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Abstract

Banks play a critical role in international trade by providing trade finance products that reduce the risk of exporting. This paper employs two new data sets to shed light on the magnitude and structure of this business, which, as we show, is highly concentrated in a few large banks. The two principal trade finance instruments, letters of credit and documentary collections, covered about 10 percent of U.S. exports in 2012. They are preferred for larger transactions, which indicates the existence of substantial fixed costs in the provision and use of these instruments. Letters of credit are employed the most for exports to countries with intermediate degrees of contract enforcement. Compared to documentary collections, they are used for riskier destinations. We provide a model of payment contract choice that rationalizes these empirical findings and discuss implications for the ongoing provision of trade finance.

JEL-Code: F210, F230, F340, G210.

Keywords: trade finance, multinational banks, risk, letter of credit.

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1 Introduction

International trade exposes exporters and importers to substantial risks, especially when the trading partner is far away or in a country where contracts are hard to enforce. Firms can mitigate these risks through specialized trade finance products offered by financial intermediaries. In 2012, banks in the United States provided these services – in the form of letters of credit and documentary collections – for about 10 percent, or about $153 billion, of U.S. goods exports.[1]

Since the global financial crisis, trade finance has been under great scrutiny from both the public and the private sectors. Policy makers have become increasingly aware that trade finance is a key tool for internationally active firms and that distress in the financial sector and rising costs of providing trade finance for banks can have negative effects on trade.[2] In 2009, the G20 committed to extending the public support for trade finance by $250 billion, worried that firms would stop exporting without bank guarantees. In the context of the Basel III framework, banks raised concerns that the new rules on capital and leverage would make trade finance too costly, bringing down the risk weights on letters of credit originally proposed.[3] Regulatory changes have affected the business. Several financial institutions lately reduced their trade finance activities or exited the business altogether. Other banks have started securitizing trade guarantees given the continuing strong demand for such services.[4] It remains an open question whether private banks can satisfy the demand or whether international organizations and government agencies should step up their participation.[5]

Despite the large interest in trade finance from policymakers, internationally active companies and financial market participants, knowledge of the business is still very limited. A main obstacle to academic research has been the lack of available data. In this

[1] In a letter of credit, the importer's bank guarantees payment to an exporter upon proof that the goods were delivered to the importer. A documentary collection consists of ownership documents that are forwarded by the exporter's bank to the importer's bank; the importer receives the documentary collection only upon payment.

[2] Niepmann and Schmidt-Eisenlohr (2013) find a causal effect of reductions in the supply of letters of credit by banks on U.S. exports using the FFIEC 009 data introduced in this paper. Based on data from Japan and Peru, respectively, Amiti and Weinstein (2011) and Paravisini et al. (forthcoming) also find that banks shocks affect international trade.

[3] Specifically, trade finance is an off-balance sheet item that will receive a higher risk weight under the 2010 international agreement known as Basel III, produced by the Basel Committee on Banking Supervision; and trade finance will also weigh on the Basel III leverage ratio.

[4] See Financial Times (2013) on the December 2013 issuance of the first $1 billion security based on trade finance.

[5] There are ongoing discussions at the WTO whether the private sector is able to meet the demand for trade finance, especially in poor countries. See Working Group on Trade, Debt and Finance (2014).

paper, we use two new, complementary data sets to shed light on the trade finance business of U.S. banks. We show, for the first time, the extent to which U.S. exporters employ letters of credit (LCs) and documentary collections (DCs), the two most important trade finance products for mitigating risk in international trade; we document the variation in the extent of their use across destination countries and detail the characteristics of banks that offer them; and we present a model that explains firms' choices regarding payment arrangements that is consistent with the patterns found in the data.

The first data set comes from SWIFT (the Society for Worldwide Interbank Financial Telecommunication). It contains the number of LCs and DCs handled by U.S. banks by location of the issuing/sending bank as well as information on the corresponding transaction values. The second data set is derived from bank responses to the Country Exposure Report (FFIEC 009), which are collected by the Federal Reserve Board. The FFIEC 009 details the banks' trade finance claims in foreign countries. While the SWIFT data provide information by instrument, the FFIEC 009 data allow us to study trade finance at the bank level by providing claims data by bank and destination.

