WHAT DRIVES BANK-INTERMEDIATED TRADE FINANCE? EVIDENCE FROM CROSS-COUNTRY ANALYSIS

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Abstract

Empirical work on the underlying causes of the recent dislocations in bank-intermediated trade finance has been limited by the scant availability of hard data. This paper aims to analyse the key determinants of bank-intermediated trade finance using a novel dataset covering ten banking jurisdictions. It focuses on the role of global factors as well as country-specific characteristics in driving trade finance. Results indicate that country-specific variables, such as growth in trade flows and funds available for domestic banks, as well as global financial conditions and global import growth, are important determinants of trade finance. These results are robust to different model specifications. Further, we do not find that trade finance is more sensitive to global financial conditions than other loans to non-bank entities.

Resumen

El trabajo empírico sobre el impacto de las tensiones financieras sobre la financiación bancaria al comercio internacional se ha visto limitado históricamente por la falta de datos. Este trabajo contribuye a examinar este tema, empleando una nueva base de datos, que cubre diez jurisdicciones, lo que permite estudiar el papel de los factores globales y de los factores específicos de país. Los resultados indican que tanto las variables específicas de país —como el crecimiento de los flujos comerciales y la financiación disponible para los bancos nacionales— como las condiciones financieras globales y el crecimiento de las importaciones mundiales son factores relevantes. Los resultados son robustos a distintas especificaciones econométricas, que controlan por la potencial endogenidad de los flujos comerciales.

Palabras clave: financiación bancaria al comercio internacional, flujos comerciales, crisis financiera global.

Códigos JEL: F14, F19.

1   Introduction

The market for global trade finance was generally regarded as well-functioning and liquid until the global financial crisis of 2008-09, and thus did not attract much attention from policy-makers and scholars. Since the crisis, however, trade finance has experienced episodes of stress, particularly after the collapse of Lehman Brothers in September 2008 and again in late 2011, when several European banks were under funding pressures.[1] In this context, understanding the drivers of trade finance becomes important for two main reasons. First, international trade is heavily dependent on trade finance since it involves certain forms of commercial risks that are elevated relative to domestic trade, such as payment risk and transportation risk, in addition to exchange rate risk, which is unique to this line of activity. These risks are often assumed by banks since importers and exporters are often unwilling to bear them. Indeed, estimates for the share of global trade relying on trade finance instruments range from 30 to 40 per cent (CGFS, 2014). Note that while the term "trade finance" includes both bank-intermediated trade finance, in which banks facilitate transactions between buyers and sellers, as well as non-bank trade finance, in which buyers and sellers extend credit to each other, this paper focuses on the first category only.[2]

Second, research has shown that shocks to banks in general and the supply of trade finance, in particular, affect exports and imports and have contributed to the recent drop in trade (Niepmann and Schmidt-Eisenlohr, 2014; Del Prete and Federico, 2014; Ahn, 2013; Amiti and Weinstein, 2011; Paravisini et al., 2011). The importance of trade finance in supporting the functioning of global trade is also underscored by the fact that many multilateral and national institutions expanded their trade finance programs to facilitate exports and imports in some emerging-market and advanced economies following the call from leaders of the Group of Twenty (G-20) countries in the aftermath of the global financial crisis.[3]

Empirical work on the underlying causes as well as the impact of the recent dislocations in trade finance has grown rapidly after the global financial crisis. However, the evidence so far is largely based on surveys or country-specific analysis using firm-level data while cross-country analysis is absent due to the paucity of hard data. As a consequence, many of the important policy questions raised by the drop in trade finance during the global financial crisis remain largely unanswered: Did declines in cross-border bank-intermediated trade financing transmit financial shocks across borders? Or did they simply reflect the lesser need for trade financing due, for instance, to weaker growth in trading partners, or subdued domestic economic growth? In other words, did supply or demand drive bank-intermediated trade finance during the global financial crisis?

To shed some light on these issues, this paper presents fresh evidence on the key determinants of bank-intermediated trade finance using a unique, newly constructed panel data set on trade finance. As such, this paper is the first attempt at understanding the

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1. Broadly speaking, the term "trade finance" refers to payment arrangements between buyers and sellers. The focus of this paper is on the international dimension of trade finance, i.e., financing for cross-border transactions.

2. Estimates for the share of global trade finance relying on different financing options, including open accounts, inter-firm trade credit, and bank-intermediated trade finance, are much higher, in the range of 80 to 90 per cent (Auboin, 2009). However, global estimates should be treated with caution as gauging the overall size of the bank-intermediated trade finance market requires extrapolation from partial data, which makes these estimates imprecise.

3. For a detailed discussion, see Asmundson et al. (2011) and CGFS (2014). The G-20 Communiqués, including the communiqué from the April 2009 summit, can be found at
http://www.g20.utoronto.ca/2009/2009communique0402.html.

determinants of bank-intermediated trade finance for a set of countries and, thus, makes an important contribution to the empirical literature in this field. Our results indicate that both global as well as country-specific factors, such as growth in trade flows and the funding availability of domestic banks, are important determinants of trade finance. The results are robust when we instrument trade flows growth to control for its potential endogeneity.

Overall, our findings suggest that the short-term, self-liquidating nature of trade finance could generate some scope for negative externalities for the global economy, especially if the banking sector is subject to shocks that are global in nature. These externalities can be amplified if a large number of banks simultaneously run down their liquidity pool embodied in their trade finance portfolios. We elaborate on the implications of the results in sections 5 and 6.

