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Trade Flows in Developing Countries: What is the Role of Trade Finance?

Clara Brandi
Birgit Schmitz

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Bonn, December 2015

Clara Brandi and Birgit Schmitz

Abstract

The availability of trade finance can be an important driver for international trade. This paper analyses the effect of trade finance on the trade flows of industrialized, emerging and developing economies and focuses in particular on the role of trade openness. We use Berne Union data on export credit insurance, the most extensive dataset on trade finance currently available, for the period 2005-2013. Using a two-stage instrumentation approach, we find a significantly positive effect of the availability of trade finance on trade. A one per cent increase in commitments is followed by a 0.27-0.54 per cent increase in total imports in the next year. This is a rather large effect and underlines the importance of trade financing for the smooth exchange of goods across countries and regions. Moreover, we find that trade openness is a very important determinant, not only of import flows but also of how trade credit insurance impacts on trade flows. The more open a country is to trade, the less important is the trade credit insurance effect on imports; when a country is more open to trade, the more frequent exchanges of goods support reliable importer-exporter relationships, so that trade partners do not have to rely as much on trade finance instruments. We further investigate how the effect of the availability of trade finance on trade flows differs across different country groups, above all with a view to different levels of income and levels of development. We find that import flows to non-OECD, lower and middle-income and developing countries are heavily supported by a higher flow of trade credit insurance. We also investigate the importance of trade finance across regions and find that trade finance is particularly important for sub-Saharan Africa.

JEL codes: F10, F13, F14, G01, G20, G22.

Key words: trade finance, international trade, trade credit, export credit insurance, Basel III regulation, financial crisis

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Abstract

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Abbreviations

BIS	Bank for International Settlements
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
CGFS	Committee on the Global Financial System
CIS	Commonwealth of Independent States
DOTS	Direction of Trade Statistics (International Monetary Fund)
GDP	Gross domestic product
ICC	International Chamber of Commerce
L/C	Letter of credit
Log	Logarithm
OECD	Organisation for Economic Co-operation and Development
R^2	R squared (coefficient of determination)
US	United States
USD	United States dollar

1 Introduction

The availability of trade finance can be an important driver for international trade. This in turn can have positive effects on economic development. Recent surveys underline the significance of the availability of trade finance for export and import decisions (ICC, 2013) but the global financial crisis has limited this availability. Moreover, currently, it is being debated to what extent trade finance has not only come under strain directly because of the financial crisis but also because of more stringent financial regulation, above all Basel III, which was introduced as a reaction to the crisis.

The literature available has made progress in assessing the link between trade finance and international trade flows. Yet, the role of trade finance in developing countries and emerging economy has mostly been overlooked. This paper seeks to contribute to closing this gap by turning the spotlight onto the significance of trade finance for the trade flows of developing and emerging economies, in particular in comparison to industrialized countries. This paper analyses the effect of trade finance on the trade flows of various different country groups, including high-income versus low-income countries, advanced and developing countries, and puts a special focus on trade openness. We use Berne Union¹ data on export credit insurance, the most extensive dataset on trade finance currently available, for the period 2005q1-2013q1.

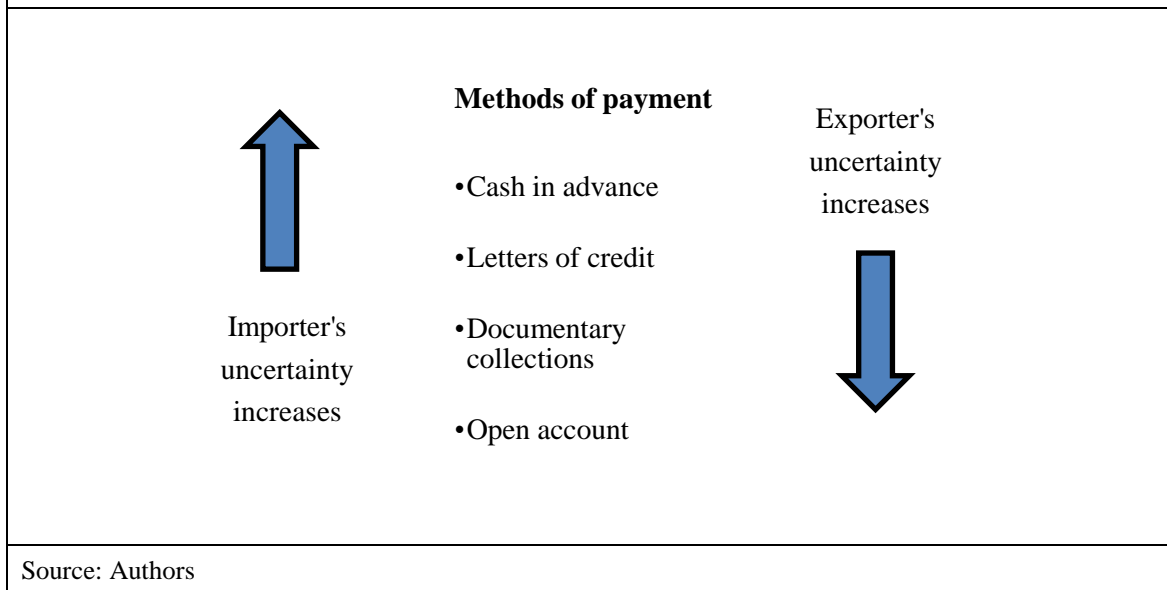
The remainder of the paper is structured as follows: Section 2 explains the need for trade finance to address information asymmetries, introduces various trade finance instruments and outlines the ways in which trade finance might matter for developing countries and emerging economies. Section 3 reviews the literature on trade finance and international trade and underlines that there is a research gap with regard to an assessment of trade finance with a specific focus on developing countries and emerging economies. Section 4 outlines the data we employ as well as our specification. Section 5 presents our estimation findings before Section 6 summarizes the findings and sketches implications and next steps.

2 Trade finance and international trade

What is trade finance needed for? The time lag between the export of goods and the payment, on average 90-100 days, generates payment uncertainty. Trade finance contributes to tackling the information asymmetry between importers (buyers) and exporters (sellers). Trade finance enhances international trade in terms of facilitating payment, mitigating risks and providing information about the status of payments or shipments.

The various trade finance instruments differ in terms of the balance of risk between exporter and importer (see Fig. 1). From the perspective of the exporter, *cash in advance* is least risky (and the most risky for the importer). The importer pays for the goods at an agreed date before the goods are shipped and the exporter receives payment while keeping control of the goods.

1 The Berne Union is an association of export credit agencies and private credit insurers. It collects data on insured trade credit.