These data demonstrate that trade finance is an important business that is highly concentrated. By value of exports, letters of credit were used in 2012 for 8.8 percent of all U.S. export transactions, while documentary collections were employed for 1.2 precent.[6] In the first quarter of 2012, only 18 U.S. banks and U.S. subsidiaries of foreign banks reported positive trade finance claims. In the same quarter, the top five banks together accounted for more than 92 percent of the claims, a level that substantially exceeds the asset concentration of the U.S. banking industry.[7]

The use of letters of credit and documentary collections varies by export market. Across destinations, the share of sales that are settled with LCs takes values between zero and 90 percent; for DCs, usage lies between zero and 10 percent. This variation is systematically related to factors associated with firms' optimal choices for payment arrangements.[8] In particular, the use of LCs and DCs depends on the extent to which contracts can be enforced in the destination country. LCs are used the most for exports to countries with an intermediate level of quality in their legal institutions, while the use

[6]These numbers are far below the 30–40 percent of bank intermediated trade found in IMF surveys. This highlights that asking banks how they perceive the share of bank intermediated trade compared to other payment forms can lead to large biases and raises the question how one should interpret the available survey data.

[7]Avraham et al. (2012) calculate that the 10 largest banks in the United States controlled 64.4 percent of banking system assets for the fourth quarter of 2011.

[8]That is, the choice between cash-in-advance, open account, letters of credit and documentary collections.

of DCs largely increases with the destination's rule of law. LCs are employed relatively more than DCs for export markets where contract enforcement is weaker.

Although the main objective of an LC is to reduce financial risk, it comes with a price and so tends not to be used in either the least risky or most risky situations. As we will show, this finding can be explained by the optimal contract choice of firms. The basic intuition is that the value of risk mitigation through bank intermediation is offset to a degree by the cost of the intermediation. Because banks can reduce but cannot eliminate the risk of a trade transaction, the fees they charge rise with the remaining risk they take on. For the riskiest destination countries, bank fees are so high that exporters prefer cash-in-advance. In that case, the importer pays before the exporter produces, and payment risk is eliminated. Similarly, LCs are not used for low-risk destinations; for those transactions, the exporter can save on bank fees by bearing the risk itself.[9]

The theoretical model presented in section 5 explains these mechanisms in detail. We modify and extend the theoretical framework in Schmidt-Eisenlohr (2013) to match the empirical findings: we present a new formulation of the LC fee, which is crucial to generate the non-linear relationship between the use of LCs and country risk; and we augment the theoretical framework with DCs, which have not been considered in the theoretical literature.

Two other key factors help determine the use of LCs and DCs in U.S. exports: (i) the *time to trade*—the time it takes goods to clear customs in the destination country—and (ii) a destination's distance from the United States. We find that both these factors have a positive effect on banks' trade finance claims. This effect likely arises because longer transit times increase the duration of the related export guarantees and thereby raise the stock of bank claims at any point in time. It indicates that the costs of trade finance increase with the time to trade and with distance.

Moreover, when a destination's distance from the United States increases, not only do banks' trade finance claims rise but so do the number of LCs and DCs. This suggests that long distance trade is inherently more risky, which makes firms rely more on bank guarantees. In line with this view, we find that a destination's quality of institutions affects the use of LCs only when we consider countries whose distance from the United States is above the median. The use of DCs, in contrast, always increases with a destination's quality of legal institutions, regardless of its distance from the United States.

[9]For cash-in-advance transactions, the importer pays before the exporter delivers. For open-account transactions, the exporter delivers before the importer pays.