The remainder of the paper is structured as follows. Section 2 summarizes the related literature. Section 3 provides a brief description of trade finance instruments and summarizes the evolution of trade finance during the global financial crisis. Section 4 describes the empirical methodology, choice of explanatory variables, and the data. Section 5 discusses the results, and section 6 concludes.

2 Related literature

Our work makes two key contributions to the empirical literature on trade finance. First, it provides fresh evidence on the determinants of bank-intermediated trade finance – an area that has been hitherto unexplored due to the lack of hard data. Previous empirical work has generally focused on firm-level data in a country-specific setting to analyze firms' choice with regard to different payment contracts. For example, Ahn (2013) finds evidence of a substantial impact of bank liquidity shocks on the supply of letters of credit import transactions in Colombia during the 2008-09 crisis. In a similar vein, Antras and Foley (2011) use detailed transaction-level data for a U.S.-based exporter to study how the choice between cash-in-advance and open account is affected by the characteristics of the country in which the importer is located. In a more recent paper, Niepmann and Schmidt-Eisenlohr (2013), using U.S. banking data, find that the volume of banks' trade finance claims differs substantially across destination countries, with claims being hump-shaped in country credit risk and increasing with the time to import of a destination market. The authors also find that trade finance claims vary systematically with global conditions, expanding when aggregate risk is higher and funding is cheaper.

Rather than taking these firm-specific approaches and focusing on certain instruments, such as letters of credit, our study takes a more comprehensive view to examine the key determinants of bank-intermediated trade finance as a whole and for a set of countries.[4] To the best of our knowledge, this is the first study to use such an approach, one that allows us to investigate the role of country-of-origin variables (frequently called "home variables") in driving trade finance. The results, therefore, complement previous empirical work that has focused primarily on either bank-level information or country-of-destination information. Further, it is informative to analyze trade finance as a whole since it encompasses a wide range of instruments, and market intelligence suggests that firms can switch relatively easily from one instrument to another, making the distinction between instruments blurred at times.

Second, our work is also related to the strand of empirical literature focusing on the relationship between financial conditions, trade credit, and trade at the firm and sectoral levels. This literature has aimed at understanding and measuring the impact of disruptions in trade finance on the so-called "Great Trade Collapse." At the firm level, Behrens, Corcos, and Mion (2013), Bricongne et al. (2012), and Coulibaly, Sapriza, and Zlate (2011) all find that financial constraints explain part of the decline in production and exports during the trade collapse. Using sector-level data, Chor and Manova (2012) examine how the sector composition of exports to the U.S. varies across countries depending on the cost of finance in those source countries. The authors find that tight financial conditions (i.e., higher interbank interest rates) led exports to fall more during the 2008-09 crisis in sectors with high external finance dependence or low asset tangibility. Further, they demonstrate that countries with tight financial conditions exported less to the United States than countries where financial conditions were less tight. Our paper contributes to this literature by showing that, controlling for trade flows, trade finance depends on global financial conditions and funding availability for domestic banks, and accordingly can be impaired by financial shocks.

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4. See Table 1.1 in the Appendix for a description of the country-specific data on trade finance used in this paper, and CGFS (2014) for an in-depth description of the data and a comparison with other sources of information.

3   Trade finance and international lending by banks

3.1   Trade finance – instruments and dynamics during the global financial crisis

The term "trade finance" is generally used for financial instruments that are specifically linked to underlying international trade transactions (exports or imports). Banks and other institutions typically provide trade finance for two purposes. First, it serves as a source of working capital for individual traders and international companies in need of liquid assets.5 Second, trade finance provides credit insurance against the risks involved in international trade, such as currency or price fluctuations, or political risk. While we acknowledge that some trade finance instruments may be long-term in nature, in this paper we focus only on short-term bank-intermediated trade finance, because it funds a much larger volume of trade and is also closely linked with overall bank funding conditions.

Trade finance comprises a wide range of products used to reduce risks related to international payments between importers and exporters. One of the most common and standardized forms of bank-intermediated trade finance is a letter of credit (or L/C). L/Cs reduce payment risk by providing a framework under which a bank makes (or guarantees) the payment to an exporter on behalf of an importer once goods have been shipped or delivered.[6] Banks may also help meet working capital needs by providing trade finance loans to exporters or importers, i.e., short-term loans used to buy the inputs necessary to produce goods ordered by foreign customers. In this case, the loan documentation is linked either to an L/C or to other forms of documentation related to the underlying trade transaction. Working capital is more important for financing export shipments than for domestic shipments because of the longer lag between production and payment for exports (Amiti and Weinstein, 2011).