Figure 1: Methods of payment and risk allocation for importers and exporters

Open account trading (i.e. the exporter ships the goods to the importer before receiving payment) is the most risky transaction for the exporter (and the least risky for the importer). *Letters of credit* (L/C) can cover the exporter's risks by transferring it to the banks involved. In the case of *documentary collections*, the seller instructs his bank to forward documents related to the export of goods to the buyer's bank with a request to present these documents to the buyer for payment, indicating when and on what conditions these documents can be released to the buyer.

There is a lack of data on trade finance and, according to a recent review of a Study Group of the Committee on the Global Financial System (CGFS) (2014) of the Bank for International Settlements (BIS), there is no readily available data on the international bank-intermediated trade finance market.

The latest data from the trade register of the International Chamber of Commerce (ICC) shows that there was about USD 6.5-8 trillion of bank-intermediated trade finance in 2011, with USD 2.8 trillion comprising L/Cs (Committee on the Global Financial System, 2014). According to estimations by a Study Group of the Committee on the Global Financial System of the Bank for International Settlements, around one-third of international trade is supported by one or more bank-intermediated trade finance products with the remaining two-thirds being financed by inter-firm credit² (see Figure 1).

There are considerable differences across countries and regions with regard to the intensity of the use of trade finance, both with a view to advanced economies as well as with a view to emerging markets.

National data show a variation that ranges from 2 per cent for Mexico to more than 40 per cent for China, India, Italy and Korea (Committee on the Global Financial System, 2014). Trade finance is especially intensively used in Asia. The Asia-Pacific-Region represents more than half of the L/C-based as well as overall trade finance usage. Europe accounts

² Inter-firm trade credit includes open account transactions, where goods are shipped in advance of payment, and cash-in-advance transactions, where payment is made before shipment.

for around one-quarter and North America, Latin America, Africa and the Middle-East each for around 5-10 per cent (Committee on the Global Financial System, 2014).

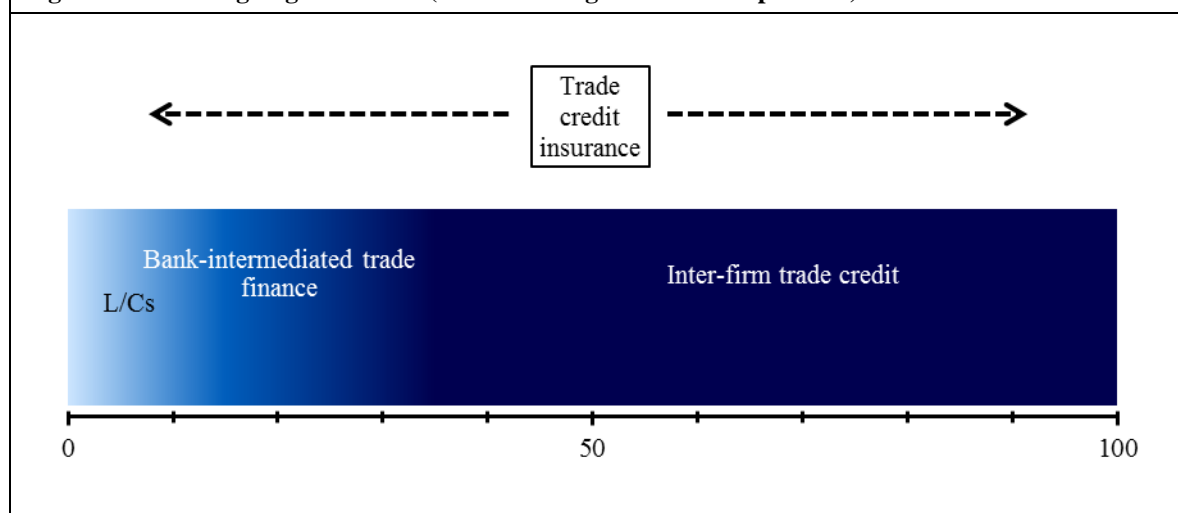
Currently, the availability of trade finance is being debated along two main contexts:

The first question is to what extent the availability of trade finance is affected by financial crises. While many authors agree that the great trade collapse of late 2008 to late 2009 after the global financial crisis was strongly driven by the reduction of global demand, recent research demonstrates that the lack of trade finance also played a significant role.

The second question is to what extent the availability of trade finance is affected by more stringent financial regulation. A hotly debated question at the moment is to what extent treatment of trade finance under Basel III threatens to hurt trade because of its approach to liquidity standards and off-balance-sheet financing (Brandi, Schmitz, & Hambloch, 2014). For example, it is currently under discussion whether Basel III makes adequate allowances for the relevant characteristics of trade finance and whether, and to what extent, it contributes to raising its costs. The effect of Basel III on trade finance has not been thoroughly investigated yet.

From a developing country perspective, trade finance – and challenging trade finance conditions – can be relevant from both an export and an import point of view. First, from the export point of view, challenging trade finance conditions might cause products from developing countries to have limited access to other markets. Second, from the import point of view, challenging trade finance conditions might generate difficulties for developing countries to import goods (including food). Moreover, challenging trade finance conditions might imply that developing countries are excluded from global value chains.

Figure 2: Financing of global trade (as a share of global trade in per cent)



Source: Authors, using data from Committee on the Global Financial System (2014)

3 Literature review

The link between trade finance and trade in developing countries and emerging economies has not yet been thoroughly investigated. At the same time, as mentioned above, the literature has more generally made progress.

The current literature makes use of three different approaches in order to analyse impact of trade finance on international trade: (1) The first strand of literature uses the different degrees of financial vulnerability of different sectors for the identification of the impact of financing conditions on aggregate trade flows. (2) A second strand puts the focus on the financing relations between banks and companies or exporters. (3) A third strand assesses specific products or product groups of trade finance and analyses the data of specific providers of trade finance.

(1) The first strand of literature assesses trade flows at the sector level and makes use of the different degrees of dependencies of these sectors on external finance in order to determine the impact of different financing conditions on aggregate trade flows.

Manova (2013) shows that financial market imperfections affect international trade flows due to the dependence of exporters on external finance. She uses a panel data set with 107 countries and 27 sectors over the period from 1985 to 1995 in order to distinguish the degree of the countries' financial market development and the industrial sectors' dependence on external finance and links these with sectoral trade data. Manova finds that the credit restrictions have a significant effect on aggregate trade. More specifically, she finds that one-third of that effect on trade flows is due to fewer firms being active as exporters and that two-thirds of that effect are due to fewer export volumes of goods.

Chor and Manova (2012) study a similar relationship for all United States (US) imports during the global crisis 2008-2009. They make use of a data set that includes monthly US imports and is disaggregated by country and by sector and link these data with information about the pre- and post-crisis financing costs of the respective countries and with data about the financial vulnerability of the various sectors in the data set. Their findings show that tense financial market conditions have reduced exports in the United States and that this effect is stronger for more vulnerable sectors, e.g. due to the strong need for wide-ranging external financing or restricted access to trade credit.