We also show that the average size of trade transactions differs by type of payment contract. The average for letter-of-credit transactions is by far the largest ($716.2 thousand), followed by that for documentary collections ($138.7 thousand). Transactions that do not rely on bank intermediation (cash-in-advance and open account) are on average much smaller ($39.2 thousand). These findings are in line with the theory in which LCs and DCs require the payment of fixed fees that cover the bank's costs for document handling and screening. These fixed fees imply that LCs and DCs are more attractive for firms when shipments are large. The results on size of transaction thus provide evidence for the existence of substantial fixed costs in the provision and use of trade finance products.

Literature Several recent papers empirically study payment contract choice in international trade. Using aggregate bilateral trade data, Schmidt-Eisenlohr (2013) provides indirect tests of the payment contract choice model proposed here. In subsequent work, Antràs and Foley (forthcoming) and Hoefele et al. (2013) employ firm-level data to study how country characteristics affect firms' choices between cash-in-advance and open account. Antràs and Foley (forthcoming) exploit information from one large U.S. firm that also provides some details on its use of LCs. Hoefele et al. (2013) rely on World Bank surveys and find a role for product complexity in payment contract choice. Glady and Potin (2011) employ SWIFT data from 2006 without information on the value of LC transactions to analyze payment contracts across countries. The authors find that the number of LC transactions increases with country risk. Demir and Javorcik (2014) use data from Turkey to analyze the role of industry-level competition for the optimal payment contract choice; the authors observe the share of exports that use LCs, but they pool bank-intermediated trade with cash-in-advance transactions.[10]

As the above discussion shows, previous empirical work on payment contract choice focuses mostly on the trade-off between cash-in-advance and open account. These studies provide some limited evidence on the use of LCs, but none have bank-level data or consider DCs. Evidence on trade finance in reports of international organizations, which are mostly based on voluntary surveys of banks, provide only an incomplete picture.[11]

[10]Turkcan and Avsar (2014) employ the same data to test the key predictions of Schmidt-Eisenlohr (2013) regarding the use of cash-in-advance and open account terms.

[11]See, in particular, surveys by the International Monetary Fund (IMF) and the International Chamber of Commerce (ICC) in ICC (2009) and IMF (2009). Results of the first four IMF surveys have been summarized by Asmundson et al. (2011). The ICC has started collecting more comprehensive data in its so-called Trade Register, which is, however, not available to researchers. See ICC (2013).

A number of papers propose theories of payment contract choice based on the model in Schmidt-Eisenlohr (2013). Antràs and Foley (forthcoming) extend the framework to a dynamic setting. Glady and Potin (2011) introduce heterogeneous firms and asymmetric information into the model. Hoefele et al. (2013) derive new predictions on the role of industry complexity. With an alternative model, Ahn (2011) studies the effect of changes in aggregate default risk on the ratio of exports to domestic sales; in this model, LCs become relatively less attractive in a crisis because risks increase both for importers and banks. None of the aforementioned papers study DCs or derive predictions that match the empirical patterns documented here.

A related line of research analyzes the effects on trade from shocks to the supply of both trade finance and general credit. Using data from Japan, Amiti and Weinstein (2011) show that bank shocks get transmitted to firms and affect their export decisions. Paravisini et al. (forthcoming) estimate the effects of loan supply shocks on exports in Peru. Del Prete and Federico (2012) study the effect of financial shocks on trade based on detailed information on loans and guarantees extended by Italian banks. Using matched importer-exporter data from Colombia, Ahn (2013) investigates whether financial shocks in 2008–2009 affected the use of LCs. Niepmann and Schmidt-Eisenlohr (2013) use the FFIEC 009 data employed in this paper to show that negative shocks to the supply of trade finance reduce the growth of U.S. exports.

Our analysis of trade finance and payment contract choice also relates to the large literature on trade credit. Granting trade credit corresponds to settling a transaction with an open account, one of the payment forms we consider. Several papers in this literature analyze the substitutability between inter-firm finance and bank finance, although none of them exploit data on bank guarantees as we do here.[12] Our results may be applicable to this literature because the trade-offs involved in trade credit are very similar to those in international trade finance.