With respect to the recent developments in the market for trade finance, Figure 1 shows the drop in trade finance and trade at the peak of the global financial crisis – between October 2008 and January 2009. The fall in trade finance was about one-third of the contraction in global merchandise trade, with the largest declines witnessed in Emerging Europe and Central Asia. In the aftermath of the crisis, the International Monetary Fund (IMF) together with the Bankers' Association for Finance and Trade – International Financial Services Association (BAFT-IFSA) undertook a survey on pricing, volumes, and drivers in trade finance markets in March 2009.[7] This was followed by several additional survey rounds. The results of these surveys showed that changes in trade finance conditions were particularly pronounced among large banks that suffered most from the crisis and were thus in greater need to deleverage quickly. Further, the surveys showed that banks also increased the cost to borrowers. Regarding the underlying causes for the decline in trade finance, the surveyed banks identified the fall in demand for trade as the major reason for the decline in trade finance, and attributed about 30 per cent of the fall to reduced credit availability at either their own institutions or counterparty banks.[8] While these surveys provide valuable insights into the developments in the market for trade finance, quantitative estimates derived from them should be treated with caution, as survey respondents usually provide only directional

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5. A working capital loan not specifically tied to trade is typically not included in this definition.
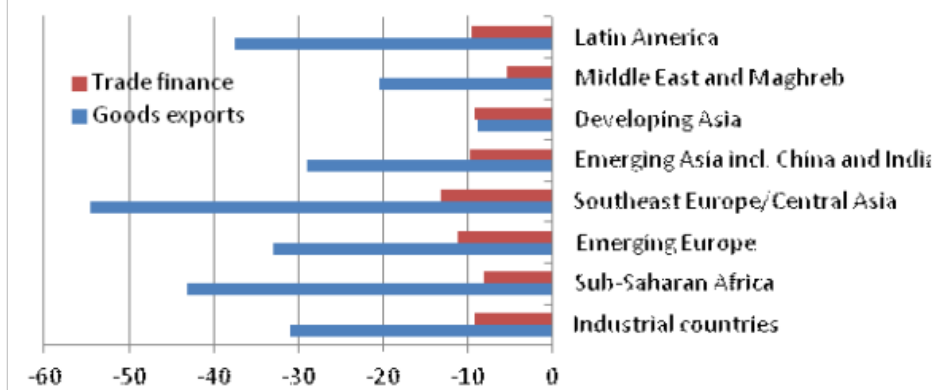
6. For the most part, L/Cs represent off-balance-sheet commitments, though they may, at times, be associated with an extension of credit. This can occur, for example, if an import L/C is structured to allow the importer a period of time (known as "usance") before repaying the bank for the payment it made on the importer's behalf.

7. International Monetary Fund (IMF), Bankers' Association for Finance and Trade (BAFT) (2009): IMF-BAFT trade finance survey. "A Survey Among Banks Assessing the Current Trade Finance Environment."

8. Asmundson et al. (2011) provides a summary of the first four IMF surveys.

indications instead of details for their firm which can then be aggregated (CGFS, 2014). In contrast, by using objective data, this paper provides a more nuanced perspective on the underlying determinants of trade finance.

Figure 1: Changes in merchandise exports and trade finance between October 2008 and January 2009 (percentage change)

Source: Asmundson et al. (2011)

4 Methodology

4.1 Empirical framework

Our research question is closely related to the growing literature on the determinants of cross-border bank flows, such as Bruno and Shin (2014), Avdjiev, Kuti, and Takáts (2012), Hermann and Mihaljek (2010), and Takáts (2010), which suggests that such flows are driven both by global factors and local (i.e., country-specific) factors. Since bank-intermediated trade finance is a subset of total cross-border bank flows, our empirical specification and choice of explanatory variables are also guided by the above literature. Specifically, following Bruno and Shin (2014) and Avdjiev, Kuti, and Takáts (2012) our benchmark specification in its general form is given by:

$$\Delta TF_{it} = \alpha + \sum_k \beta_k X_{k,i,t} + \sum_l \beta_l Y_{l,t} + \alpha_i + \varphi_y + \gamma_q + \varepsilon_{i,t}, \tag{1}$$

where ΔTF_{it} denotes the growth in the outstanding volume of bank-intermediated trade finance for country i, $X_{k,i,t}$ are k country-specific exogenous variables, and $Y_{l,t}$ denotes l global variables. The benchmark measure of the dependent variable is the quarter-over-quarter (qoq) rate of growth of trade finance, calculated as the difference between log (tradefinance)t and log(tradefinance)t-1.[9] We do not rule out the existence of time-invariant, country-specific factors that can stem from either the way trade finance is measured in each country, or from any additional country-level effects not captured by our control variables. Thus, we include country-specific dummies, α_i, in our model. We also acknowledge the possible existence of year-specific and quarter-specific factors, which are captured by the time dummies φ_y and γ_q, respectively. Table 1.2 provides further details on all the variables included in the analysis.

In what follows, we describe our selection of the global and country-specific explanatory variables in detail. With regard to global factors, Bruno and Shin (2014) argue that global financial conditions are the key drivers of cross-border bank flows – and, accordingly, we expect them to be drivers of bank-intermediated trade finance. We include three different measures as proxies for global financial conditions. First, we use the VIX index of implied volatility of S&P 500 equity index options – which is the most widely used measure of global financial conditions in the literature. Second, we use a synthetic indicator of financial stress, namely, the financial conditions index (FCI), which is based on the methodology of Guichard, Haugh, and Turner (2009). The FCI is derived from real short-term interest rates, real long-term interest rates, the real effective exchange rate, bond spreads, stock market capitalization, and credit standards in the euro area, Japan, the United Kingdom, and the United States.[10] As such, it is a more comprehensive measure of global financial conditions than the widely used VIX index.