Iavocone and Zavacka (2009) examine the effect of banking crises on manufacturing exports on the basis of panel data on 23 banking crisis episodes involving both developed and developing countries during the earlier period from 1980 to 2000. They find that the banking crises have a robust effect on export growth, which is additional to external demand shocks and is particularly significant for sectors producing durable goods. Their findings also indicate that exports from sectors that are more dependent on external finance and banking finance as opposed to inter-firm finance grow significantly less than other sectors.

Berman and Martin (2012) study sub-Saharan Africa and assess the impact of past banking crises (1976-2002) on trade and find that African exporters are especially vulnerable to a banking crisis in the countries they export to. They also find that the 'disruption effect (a banking crisis disrupts the financing of trade channels)' is much larger and long-lasting for African exporters than the 'income effect (during a banking crisis, income and exports to the country fall)'. Their empirical findings also support the hypothesis that exporters in

African countries depend more on bank-based trade finance than exporters in other regions and that this dependence on trade finance is a key reason for their vulnerability to banking crises in the countries they export to.

(2) The second strand of literature directs the spotlight on the financing relations between banks and companies or exporters and their effects on the exporting activities of the companies under consideration.

Amiti and Weinstein (2011) assess firm-level data on Japanese companies and study the effects of the Japanese financial crisis of the 1990s on exports. They analyse the links between firms' exports, their ability to obtain credit, and the health of their banks. They find that the health of negotiating banks affects the trade finance conditions and thus the exports of the respective companies. One-third of the decline of Japanese exports to the United States can be explained by the reduction of bank equity. Export growth of companies is more strongly affected than domestic sales. This underlines the importance of financing conditions for international trade and the heterogeneous effects on exports and domestic activities.

In their study on exports from Peru, Paravisini, Rappoport, Schnabl, and Wolfenzon (2015) expand this approach and distinguish between the credit elasticity of the export volume and the spectrum of goods (intensive and extensive effect). Their data set contains data on all Peruvian exports, all participating firms and banks, the relevant product categories, as well as the recipient countries and tariff and transport conditions. On the basis of this extensive data set with the respective transaction details, the authors can control for the demand effects at the level of product categories and recipient countries. A decline of the credit supply of banks by 10 per cent generates a decline in the export volume of 1.8 per cent due to the intensive effect and of an additional 0.3 per cent due to the extensive effect. 15 per cent of the decline in trade in Peru can thus be explained by deteriorating refinancing conditions of banks.

On the basis of their Italian data set, Del Prete and Federico (2014) measure not only the credit supply of a bank for a single company but also those credits that are specifically designated for exports and imports. Their findings show that companies export less if they are financed through banks that are subject to greater refinancing shocks. At the same time, this effect is only significant for domestic credits and credits for importing activities while export credits are not directly affected. The authors conclude that export credits are less risky and thus less strongly restricted; they therefore come to the conclusion that the general financing conditions of exporting firms are relevant for the respective export volume.

Ahn (2013) studies data from Columbia for the years 2008 and 2009 that enables him to not only link banks and exporters but also the respective importers. On this basis, he is able to estimate the effect of liquidity shocks of the banks on the supply of letters of credit while controlling for importer-exporter-banking-combinations and product effects. He shows that a reduction of deposit growth (liquidity shock) of a bank by 1 per cent generates a reduction of goods of a given category by 4.2 per cent and that the probability not to be able to supply the respective goods markets rises by 8.4 per cent.

Bricogne, Fontagné, Gaulier, Taglioni, and Vicard (2012) use a similar strategy by linking firm data with detailed export data and information on credit information files on the basis of data on all French exporters. They show that export-oriented firms in sectors that are

more dependent on external finance have been most strongly affected by the global financial crisis. They conclude that credit-restricted firms do in fact reduce their export activities. But the aggregate effects on overall French exports are rather small since this applies only to a few French firms during the crises.

Building on a data set of all trade finance claims of US banks, Niepmann and Schmidt-Eisenlohr (2013) show in addition that the supply shocks of individual banks regarding letters of credit do not only affect overall export growth in the United States but also have heterogeneous effects for different export destinations. Since the banks' extents of engagement vary across different countries and since letters of credit are country-specific, the decline in supply of letters of credit of a single bank leads to a reduction of export in very specific countries. The authors also showed that a supply shock regarding trade finance has stronger effects on the exports of smaller and more risk-prone countries and larger effects in times of general insecurity.

(3) The third strand of literature assesses specific products or product groups of trade finance and analyses the data of specific providers of trade finance. Often, the data stem from one single company that dominates the domestic market or has a substantial market share in international markets.

For example, Egger and Url (2006) assess export guarantees for Austria, while Felbermayer and Yalcin (2013) study them for Germany (Euler Hermes). Both studies showed that export guarantees increase export volumes. The latter study stresses that export guarantees are concentrated on few sectors and export destinations but that there is little evidence that export guarantees can moderate frictions in terms of financing conditions.

Van den Veer (2015) studies the data set of a large credit insurance company and its export credit insurance for 25 OECD countries for exports to 183 countries worldwide. The study suggests that private export credit insurance does not only increase the volume of exports but that, due to the multiplier effect, each euro of insured exports generates around 1.3 euros of exports.

In general, the different strands of literature entail different methodological strengths and weaknesses. The first strand of literature only measures the supply effect of financing conditions indirectly, thereby making a convincing identification of the exact effects of trade finance on trade flows difficult. Compared to the first strand of literature, the second strand – with its focus on bank-firm-relations – is more successful in doing that. On the basis of their detailed data sets, the latter type of studies succeeded in showing which specific effect trade finance conditions had on specific firms or export sectors. On the other hand, the explanatory power of these studies regarding aggregate effects with a view to international trade is relatively limited since these studies could only focus on one country (so far the United States, Italy, Columbia, Peru) due to issues of data availability. The third strand is able to include a larger number of exporting and importing countries; but since the respective data sets are limited to one product of one single company, it is usually possible to assess only a small share of overall aggregate trade finance.

In addition, a more general observation is that there are hardly any studies on the link between the availability of trade finance and the trade flows of developing and emerging economies – despite their rising importance to the global economy. This is especially striking in light of the fact that it is the trade flows of these countries in particular that are

subject to various country risks and whose financial development is often not in tune with their economic development. This, in turn, suggests that trade finance might play a more important role in these countries.

Developing and emerging economies are a highly heterogeneous group of countries, not least with a view to their integration into global trade. They differ in terms of the goods they export and import (e.g. raw materials, agricultural products, and manufactured goods) and in terms of their role in global value chains (see also Brandi / Schmitz, 2015). In turn, these heterogeneities affect the importance of international trade for the economic development of these countries (e.g. with a view to import dependency, value-added trade) and thus the interest of these countries regarding international trade rules and financial market regulations. In the literature, these determinants have not yet been subject to detailed study and their effects on international trade and financing conditions have not received the attention they deserve.