Finally, our paper contributes to the literature on financial conditions and comparative advantage. Letters of credit and documentary collections represent a channel, distinct from the loan and credit channel, through which financial conditions can alter the ability of firms to compete and to export. See, in particular, Beck (2003) and Manova (2013) on how financial development affects trade patterns.

[12] Among the theoretical contributions are Ferris (1981), Petersen and Rajan (1997), Biais and Gollier (1997), Wilner (2000), Burkart and Ellingsen (2004) and Cunat (2007). Empirical studies include Ng et al. (1999), Love et al. (2007), Giannetti et al. (2011) and Klapper et al. (2012). See also Eck et al. (2014).

The remainder of the paper is structured as follows. Section 2 describes modes of payment in international trade, section 3 details data sources and aggregate statistics, and section 4 presents the empirical findings. Section 5 describes the theoretical model and section 6 analyzes the conformance of the model with the patterns observed in the data. Section 7 concludes.

2 Payment Contracts in International Trade

When an exporter and an importer trade, they have to decide how to settle the transaction. Under one option, the exporter produces the good and the importer pays upon receipt (open account). Under another, the importer pays before the exporter produces the good (cash-in-advance). In each case, one of the trading partners bears substantial risk: With an open account, the exporter may never receive payment. Under cash-in-advance, the importer may never obtain the goods. To reduce the risk of the transaction for either party, firms can turn to banks, which can act as intermediaries and thereby attenuate enforcement problems.[13] The two most common trade finance instruments provided by banks are letters of credit and documentary collections.

Letter of credit The importer initiates the letter of credit transaction (figure 1) by having its bank issue the instrument to the exporter. The letter of credit guarantees that the issuing bank will pay the agreed contract amount when the exporter proves that it delivered the goods, typically by providing shipping documents confirming the arrival of the goods in the destination country. To cover the risk that the issuing bank will not pay, an exporter may have a bank in its own country confirm the letter of credit, in which case the confirming bank agrees to pay the exporter if the issuing bank defaults.

Documentary collection In contrast to a letter of credit, a documentary collection does not involve payment guarantees. Instead, the exporters bank forwards ownership documents to the importers bank; the documents, which transfer the legal ownership of the traded goods to the importer, are handed to the importer only upon payment for the goods (figure 2).

[13] Besides non-delivery and non-payment, there could also be a timing problem. Eventually, the exporter may deliver and the importer may pay, but a long delay would generate significant costs for the other party.

A letter of credit provides more security to the exporter than does a documentary collection. With a letter of credit, an exporter is paid by the issuing bank/confirming bank upon proof of delivery regardless of whether the bank received the importers payment. A documentary collection does not offer an exporter this safety since the exporter is paid only if the bank receives the payment from the importer. If the importer defaults, does not want the goods, or can take possession of the goods and divert them without receiving the export documents, the exporter may not get paid even though it delivered. Therefore, compared with a letter of credit, a documentary collection leaves the exporter exposed to a great deal more risk.

Besides instruments that reduce the risk of a transaction, banks also provide pre-export and pre-import loans to firms. With an LC, a DC or an open account, the exporter is paid only after delivering the goods. Therefore, it has to pre-finance the production of the goods. When trade is settled with cash-in-advance, it is the importer that must pre-finance the transaction and provide the working capital to the exporter. In both cases, firms may turn to banks to obtain the required funds. Section 4 discusses in more detail the trade-offs involved in choosing between different forms of payment.

3 Data Sources

We use two data sets for our analysis, each with advantages and potential limitations. The first data set comes from SWIFT (the Society for Worldwide Interbank Financial Telecommunication). It contains the number and values of letters of credit and payments related to documentary collections that have been sent to U.S. banks by banks in importing countries, by location of the issuing/sending bank. The second data set is based on regulatory information collected by the Federal Reserve Board on behalf of the Federal Financial Institutions Examination Council (FFIEC) via the Country Exposure Report (FFIEC 009). All large U.S. banks and large U.S. subsidiaries of foreign banks report their trade finance claims on the Country Exposure Report.