Finally, since trade finance is predominantly denominated in U.S. dollars – even more so than global trade – the ability of banks to provide trade finance can be disrupted if banks' dollar funding lines are curtailed (CGFS, 2014).[11] Indeed, this seems to have been the case in

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9. An alternative would be to define trade finance relative to trade flows. Instead, we include trade flows as an explanatory variable in the benchmark estimations.
10. For details on the construction of this variable, see Guichard, Haugh, and Turner (2009).
11. More than 80 per cent of L/Cs are settled in U.S. dollars.

some instances in 2008-09 and in 2011-12.[12] We account for dollar funding pressures in our framework in the form of a proxy based on the difference between the cost of three-month dollar funding in foreign markets and the three-month dollar LIBOR.[13] We expect this variable to have a negative impact on bank-intermediated trade finance. Trade finance may also be affected by other global variables such as world demand, which we proxy here by global imports growth.[14]

Trade finance is also likely to depend on country-specific macroeconomic fundamentals or "pull" factors. We include nominal GDP growth since faster-growing economies are likely to have greater demand for credit (Bruno and Shin, 2014).[15] Following recent literature on the links between private and sovereign debt, we include the S&P rating as a measure of sovereign creditworthiness. Sovereign defaults are frequently accompanied by domestic banking crises, usually due to the fact that the government postpones the default decision and strains the banking system in order to service the debt, until it is no longer feasible (Arteta and Hale, 2008). This would make domestic liquidity more scarce, which in turn would put upward pressure on the cost of trade finance, since banks set rates that account for the higher probabilities of defaults by importers and exporters.

Trade finance may also be facilitated by country-specific financial factors such as the leverage, equity, and funding costs of local banks, although the lack of good-quality data acts as a constraint in testing these hypotheses. As a proxy for local banks' soundness, again following Bruno and Shin (2014), we use the banks' capital-to-assets ratio. We expect this measure to be positively correlated with bank-intermediated trade finance growth. Following the recent literature, we also include the five-year credit default swap (CDS) spreads for each banking sector as a measure of banks' riskiness and short-term funding costs in wholesale markets (for example, Chui et al., 2010). We construct this measure as a simple average of the CDS spreads for the main banks in each country (see Table 1.3). Finally, we also include the (country-specific) growth in trade flows (defined as the sum of exports and imports), which is expected to be an important determinant of trade finance.

Estimating equation (1) poses some challenges. First, there is potential endogeneity arising from the inclusion of growth in trade flows as an explanatory variable. Second, global factors are likely to be important determinants of trade finance, which in turn can be a source of large cross-sectional correlation. Indeed, inference can be misleading if the standard errors are not robust to such cross-sectional correlation. A final issue is the size of the panel. Our data set contains 10 countries (N), and an average of 30 quarters (T). In panels with large T, the dynamic panel bias becomes insignificant and such models can be estimated with more straightforward fixed effects estimators (Roodman, 2006).

Taking these issues into account, we estimate the benchmark model based on the fixed effects estimation with Driscoll-Kraay standard errors, which renders errors robust to cross-sectional correlation (Driscoll and Kraay (1998); Hoechle (2007)). As mentioned above, we also include the time (i.e., year) dummies in order to control for any additional time-specific

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12. For instance, reduced dollar funding in the aftermath of the Lehman failure was one of the main reasons for the Brazilian and Korean central banks to provide both direct and indirect support to trade finance markets (CGFS, 2014).
13. The foreign currencies included are the Canadian dollar, euro, Hong Kong dollar, Singapore dollar, Japanese yen, Korean won, Swiss franc, and the pound sterling. The overall dollar funding pressure is obtained as the unweighted average across all these currencies. The source of this variable is the Federal Reserve Board.
14. Another alternative is to use global real GDP growth, but we consider global imports growth to be a better proxy for global demand conditions.
15. There is also evidence that foreign bank lending to emerging markets is procyclical (see Jeanneau and Micu, 2002).

sources of cross-sectional correlation. However, this estimation procedure does not eliminate the biases stemming from the potentially endogenous variable, namely, trade flows growth. Therefore, as a robustness check, we also estimate equation (1) using instrumental variables (IV) to correct account for the potential endogeneity of trade flows growth. The IVs should be such that they do not directly determine TF_{it} but are correlated with the variable being instrumented. We consider two potential instruments capturing a country's external demand. To construct these variables, we first identify the ten main trading partners for each country in our sample and compute the share of exports to each of these countries in total exports of the particular country. Next, we compute two trade-weighted aggregates and test their validity as instruments. The first variable is the trade-weighted measure of real GDP growth for each country's top ten trading partners. The second instrumental variable is a similar trade-weighted measure of growth in exports to the main trading partners for each country. Both variables are potentially valid instruments as we expect them to be highly correlated with a trade flows growth but uncorrelated with the error term.[16] We then estimate equation (1) using the within 2SLS estimator.

A final issue with regard to estimating equation (1) is the correlation between the global variables which turs out to be quite strong (Table 1). Thus, we include these variables on an individual basis in the regression analysis. We also perform panel unit root tests (Fisher-type tests) to check for non-stationarity in certain variables (trade finance growth, GDP growth and banks' capital-to-assets ratio) and do not find any evidence of unit roots.

Table 1: Matrix of correlations between global variables

	Financial conditions index (FCI)	VIX	World imports growth (qoq)	Dollar funding pressure
Financial conditions index (FCI)	1			
VIX	0.93	1		
World imports growth (qoq)	-0.65	-0.57	1	
Dollar funding pressure	0.8	0.77	-0.59	1

Note: The correlations between the financial variables are generally lower once we exclude the peak crisis periods, i.e., 2008Q4 and 2009Q1.

