes their exports. Financial development and trade openness thus provide the same service to the economy by boosting world trade. Therefore, financial reforms may be particularly favorable to international trade when trade restrictions are important, i.e., when trade costs are high. Symmetrically, trade openness policies may more effective when the economy is poorly financially developed. These arguments provide support for the view that financial deregulation (in terms of openness to foreign equity flows) and trade liberalization are substitutes.

Manova (2008) uses data on 91 countries between 1980 and 1997 to empirically confirm this theoretical intuition. She measures the degree of trade liberalization using tariff levels, the degree to which the black market exchange rate is below the official one and the extent of the state monopoly on exports. Ultimately, she demonstrates that the positive impact of equity market liberalization on firms' exports is amplified when trade policy is restrictive. This result is consistent with the view that financial liberalization and trade openness reforms are institutional substitutes. When one liberalization policy is implemented, the other has a smaller effect on export performance.

4.2.2 Financial deregulation and trade liberalization as complements

In a second strand of literature, financial and trade reforms are considered complementary. Indeed, some theoretical contributions establish that when focusing on productivity or growth rather than international trade flows, the effects of financial deregulation and trade liberalization may amplify each other. To address this issue, Taylor (2010) introduces financial constraint into the heterogeneous firm trade model developed by Melitz (2003). By reducing trade costs, trade openness promotes exports. It also increases average productivity in the economy: the least productivity firms exit production because they are unable to cope with the decline in prices induced by trade openness. When financial development increases, lenders are better able to recover a fraction of borrowers' output and domestic firms' exports become more pledgeable. This weakening of domestic firms' financial constraints reduces prices, resulting in a reallocation from low- to high-productivity firms. This ultimately amplifies the positive impact of trade openness on average productivity. The theoretical model developed by Peters and Schnitzer (2012) also concludes that trade openness and financial liberalization are complements. When trade between two countries is open, financial development is necessary for firms in both countries not

only to benefit from export opportunities, but also to face fiercer import competition. If financial constraints remain tight in one of the two countries, neither productivity nor technological convergence will be observed. To illustrate their theoretical argument, the authors refer to the North American Free-Trade Agreement (NAFTA): "after the trade agreement, Mexico increased its GDP and its exports. However, due to institutional gaps, in particular credit market development, the productivity gap with respect to the USA and Canada did not close." (Peters and Schnitzer, 2012, page 2).

Nevertheless, econometric studies fail to provide an unequivocal validation of these theoretical arguments. Employing a micro-level approach, Topalova and Khandelwal (2011) find that financial development did not amplify the productivity effect of trade liberalization during the period of reform in India during the 1990s. Using a panel data on firms over the period 1989-2001, the author shows that a 10 % reduction in tariffs implies a 0.5 % increase in firms' productivity. However, this impact does not depend on whether the firm's home country is highly or poorly financially developed in terms of credit per capita.

However, Chang et al. (2009) find that institutional complementarities between financial and trade liberalization can be observed when focusing on GDP growth rather than productivity. Based on a panel of 22 developed and 60 developing countries between 1960 and 2000, their GMM estimates indicate that the ratio of imports and exports to GDP increases the GDP per capita growth rate to a greater extent when the ratio of private credit to GDP is high. This contribution provides some support for the view that the positive effect of trade openness reforms on growth can be amplified by financial development. It also suggests that bundling financial reforms and trade liberalization can be an effective means of increasing growth in developing or emerging countries.

This section demonstrates that finance and trade are not only linked through a one-way causal relationship from the former to the latter. First, finance is driven by trade at both the micro- and macro-levels. Moreover, by suggesting the existence of institutional substitutabilities and complementarities between financial and trade reforms, the literature provides an interesting framework for the analysis of the bundled (i.e., both financial and trade) reforms advocated by international institutions.

Conclusion

The aim of this paper was to present a review of the literature dedicated to examining the impact of finance on international trade. Several important results were highlighted. First, exports performance was shown to strongly depend on sectors' or firms' external finance dependence. More vulnerable firms or sectors export less than others. Moreover, insufficient financial development and financial crises have a greater adverse effect on exports when firms or sectors rely on external finance. Second, trade finance plays a key role in determining trade performance. Notably, because they involve banks, letters of credit provide a powerful transmission channel for the effects of banking crises, which affect international trade to a greater extent than they

do on domestic activities. By emphasizing the causal relationship from finance to trade, these findings shed light on the role played by the recent financial crisis in the 2009 collapse in trade. These findings also contribute to explaining why trade has become more sensitive to trends in GDP evolution since the 1960s, particularly during periods of depressed economic activity (Freund, 2009). Finally, the literature also reveals that finance and trade have a more complex relationship. On the one hand, finance is also driven by trade patterns. At the micro-level, some studies report that exporting participation leads to a relaxation in firms' financial constraints. At the macro-level, financial development is determined by trade patterns. On the other hand, trade openness reforms appears to be more effective in promoting GDP growth when financial systems are well developed.

The relationship between finance and trade calls for further research. First, interactions between financial liberalization and trade openness deserves deeper investigation. Additional empirical studies should be conducted using macro, rather than micro, data sets to determine whether the impact of trade openness on aggregate productivity can be magnified by financial development. Second, the analysis could be enriched by examining whether the relationship between finance and trade is affected by the competitive structure of trading industries. Finally, it would be interesting to explore the extent to which interactions among finance and trade are linked to labor market arrangements and income inequalities within and between trading countries.

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Notes

¹Nevertheless, the decline in merchandise export volumes was particularly severe (-25%) in Japan. For additional details, see Tanaka (2009) and Wakasugi (2009).

²While common practice, comparing GDP and exports (or imports) remains difficult since while the former is calculated from added values, the latter relates to total production.

³The literature also examines other explanations such as the vertical specialization induced by globalization and multinational firms (Bems et al., 2009; Yi, 2009) or the decline in demand due to depressed economic activity (Eaton et al., 2011).

⁴Financial constraints can also affect the quality of exported products. For theoretical and empirical investigations on this issue, see Fan et al. (2012).

⁵In addition, once a firm is engaged in international trade, it is able to use the profits earned from its past exporting activity to finance the costs associated with new exporting destinations.

⁶We address this issue in greater details in Section 4.

⁷While the literature typically considers the leverage ratio as an indicator of firms' vulnerability, Harris and Li (2011) interpret it as an indicator of financial health because it measures the firm's ability to raise long term funds at a low tax cost, relative to equities. The authors find that having a high ratio of long-term debt to total assets significantly reduces the likelihood that the firm will cease exporting.

⁸Financial development also has a positive impact on the ratio of manufactured imports to GDP but this impact is much smaller than the effect on proxies for manufactured export.

⁹The existence of a negative correlation between interbank lending rates and exports is also documented by Feng and Lin (2013).

¹⁰Berman (2009) demonstrates that financial vulnerability also exaggerates the effect of a currency crisis on exports. When exporting firms are indebted in foreign currency, a depreciation of the domestic currency increases the fixed cost of exports, thus reducing the number of exporting firms. This so-called balance-sheet effect is amplified when firms are financially constrained and have few tangible assets.

¹¹As we will see in Section 4, international trade may in turn affect finance. However, many of the econometric studies mentioned in this section instrument financial indicators to account for endogeneity.

¹²During the financial crisis, one observed a significant shift from OA to letters of credit due to increased uncertainty (Mora and Powers, 2011).

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