4 Data and specification

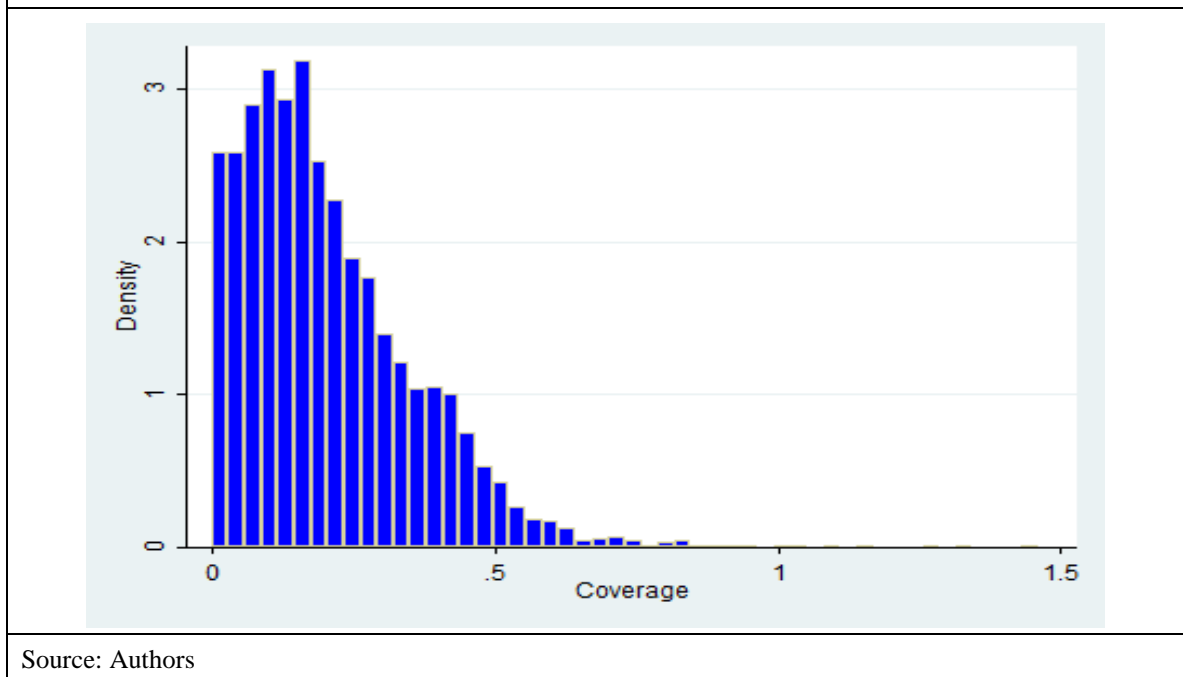
Against the background of this literature review, this paper seeks to contribute to closing the above-mentioned gaps and first aims to address the following main questions:

- i. Which significance does trade finance have for the trade flows of different country groups, including high-income and low-income countries?
- ii. Are the effects of a reduced availability of trade finance for the trade flows of economies more open to trade stronger than for the trade flows of more closed economies?

For data on the availability of trade finance, we employ the most extensive dataset on trade finance currently available. We use data on export credit insurance collected by the members of the Berne Union, an association of export credit agencies and private export credit insurers.³ This is available on a quarterly basis for 218 countries and covered the period from the first quarter of 2005 to the first quarter of 2013. The Berne Union provides for credit insurance data by destination country, not by country of origin. Against this background, the first option is to focus on the link between trade finance and developing country imports. As our variable of interest we use short-term commitments, which is actual insurance given to cover actual loans. Thus, a commitment means that a loan agreement (as well as the underlying project or export transaction agreement) has been signed, the insurance for this loan is in place, and the insurance premium has been paid or invoiced. In some cases, a part of a loan may not yet have been disbursed, however the non-disbursed amount typically represents only a minor share of the total amount reported as a commitment.

The data set covers one trade finance product but, in contrast to the third strand of literature outlined above, the data set provides aggregate data at the country level for a large country panel. This has the following advantage: the data enable us to analyse a clearly circumscribed market, which enhances our identification strategy, while, at the same time, it enables us to study the effect of trade finance on relevant share of international trade flows.

3 Auboin and Engemann (2014) also use this data for a different time period in related work.

Figure 3: Coverage (commitments/total imports)

Source: Authors

Figure 3 depicts the distribution of the trade finance intensity or, as we call it here, the credit insurance coverage of import flows. We define coverage as commitments over total imports. While the average country for an average year uses trade credit insurance for about 20 per cent of imports, this ratio varies widely over the sample.

To estimate the effect of export credit insurance on trade we use a ‘one-sided’ gravity model of trade. The gravity model explains trade between a pair of countries with the distance and their economic ‘masses’.

We employ the following specification:

$$\begin{aligned}
 \log(\text{realimports}_{it}) &= \beta_0 + \beta_1 \cdot \log(\text{commitments}_{i,t-1}) + \beta_2 \cdot \log(\text{realGDPpercapita}_{i,t-1}) \\
 &+ \beta_3 \cdot \log(\text{population}_{i,t-1}) + \beta_4 \log(\text{distance}_{i,t-1}) + \beta_5 \log(\text{REER}_{i,t-1}) \\
 &+ \beta_6(\text{openess}_{i,t-1}) + \beta_7(\log \text{ commitments}_{i,t-1} \cdot \text{openess}_{i,t-1}) \\
 &+ \text{time dummies} + \alpha_i + \epsilon_{it}
 \end{aligned}$$

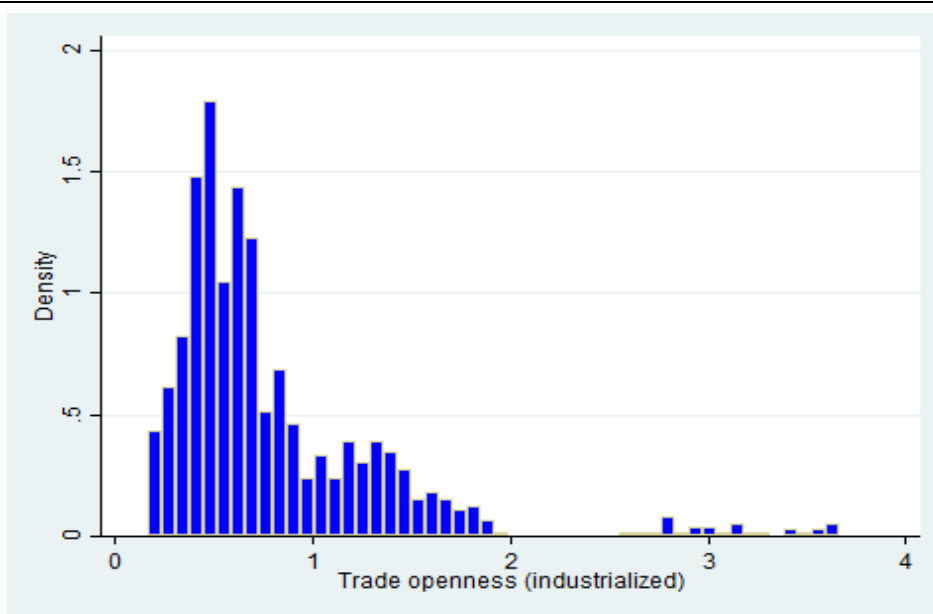
Since we only have credit insurance data by destination country we use total real imports by country as the dependent variable. As independent variables, we use real GDP *per capita*, population, a GDP-weighted average distance to trade partners, the real effective exchange rate, and the trade credit insurance measure commitments. We augment this basic specification with a measure for trade openness.