4.2 Data

The data on trade finance used in this paper were put together by members of the Study Group on Trade Finance under the auspices of the Committee on the Global Financial System (CGFS).[17] The sample includes the following 10 countries: Australia, Brazil, France, Germany, India, Italy, Korea, Spain, the United Kingdom, and the United States. The sample spans the time period 2001Q1 to 2012Q4, although the trade finance data are not available for the full time period for some countries, resulting in an unbalanced panel.
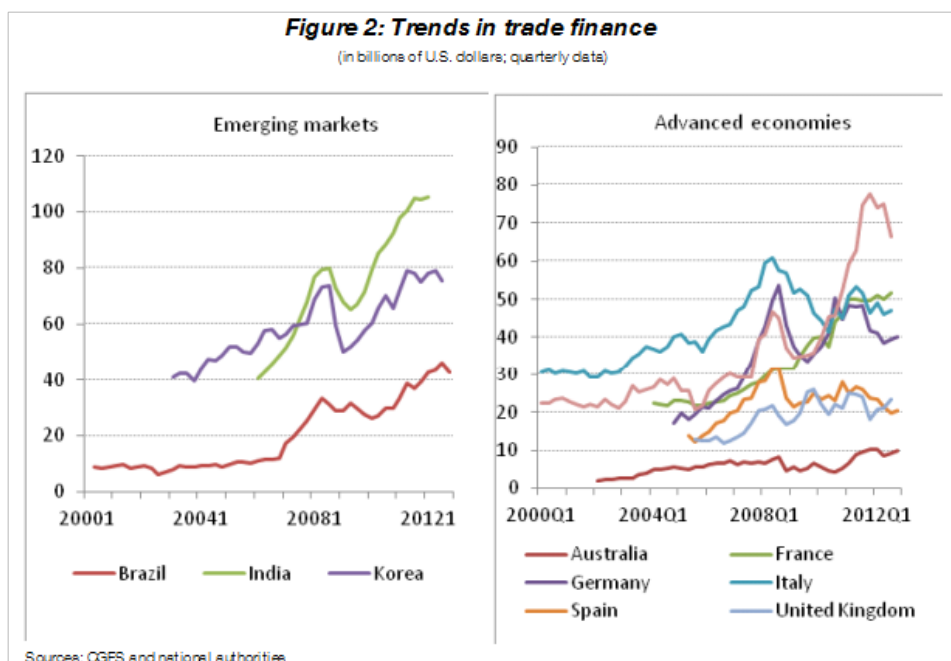
Table 1.1 provides a detailed description of the country-specific data on trade finance. Data coverage in terms of trade finance instruments differs substantially across countries. While countries like Brazil, India, Italy, and Korea have detailed data covering a significant share of overall trade finance activities in their countries, others have statistics capturing only specific components of their trade finance markets, such as export-related trade finance or letters of credit (L/Cs). For most countries, the available data capture only on-balance-sheet lending activities (i.e., L/Cs are excluded, except when they are tied to or

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16. We also consider three competitiveness indicators from the OECD as potential instruments: relative unit labour costs, relative consumer prices, and relative price of exported goods. However, these indicators fail to pass the test of validity of instruments.

17. The final report of the Study Group (CGFS, 2014) can be found at http://www.bis.org/publ/cgfs50.htm.

become funded loans) by resident banks and focus on lending to domestic borrowers. Admittedly, the focus on domestic lending makes it difficult to track global activities of banks in these countries. On the other hand, statistics for countries like Germany and the United States mainly cover cross-border activity, particularly so to emerging-market economies (EMEs), which makes it difficult to track the domestic activities of banks in these countries. Thus, each national data source should be viewed as providing a partial window into aspects of the bank-intermediated trade finance activities conducted in that country (CGFS, 2014). As mentioned earlier, we include country-specific fixed effects in equation (1) to account for the differences in the way in which trade finance is measured across countries but not every potential source of heterogeneity can be controlled for. Yet we believe that our estimates mark an improvement over existing research, which has focused either on firm-specific data or on specific instruments, while our data set provides a more comprehensive coverage of trade finance within each country.

A few recent trends in the data are worth highlighting. Globally bank-intermediated trade finance has increased substantially in dollar terms over the past decade, particularly since the end of 2006. The pace, however, has diverged significantly across countries in recent years (Figure 2). The growth in trade finance is particularly notable in some of the emerging-market countries in our sample, which in turn corroborates anecdotal evidence that local banks in these countries are playing a greater role in the provision of trade finance (CGFS, 2014).

Figure 2: Trends in trade finance
(in billions of U.S. dollars; quarterly data)

Sources: CGFS and national authorities

5 Results

5.1 Benchmark specification

Table 2 shows the benchmark regressions with the quarter-over-quarter growth in outstanding trade finance volumes as the dependent variable. As discussed, all regressions are estimated using fixed effects estimation with Driscoll-Kraay standard errors. Column (1) includes world imports growth as an explanatory variable, while columns (2) through (4) include our three measures of global financial conditions individually. Results show that growth in bank-intermediated trade finance is positively associated with trade flows growth, as expected.[18] The CDS spread also has the expected sign and is statistically significant. An increase in CDS spreads of 100 basis points is associated with a reduction in trade finance of roughly 1.3 percentage points on a quarter-over-quarter basis.[19] The capital-to-assets ratio of banks, however, does not have a statistically significant impact on trade finance. Growth in world imports is associated with stronger trade finance growth, as expected, and the effect is highly statistically significant.

Table 2: Determinants of growth in trade finance: FE estimations with Driscoll-Kraay standard errors

	(1)	(2)	(3)	(4)
Trade flows growth	0.123*	0.201***	0.195***	0.229***
	[0.070]	[0.056]	[0.071]	[0.049]
Bank capital to total assets	0.007	0.006	0.007	0.005
	[0.010]	[0.010]	[0.009]	[0.010]
CDS spreads	-0.011**	-0.013**	-0.012**	-0.016**
	[0.005]	[0.006]	[0.005]	[0.007]
S&P rating	0.001	-0.001	0	-0.003
	[0.006]	[0.007]	[0.007]	[0.007]
GDP growth	-0.007	-0.006	-0.007	-0.005
	[0.004]	[0.005]	[0.005]	[0.005]
World imports growth	0.009***			
	[0.001]			
VIX		-0.004***		
		[0.001]		
Financial conditions index			-0.068***	
			[0.022]	
Dollar funding pressures				-0.040***
				[0.014]
Observations	294	294	294	294
Within R-squared	0.3	0.27	0.26	0.26

Notes: Driscoll-Kraay standard errors in brackets. *** p<0.01, ** p<0.05, *p<0.1. The dependent variable is the quarter-over-quarter (qoq) growth in the outstanding volume of trade finance. All explanatory variables in growth rates are also in terms of qoq growth. All specifications include year and quarter dummies and country-specific fixed effects and are estimated using the fixed effects estimation with Driscoll-Kraay standard errors.

International financial strains are found to impair trade finance, as exemplified by the negative and highly significant relationship between the VIX, the financial conditions index (FCI), and dollar funding pressures (columns (2) – (4)). Specifically, a 100-basis-point increase in the FCI translates into a roughly 7-percentage-point drop in trade finance, while a similar increase in dollar funding costs is associated with a roughly 4-percentage-point decrease in the growth of

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18. We also included other country-specific macroeconomic fundamentals, such as inflation, budget balance/GDP, and external debt/GDP in the benchmark specification, but the coefficients on these variables were generally not significant. Hence, we do not include them in the benchmark regressions reported here.

19. This is the average impact across the four specifications in Table 3.

trade finance. These sizable impacts illustrate well the important role played by global financial conditions in determining trade finance flows. These results are also in line with Takáts (2010), who finds that the VIX can explain a substantial part of the variation in cross-border bank lending, especially during the post-Lehman episode. All in all, the results suggest that trade finance growth depends on global financial conditions, global imports growth, as well as country-specific trade flows growth and funding availability for domestic banks.

5.2 Robustness check – IV estimation

We re-estimate the regressions in Table 2 using instrumental variables. To instrument trade flows growth, we use the two valid instruments identified: the trade-weighted measure of the main trade partners' trade-flows growth; and the trade-weighted measure of the main partners' real GDP growth. The results are reported in Table 3. The Sargan-Hansen test of overidentification confirms that the instruments are valid. The IV estimation results are broadly in line with the benchmark results. Trade flows growth has a positive impact on the growth of bank-intermediated trade finance. This effect is not statistically significant in the first column, perhaps due to the high correlation between the instruments and one of the other independent variables – the worlds import growth. Global financial strains have a negative and statistically significant impact on trade finance growth. Higher world imports growth is positively associated with trade finance growth. The coefficient for CDS spreads is only significant in one specification (column 4). A potential explanation for this could be that the impact of the country-specific variables is not properly identified by the instrumental variable approach given the cross-sectional correlation that could arise from the presence of the global financial variables.

Table 3: Determinants of growth in trade finance: Instrumental variables approach

	(1)	(2)	(3)	(4)
Trade flows growth	0.168	0.268**	0.262**	0.296***
	[0.109]	[0.105]	[0.107]	[0.099]
Bank capital to total assets	0.007	0.007	0.007	0.006
	[0.011]	[0.011]	[0.011]	[0.011]
CDS spreads	-0.011	-0.012	-0.012	-0.015*
	[0.009]	[0.009]	[0.009]	[0.009]
S&P rating	0.001	-0.001	0	-0.002
	[0.010]	[0.011]	[0.011]	[0.011]
GDP growth	-0.008	-0.007	-0.008	-0.007
	[0.006]	[0.006]	[0.006]	[0.006]
World imports growth	0.009***			
	[0.002]			
VIX		-0.003***		
		[0.001]		
Financial Conditions Index			-0.061***	
			[0.021]	
Dollar funding pressures				-0.037***
				[0.012]
R-squared	0.268	0.244	0.237	0.248
Observations	294	294	294	294
Sargan-Hansen statistic	0.03	0.08	0.01	0.25
p-value	1	1	1	1

Note: All models include country-fixed effects, year dummies and quarterly dummies. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Trade flows growth is instrumented with two instruments: the trade-weighted real growth of the top ten trading partners for each country; and the weighted trade flows growth of the top ten trading partners for each country. We assess the validity of instruments using the Sargan-Hansen test of the validity of instruments. The null hypothesis is that the excluded instruments are valid (i.e., uncorrelated with the error term and correctly excluded from the estimated equation). Thus, if the test does not reject the null hypothesis, there is evidence in favor of the validity of the instruments used.