Trade openness is one of the other characteristics of interest to us. On the one side, countries more open to trade were more heavily affected by the great trade collapse. But a higher openness to trade usually also means a higher frequency of trade. More frequent

trade relationships can come along with a stronger reputation. And a better reputation may reduce the need for trade finance in good and, in particular, in bad times.

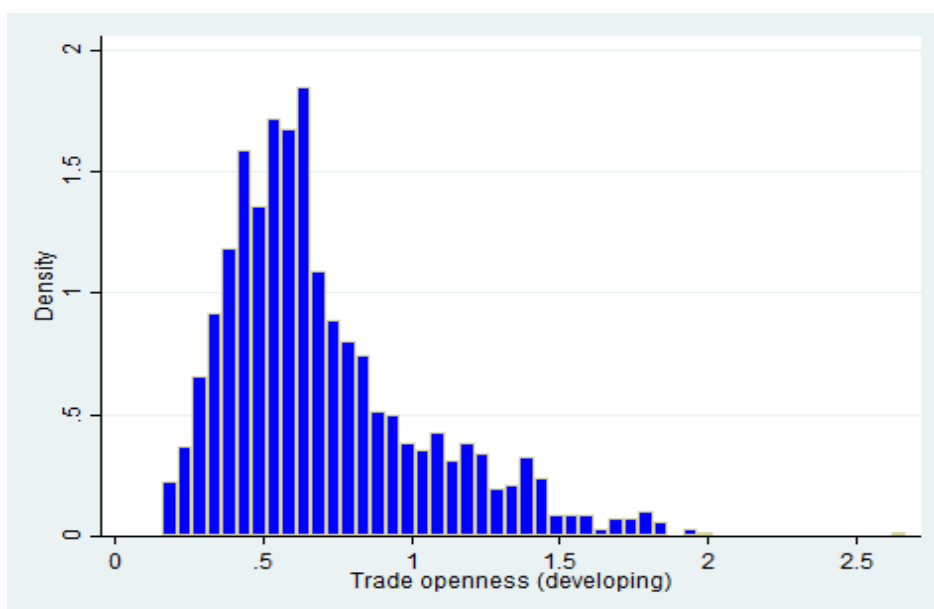
Figures 4 and 5 show that trade openness is indeed distributed heterogenously in the sample and this large range of values is also present for developing and emerging countries.

Figure 4: Trade openness of industrialized countries (total imports + exports/nominal GDP)



Source: Authors

Figure 5: Trade openness of developing countries (total imports + exports/nominal GDP)



Source: Authors

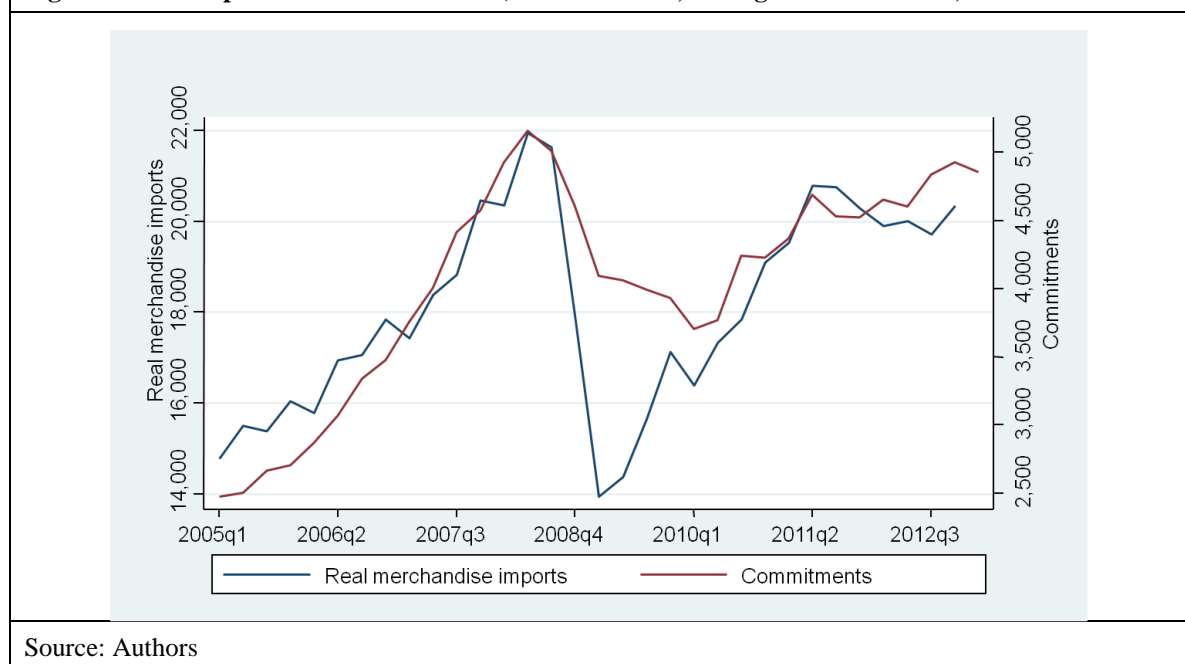
In further steps, we investigate how the role of trade credit insurance differs across country groups and in particular between developed and developing countries. To do this,

we split the sample according to OECD membership, income classes as defined by the World Bank, and advanced and developing economies as defined by the Direction of Trade Statistics of the International Monetary Fund. Moreover, we looked at regional effects and investigated subsamples of developing Asia, Central and Eastern Europe, the CIS countries, the Middle East and North Africa, sub-Saharan Africa and the Western Hemisphere; the country groupings are taken from the Direction of Trade Statistics.