5.3 Additional analysis: Advanced economies versus EMEs

We investigate whether EMEs and advanced economies are impacted differently by some global variables.20 To do so, we create a dummy variable called "EMEs", which takes a value of 1 if a country is classified as an emerging market economy and 0 otherwise. We then interact these variables with each of the four global variables and include the resulting (four) explanatory variables in the regression framework. The coefficient on each variable indicates whether global variables have any differential impact on emerging economies, compared with the benchmark effect.

The results are reported in Table 4 and are very similar to the benchmark specification (Table 2). Global factors are important in explaining bank-intermediated trade finance in both EMEs and advanced economies; they do not have any additional impact on emerging economies.

Table 4: Effects of global variables on emerging economies: FE estimation with Driscoll-Kraay standard errors

	(1)	(2)	(3)	(4)
Trade flows growth	0.126*	0.204***	0.199**	0.227***
	[0.064]	[0.054]	[0.068]	[0.050]
Bank capital to total assets	0.006	0.005	0.006	0.004
	[0.010]	[0.010]	[0.009]	[0.010]
CDS spreads	-0.018**	-0.017**	-0.015*	-0.020**
	[0.006]	[0.006]	[0.007]	[0.007]
S&P rating	-0.007	-0.007	-0.004	-0.009
	[0.008]	[0.010]	[0.010]	[0.009]
GDP growth	-0.004	-0.005	-0.006	-0.004
	[0.004]	[0.005]	[0.004]	[0.005]
World imports growth	0.010***			
	[0.001]			
EMES*World imports growth	-0.005**			
	[0.002]			
VIX		-0.004***		
		[0.001]		
EMES*VIX		0.001		
		[0.001]		
Financial Conditions Index			-0.068***	
			[0.020]	
EMES*Financial Conditions Index			0.012	
			[0.020]	
Dollar funding pressures				-0.041**
				[0.013]
EMES*Dollar funding pressures				0.014
				[0.012]
Observations	294	294	294	294
Within R-squared	0.309	0.266	0.265	0.266

Note: All models include country-fixed effect, year dummies, and quarterly dummies. Driscoll-Kraays standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

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20. Advanced economies include: Australia, France, Germany, Italy, Spain, the United Kingdom, and the United States. EMEs include Brazil, India, and Korea.

We also estimate the model using the instrumental variables approach as in section 5.1 above. The results are reported in table 5 and are largely in with those obtained from using the fixed effects estimation using Driscoll-Kraay standard errors (Table 4). The impact of global variables is not significantly different for emerging economies compared to the benchmark effect.

Table 5. Effects of global variables on emerging economies: Instrumental variables

	(1)	(2)	(3)	(4)
Trade flows growth	0.172	0.273***	0.269**	0.296***
	[0.109]	[0.106]	[0.109]	[0.099]
Bank capital to total assets	0.006	0.006	0.007	0.005
	[0.011]	[0.011]	[0.011]	[0.011]
CDS spreads	-0.018*	-0.016	-0.015	-0.019*
	[0.010]	[0.011]	[0.011]	[0.010]
S&P rating	-0.007	-0.006	-0.005	-0.008
	[0.011]	[0.013]	[0.014]	[0.013]
GDP growth	-0.005	-0.007	-0.008	-0.006
	[0.006]	[0.006]	[0.006]	[0.006]
World imports growth	0.009***			
	[0.002]			
EMES*World imports growth	-0.005			
	[0.003]			
VIX		-0.003***		
		[0.001]		
EMES*VIX		0.001		
		[0.002]		
Financial Conditions Index			-0.062***	
			[0.021]	
EMES*Financial Conditions Index			0.015	
			[0.026]	
Dollar funding pressures				-0.038***
				[0.012]
EMES*Dollar funding pressures				0.013
				[0.015]
R-squared	0.281	0.222	0.243	0.225
Observations	294	294	294	294
Sargan-Hansen statistic	0	0.1	0	0.2
p-value	1	1	1	1

Note: All models include country-fixed effect, year dummies, and quarterly dummies. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Models are estimated with instrumental variables. In these especifications, trade flows growth is instrumented with two instruments: the real growth of the Top 10 trade partners; and the trade flows growth ot the Top 10 trade partners. Other instruments employed in previous specifications (OECD competitiveness indicators) fail to be valid instruments. Test of overidentifying restrictions: test of the null hypothesis that the excluded instruments are valid instruments.

6 Conclusion

Understanding the drivers of trade finance is important from both an academic as well as policy-makers' standpoint, since 30 to 40 per cent of global trade relies on some version of trade finance. The sharp drop in trade finance during the global financial crisis has raised some important policy questions. However, empirical work on the determinants of trade finance has been very limited due to the lack of availability of data, with previous studies having focused on developments in specific countries. Our paper addresses this gap by analyzing the main determinants of bank-intermediated trade finance using a newly constructed data set in a panel estimation framework.

Results indicate that bank-intermediated trade finance is impaired by global financial strains, while it depends positively on global imports growth. Country-specific variables, namely, growth in trade flows, and the funding availability of domestic banks – as measured by the banks' CDS spreads – are also important determinants of trade finance. These results are robust to different model specifications.

We acknowledge that there are other potentially relevant drivers of bank-intermediated trade finance that have not been included in our analysis. These include measures of contractual enforcement, bank lending restrictions, and foreign exchange restrictions, as well as additional country-specific measures of banking system soundness. However, including these indicators in an econometric framework is challenging given the lack of good-quality data. Further, policy responses to mitigate the impact of global financial conditions probably played an important role in determining trade-finance developments. However, given the small sample size and the significant heterogeneity in policy responses across countries, we leave these questions to be addressed in future research.