Country and time fixed effects are included to control for time and country specific effects. We use an instrumental variable panel fixed effects estimator. Import volumes are taken from the International Monetary Fund's Direction of Trade Statistics (DOTS) and are total merchandise imports from the rest of the world by country and on a quarterly basis. GDP data are taken from the International Monetary Fund's International Financial Statistics; population data is taken from the World Bank. As a distance variable, we use a GDP-weighted distance measure. This variable gives a measure of how distant a country is from major economic hubs in the world. Countries in southern Africa or the Pacific would, in this sense, be far away from 'global GDP' compared to countries in Europe or Asia. The measure is constructed using bilateral distance between countries and real GDP and real GDP *per capita* for each year. Distance measures do not change by year. The bilateral distance measure itself is constructed by CEPII as part of its GEODist database. The real effective exchange rate index data are taken from the Bruegel Institute's Real Effective Exchange Rate Database. Trade openness is defined as the sum of total exports and total imports over nominal GDP.

On the basis of the average of all countries, Figure 6 depicts commitments and imports between 2005q1 and 2013q1. It illustrates that both imports and short-term commitments increased until 2008, with commitments dropping sharply in the second quarter of 2008 and imports dropping at the end of 2008 and imports recovering in the course of 2009 until they were back to pre-crisis levels in 2010.

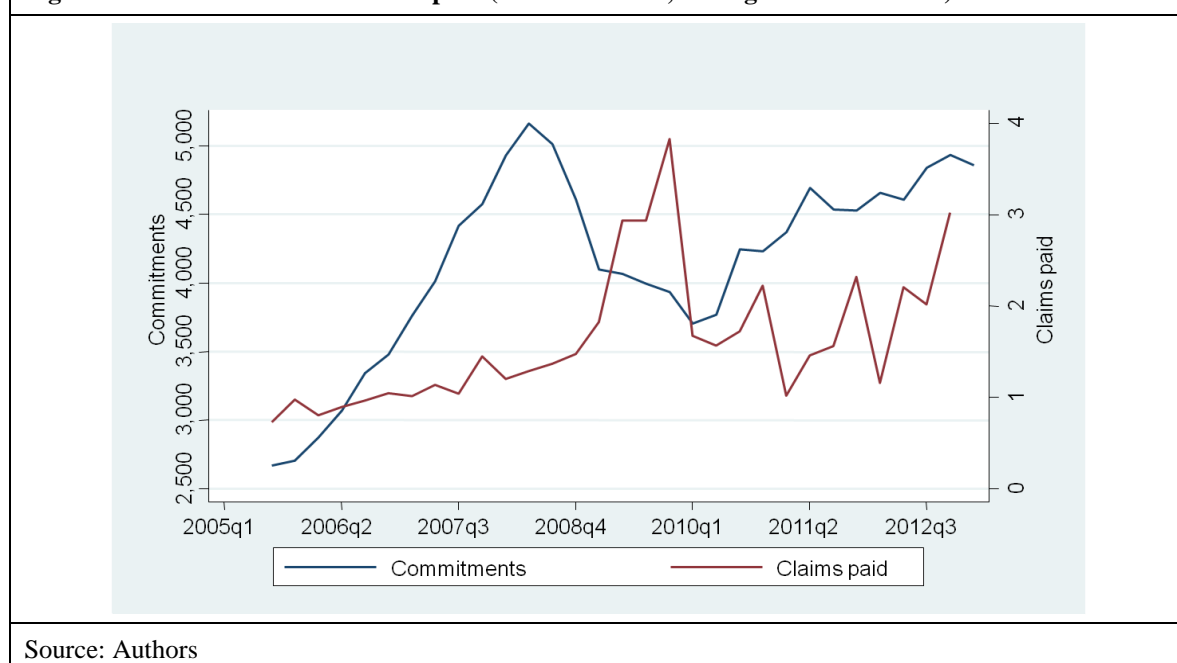
Figure 6: Real imports and commitments (in million USD, average of all countries)



Despite the seeming correlation between export credit insurance and the collapse of international trade after the beginning of the financial crisis in 2008, no causal relation can be assumed. Reverse causality could cause an endogeneity bias here. Instead of some exogenous factor leading to higher trade insurance coverage, growth in trade could also explain growth in insured exports. Clearly, this would bias the estimate of trade credit insurance on trade upwards.

We therefore apply an instrumental variable approach and use the claims ratio as an instrument for commitments. *Claims paid* is the total amount that Berne Union members have paid to the insured. This data series is also available by country on a quarterly basis. The claims ratio is then defined as claims paid over commitments. The claims ratio is a key performance indicator for insurers, and an important determinant of an insurer's decision to adjust its supply of insurance.

Figure 7: Commitments and claims paid (in million USD, average of all countries)



Source: Authors

Figure 7 illustrates short-term commitments and short-term claims paid (albeit on different scales), which seem to be negatively correlated over time. In the wake of the financial crisis of 2009, short-term claims paid were growing while commitments fell. The low ratio of claims paid to short-term commitments suggests that the risk was limited. The instrumental variable estimation uses only part of the variability in insured exports to estimate the relationship between commitments and total exports. So, in a case of a shock, claims increase. The claims ratio also increases, as the insurers only raise the premiums of new contracts. However, in order to limit the rise in claims, the private trade credit insurer reduces its exposure by using its right to cancel a credit limit on any buyer at any given time.

In order to be used as a valid instrument, our instrumental variable must be strongly correlated with the endogenous variable. Both the graphical illustration and the correlation measure (-0.23) support this precondition.

In the first stage regressions, we use four lags of the claims ratio. As a robustness check we also worked with other lag choices. The first stage is also estimated with real GDP *per capita*, population, distance, and the real effective exchange rate. We also add time dummies and use country fixed effects. We find a negative, large and strongly statistically significant effect of the claims ratio/trade risk on commitments up to one year ahead. Longer lags are no longer significantly different from zero. If we were using a shorter lag structure we would miss a significant part of the impact of the claims ratio on commitments. Real GDP *per capita*, population, distance, and the real effective exchange rate have the expected effects representing higher demand or higher costs on commitments. Table 1, column 1 shows our preferred specification for the first stage, which is also then used for all regressions of the second stage. We run a battery of tests to investigate the quality of our chosen instrumental variable. The F-statistic for excluded instruments is very high; the same is true for the test statistics for the underidentification and weak identification test, which allows us each time to reject the null hypothesis of no explanatory power of the instrument, the regression being underidentified or only have a weak identification. The test for overidentification gives us a Sargan statistic of 4.682, so that we cannot reject the null hypothesis of having a valid instrument. In summary, the claims ratio is a valid and strong instrument for commitments.

5. Estimation results

The baseline results of estimating the specification presented in Section 4.2 are presented in Table 1, column 2. The model is estimated with two sets of fixed effects (year and country). The explanatory variables are entered in lags to mitigate potential endogeneity problems. The model in general fits the data well. We get a large R^2 and the estimates of the control variables are sensible and all highly significantly different from zero.

Imports increase with higher demand, a one per cent higher real GDP *per capita* leads to a 0.7 per cent and 1 per cent higher population (market size) leads to 1.04 per cent higher real imports in the following year. An increase in the real effective exchange rate increases imports by about 0.2 per cent. Trade credit insurance appears to be an important stimulator of imports. A one per cent increase in commitments is followed by a 0.27 per cent increase in total imports in the next year. This is a rather large effect and underlines the importance of trade financing for the smooth exchange of goods across countries and regions. In the regression set up of columns 3, we investigate whether the effects found so far are similar across all degrees of trade openness. We find that trade openness is a very important determinant, not only of import flows but also of how trade credit insurance impacts on trade flows. Openness to trade has a large positive effect on imports, not surprisingly and often shown in the empirical literature. And openness to trade comes with a reputation effect. When a country is more open to trade, the more frequent exchanges of goods support reliable importer-exporter relationships, so that the trade partners do not have to rely as much on trade finance instruments. The coefficient of the interaction variable between openness and commitments is negative and strongly significantly different from zero. The more open a country is to trade, the less important is the trade credit insurance effect on imports.

Table 1: First stage and second stage regression results for the basic specification			
	1	2	3
	First stage	Second stage	Second stage
	Dependent variable	Dependent variable	Dependent variable
	Log commitments	Log imports	Log imports
log trade risk (t-1)	-0.0241*** <i>0.0041</i>		
log trade risk (t-2)	-0.0234*** <i>0.0041</i>		
log trade risk (t-3)	-0.0245*** <i>0.0042</i>		
log trade risk (t-4)	-0.0195*** <i>0.0040</i>		
log commitments (t-1)		0.2736*** <i>0.0737</i>	0.5446** <i>0.2537</i>
openness to trade* log commitments (t-1)			-0.4758* <i>0.2840</i>
openness to trade (t-1)			4.2052* <i>2.3900</i>
log GDP per capita (t-1)	1.9036*** <i>0.0890</i>	0.7771*** <i>0.1857</i>	0.6491** <i>0.3043</i>
log population (t-1)	1.2309*** <i>0.1786</i>	1.0768*** <i>0.2247</i>	1.2772*** <i>0.3460</i>
log distance (t-1)	-1.4521*** <i>0.4817</i>	1.0461** <i>0.5143</i>	-0.8055 <i>0.7978</i>
log reer (t-1)	0.2173*** <i>0.0573</i>	0.1977*** <i>0.0629</i>	0.2568** <i>0.1111</i>
F-statistic for excluded instruments	53.41 p-value 0.0000		
underidentification test (Anderson LM statistic)	186.41 p-value 0.0000		
weak identification test (Cragg-Donald Wald F Statistic)	52.41 Critical value for 5% bias is 16.85		
overidentification test Sargan statistic	4.682 p-value 0.1966		1.637 p-value 0.4411
R ²		0.47	0.55
observations	1657	1657	1332
estimator	Panel IV	Panel IV	Panel IV
country fixed effects	yes	yes	yes
time fixed effects	yes	yes	yes
Notes: ***, **, * denote significance at the 1%, 5%, 10% level. Standard errors are reported below the coefficients.			
Source: Authors			

Table 2: Regression results for different country groupings

	1 OECD	2 Non-OECD	3 High income	4 Low/middle income	5 Advanced economies	6 Developing economies
log commitments (t-1)	-0.0265 <i>0.0714</i>	0.3464*** <i>0.1288</i>	0.1064 <i>0.0680</i>	0.4717*** <i>0.1428</i>	-0.0401 <i>0.0738</i>	0.3739*** <i>0.1280</i>
R ²	0.63	0.43	0.62	0.42	0.62	0.44
observations	779	878	998	659	802	855
estimator	Panel IV	Panel IV	Panel IV	Panel IV	Panel IV	Panel IV
country fixed effects	yes	yes	yes	yes	yes	yes
time fixed effects	yes	yes	yes	yes	yes	yes

Notes: ***, **, * denote significance at the 1%, 5%, 10% level. Standard errors are reported below the coefficients.
Source: Authors

Table 3: Regression results for regional sample splits

	1 Developing Asia	2 Central and Eastern Europe	3 Commonwealth of Independent States	4 Middle East and North Africa	5 Sub-Saharan Africa	6 Western Hemisphere
log commitments (t-1)	0.1600 <i>0.2206</i>	0.2041* <i>0.0796</i>	0.5208 <i>0.3387</i>	0.8560*** <i>0.2654</i>	1.4021*** <i>0.3186</i>	0.5719*** <i>0.1787</i>
R ²	0.61	0.60	0.63	0.49	0.22	0.62
observations	125	183	56	185	150	156
estimator	Panel IV	Panel IV	Panel IV	Panel IV	Panel IV	Panel IV
country fixed effects	yes	yes	yes	yes	yes	yes
time fixed effects	no	no	no	no	no	no

Notes: ***, **, * denote significance at the 1%, 5%, 10% level. Standard errors are reported below the coefficients.
Source: Authors

In Table 2, we display the results of the second-stage regression across different country groupings. Column 1 and 2 illustrate that while the effect for OECD countries is not significant, we do find a highly significant effect for non-OECD countries. In columns 3 and 4 we display the results of our investigation of the effect in high-income versus low- and middle-income countries (based on World Bank classification). We find that the effect in the former is not significant; in contrast, in low- and middle income countries, the effect is highly significant. In columns 5 and 6, we display our findings regarding advanced versus developing economies, as defined by DOTS. The results suggest that there is no statistically significant effect in the former but the findings indicate the availability of trade finance has significant effects on trade flows in the latter. In summary, the results indicate that the trade flows of industrialized countries are not dependent on trade finance while developing economies' imports are strongly driven by the availability of trade finance. Reasons for this strong role could lie in various country risks and a financial development that is often not in tune with the country's economic development.

Table 3 contains the results of our analysis of the importance of trade finance across regions. Our findings indicate that the availability of trade finance has a strong positive and significant effect on trade flows of Central and Eastern Europe, the Commonwealth of Independent States, the Middle East and North Africa, sub-Saharan Africa and the Western Hemisphere. The coefficient for does has the right sign but is not statistically significant for Developing Asia. The results suggest that the availability of trade finance has even an over-proportional effect in sub-Saharan Africa (1.4 per cent). The empirical evidence thus shows that trade finance is essential for importing goods to sub-Saharan Africa.

6 Summary and outlook

This paper has investigated the effect of trade credit on the trade flows of industrialized, emerging and developing economies and focuses in particular on the role of trade openness.