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Data Appendix

Table 1.1: Trade finance data

Country	Data description	Source
1. Australia	Stock of banks' contingent liabilities arising from trade-related obligations (e.g., documentary L/Cs issued, acceptances on trade bills or shipping guarantees issued).	Reserve Bank of Australia
2. Brazil	Stock and flows of resident banks' trade finance vis-à-vis residents for exports and imports.	Central Bank of Brazil
3. France	Stock of trade finance, including both buyer and supplier credit lines.	Bank of France
4. Germany	Estimations for the volume of short-term trade finance to emerging and developing countries, covering maturities of 12 months or less.	Deutsche Bundesbank (not public)
5. India	Stock of short-term loans and advances of pre- and post-shipment bank-intermediated export credit, as well as stock and flows of import credit extended by banks with maturities of less than three years.	Reserve Bank of India
6. Italy	Stock of loans and guarantees for import and export purposes by domestic banks.	Italian credit register (not public)
7. Korea	Stock of documentary bills, domestic import usance bills, and pre-shipment finance.	Bank of Korea, Financial Supervisory Service
8. Spain	Stock of commercial credit to non-residents and documentary credit to residents and non-residents, granted by banks operating in Spain.	Bank of Spain (not public)
9. United Kingdom	Estimates derived from reported amounts for "lending under Export Credit Guarantee Department bank guarantee" and "holdings of non-resident bills," which may be discounted for trade finance purposes.	Bank of England (not public)
10. United States	Stock of bank-intermediated, short-term trade finance (including funded loans and unfunded off-balance-sheet commitments and guarantees) vis-à-vis foreign residents on an ultimate risk basis.	FFIEC Country Exposure Lending Survey*

Source: CGFS (2014)

*FFIEC stands for the Federal Financial Institutions Examination Council.

Table 1.2: Description of variables

Variable	Source	Description
Country-specific		
Nominal GDP growth	National Statistical Agencies via Haver	Quarter-over-quarter (annualized rate) growth in percentage points; seasonally adjusted.
S&P rating	Standard & Poor's	We transform ratings into numerical values, using a linear mapping. AAA corresponds to "20," while D corresponds to "0." The threshold between investment grade and junk is 12.
Banks' capital-to-assets ratio	WDI (annual data – interpolated)	In percentage points
Trade flows growth (sum of exports and imports)	CGFS (2014)	Qoq growth in basis points; calculated as log differences
CDS spreads	Datastream	Five-year CDS spreads, in percentage points, measured as the average of the CDS spreads for the main banks in each country (as listed in Table 1.2)
Growth in cross-border loans to non-banks	BIS Locational Banking Statistics; Table 3B	Qoq growth in "external loans in all currencies vis-à-vis the non-bank sector," in basis points; calculated as log differences
Global variables		
VIX index	Haver Analytics	In level
Financial conditions index (FCI)	Banco de España, national statistical agencies	Constructed following Guichard, Haugh, and Turner (2009). The index covers four economic areas: the United States, the United Kingdom, Japan, and the euro area. In each country/region, the index aggregates information on credit conditions, bond spreads, real and short-term interest rates, and real effective exchange rates.
Imports growth	World Bank, World Development Indicators	Qoq growth in percentage points; calculated as log differences.
Dollar funding pressures	Federal Reserve staff calculations	Difference between the cost of three-month dollar funding in foreign markets and the three-month U.S. dollar LIBOR. The foreign currencies included are the Canadian dollar, euro, Hong Kong dollar, Singapore dollar, Japanese yen, Korean won, Swiss franc, and the pound sterling. The overall dollar funding pressure is the unweighted average across all these currencies, expressed in percentage points.
Instrumental variables		
Trade-weighted exports growth	Direction of Trade Statistics (DOTs) data via Haver	Trade-weighted growth (quarter-over-quarter) in exports to top export destinations. The weights used are the share of exports to each destination country in total world exports of the source country (in percentage points)
Trade-weighted real GDP growth	Direction of Trade Statistics (DOTs) data via Haver ; National Statistical Agencies via	Trade-weighted real GDP growth (quarter-over-quarter). The weights used are the share of exports to each destination country in total world exports of the source country (in percentage points)

Table 1.3: List of banks included in CDS spreads (5 years) measure

Country	Banks
1. Australia	National Australia Bank
2. Brazil	Banco do Brasil, Bradesco, Votorantim
3. France	BNP Paribas, Credit Agricole, Société Générale
4. Germany	Deutshe Bank AG, Commerzbank AG
5. India	ICICI Bank, State Bank of India
6. Italy	Intesa Sanpaolo, Unicredito Italiano
7. Korea	Hana Bank, Woori Bank, Kookmin Bank
8. Spain	Banco Santander, BBVA
9. United Kingdom	Barclays Bank, Lloyds Bank, RBS Group PLC, HSBC Bank PLC
10. United States	Bank of America, Citigroup Inc., Goldman Sachs, JP Morgan Chase, Morgan Stanley, Wells Fargo

Note: For Brazil, we use as the sovereign CDS spreads for the period prior to 2011 as a proxy since the information on banks' CDS spreads is only available from 2011.

Source: Datastream

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