We use Berne Union data on export credit insurance, the most extensive dataset on trade finance currently available for a wide range of countries for the period 2005-2013. We use the claims ratio as an instrument for trade credit insurance. Using a panel instrumental variable approach, the first stage results support strongly our instrumentation strategy. The second stage results reveal a significantly positive effect of the availability of trade credit on trade. A one per cent increase in commitments is followed by 0.27 per cent increase in total imports in the next year. This is a large effect and underlines the importance of trade financing for the smooth exchange of goods across countries and regions. Moreover, we find that trade openness is a very important determinant not only of import flows but also of how trade credit insurance impacts on trade flows. The more open a country is to trade, the less important is the trade credit insurance effect on imports. When a country is more open to trade, the more frequent goods exchanges support reliable importer-exporter relationships, so that the trade partners do not have to rely as much on trade finance instruments. As a next step, we investigated how the effect of the availability of trade finance on trade flows differs across different country groups, above all with a view to different levels of income and of development. Our findings indicate that trade credit

insurance does not play an important role for trade flows going to OECD, high income, and advanced economies. But import flows to non-OECD, lower and middle-income and developing countries are heavily supported by a higher flow of trade credit insurance. One per cent increase in trade credit insurance leads to 0.34-47 per cent increase in total imports. This, in turn, suggests that the availability of trade finance is a strong driver for trade in developing economies. We also investigated the impact of trade finance across regions and found that trade finance strongly supports imports to the Western Hemisphere, the Middle East and North Africa and sub-Saharan Africa. Any shock to trade finance supply in these regions might have strong real effects so that trade finance assistance by multilateral development banks could be helpful in crisis periods.

For future research, the next steps will be particularly promising: First, we will assess to what extent the trade structure of the trading countries matters, e.g. with respect to the share of imports that consists of manufactured goods versus agricultural commodities or fuels and ores. Second, we will investigate the relevance of trading partners, i.e. whether North-North, South-South or North-South trading relationships show a differing degree of dependence on trade financing. Third, we will analyse the impact of the crisis. To do so, we will investigate how the crisis period can be adequately modelled, because the crises period on the financial markets is different from the crisis period for trade (The Great Trade Collapse). The former could also be modelled endogenously by using sovereign risk ratings or the relevant short-term spread. These further steps will enhance our understanding of the role of trade finance in different country settings and will provide us with guidance with regard to potential policy implications.

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Appendix

Table A1: Various trade finance instruments	
Import letters of credit (L/Cs)	<ul style="list-style-type: none"> - Company in one country (importer) wants to import goods from a company in another country (exporter) → necessary: agreement on payment of goods - Exporter: risk of shipment - With L/C: exporter asks importer for a guarantee from a bank for the assurance of the payment - Importer requests L/C from his/her bank to assure exporter of the payment - Exporter needs to issue the required documents (e.g. invoices, bills of lading) to the bank - If documents compliant: payment to the exporter - Import L/C: risk reduction of non-payment to the exporter due to, in general, the lower risk profile of banks compared to companies <p>Source: Humphrey (2009); International Chamber of Commerce [ICC] (2013a)</p>
Export confirmed letters of credit	<ul style="list-style-type: none"> - Issue of import L/C: risk reduction of non-payment for the importer but risk is borne by bank issuing the L/C (which might not make the payment) → if the exporter does not trust/is not confident with the issuing bank, there is a risk that the exporter will not ship the goods - Therefore: export confirmed L/C → exporter consults his/her bank of choice and requests a guarantee to assure the payment from the issuing bank (importer's bank) - Risk borne by confirming bank (exporter's bank) - Same as with import L/Cs: issuance of documents on behalf of the importer in favour of exporter - Risk reduction of non-payment for the exporter <p>Source: ICC (2013a)</p>
Loans for export	<ul style="list-style-type: none"> - Problem with L/Cs above for the exporter: long period of time for the payment, in which time period the exporter might be faced with other payments he/she has to make (e.g. staff etc.) → need for working capital - Given that exporter has a L/C, the L/C can be used as collateral for a loan at a bank which can be used for further export → reduction of liquidity risks for the exporter - Examples: negotiable L/Cs, discounted L/Cs, forfeiting and factoring, supply chain finance <p>Source: ICC (2013a)</p>
Loans for import	<ul style="list-style-type: none"> - Clean import loan: <ul style="list-style-type: none"> o Bank advances cash to the importer on presentation of supplier invoices and evidence of shipment o Importer is able to pay for the goods, usually in order to bridge the gap between the receipt of goods and selling them on - Other structure: bank is allowed to release goods to the importer under trust receipts; therefore the importer is able to use the goods immediately but the ownership remains with the bank until the importer settles the loan - Both structures: loan secured against the goods being imported <p>Source: ICC (2013a)</p>
Performance guarantee and performance standby letters	<ul style="list-style-type: none"> - Performance guarantee: guarantee a seller's obligations to deliver and perform according to the contract to act to mitigate any distrust between parties and to reduce cash outlay in situations where cash deposits are required - Standby L/C: written by a bank on behalf of a client and is used as a 'payment of last resort' should the client fail to fulfil a contractual obligation to a third party - Guarantees typically remain undrawn, unless an exporter fails to deliver or the importer defaults - Most commonly used where the commercial relationship extends into the medium or long term, such as arrangements including services beyond delivery <p>Source: ICC (2013a)</p>
Trade credit	<ul style="list-style-type: none"> - Companies extend credit to each other when buyers delay or advance payments to suppliers - Open account: involves importers paying invoices once goods are received <ul style="list-style-type: none"> o Exporter bears the risk: importer only commits to pay for the goods at one point in time after the goods have been received - Cash in advance: importers can extend credit to exporters if they pay for goods (all or in part) in advance <ul style="list-style-type: none"> o Importer bears all of the risks, relating not only to non-supply of the goods, but also exchange rate fluctuations and other uncertainties <p>Source: Authors.</p>

Figure A1: How does a letter of credit work?

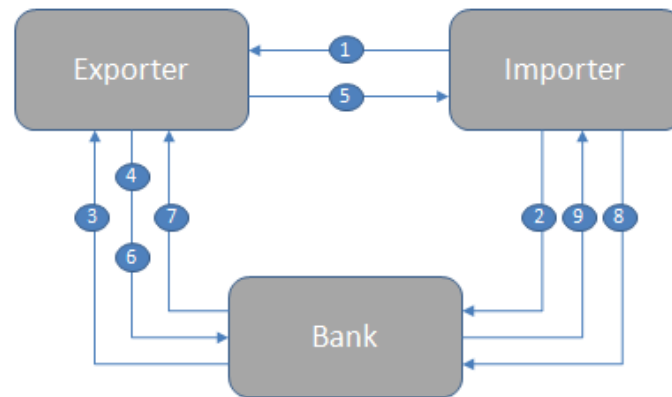


Figure A1 illustrates a letter of credit transaction. After the importer and the exporter have agreed on the contract of sale (1), the importer asks for a letter of credit (2), which the bank issues in favour of the exporter (3). After the exporter has agreed (4), he/she sends the goods to the importer (5) and the required papers to the bank (6). If the documents are in order, the bank issues the payment to the exporter (7) and the importer issues a transfer to the bank (8). Finally, the bank transfers the documents to the importer (9).

Source: Authors based on ICC (2013a)

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