The SWIFT data comprise more than 90 percent of all LC and DC transactions by banks in the United States and identify the financial instrument involved in each transaction. However, the sample starts only in 2003; and although the data contain the number of LCs and DCs issued from then onward, the value of the transactions covered by these instruments is available only since the fourth quarter of 2010. The FFIEC

009 data provide claims by bank and destination country since 1997, which allows us to study trade finance at the bank level and over a longer time period. These data do not show banks trade finance claims by instrument; although we demonstrate that they bear a strong similarity to the SWIFT LC data, they nonetheless may not be exclusively reflecting letters of credit.

3.1 The SWIFT data

The SWIFT network provides a communications platform through which financial institutions exchange standardized financial messages. According to the SWIFT website, more than 10,500 corporations and financial institutions in 215 countries use this platform. SWIFT estimates that, worldwide, about 90 percent of LC and DC transactions go through the SWIFT network, but this number is likely much higher for U.S. activity since practically all banks in the United States use this service. Whenever a bank in an importing country issues a letter of credit, it sends a so-called MT700 message to the U.S. bank involved; when it releases a payment related to a documentary collection, it sends an MT400 message to the U.S. bank. The message specifies the terms of the letter of credit or the payment, including the names of the trading parties, the banks involved and the goods traded. Our SWIFT data set shows the number of MT700 and MT400 messages received by banks located in the United States by sender country at a monthly frequency from 2003 to 2012. From the fourth quarter of 2010 onward, we also know the total value of the messages in dollars. Because the value data is available for only a relatively short period, and message counts and amounts are highly correlated, we mainly use the count data for the analysis.[14]

3.2 Banks' trade finance claims

U.S. banks and U.S. subsidiaries of foreign banks that have more than $30 million in total foreign assets are required to file the Country Exposure Report (FFIEC 009). They have to include information on their claims (including commitments and guarantees) with maturities of up to one year against parties residing in foreign countries, that are "directly related to exports and imports and will be liquidated through the proceeds

[14]The correlation between log values and log numbers is about 90 percent.

of international trade."[15] Trade finance claims are reported by country at a quarterly frequency; and they are on a consolidated basis, that is, they include the exposures of banks' foreign affiliates.[16]

At first glance, it is not obvious which trade finance instruments are reflected in the reported claims nor how trade finance claims relate to U.S. exports and imports. To clarify what the data capture, we study the reporting instructions, analyze correlations between banks' trade finance claims and trade, and compare the FFIEC 009 data with the SWIFT data. In the following, we summarize the results of this analysis, which shows that (i) banks' trade finance claims largely reflect trade finance in support of U.S. exports; (ii) the main instrument in the data are letters of credit, and the data do not include documentary collections; and (iii) the data capture at least 85 percent of U.S. banks' trade finance claims.

Trade finance claims are related to U.S. exports The purpose of the FFIEC 009 report is to evaluate banks' exposures to foreign countries. If a bank could suffer a loss because a foreign party defaults on its obligation to pay, the bank has to report the potential loss as a claim on the country in which the foreign party resides. U.S. banks do not have to indicate their claims on U.S. parties. Theoretically, banks' trade finance claims could be related to U.S. import and export activity as well as to third-party trade, given that banks provide information on a consolidated basis and include loans and guarantees extended by their foreign affiliates. Table 1 displays the trade finance instruments that could be included in the data according to the reporting instructions. However, a close investigation of the data indicates that only instruments in support of U.S. exports matter.

[15]The exact reporting instructions for the trade finance item in the FFIEC 009 Report are as follows: *"Report total extensions of credit with maturities one year and under [...] that: (1) are directly related to imports or exports and (2) will be liquidated through the proceeds of international trade. Provided these two conditions are met, such credit extensions may include customers' liability on acceptances outstanding, own acceptances discounted, acceptances of other banks purchased, pre-export financing where there is a firm export sales order, commercial LCs, as well as other loans and advances whenever such extensions directly relate to international trade. Include credit extensions for pre-export financing when there is a firm export sales order and the proceeds of the order will pay off indebtedness."*

[16]For data through 2005, trade finance claims are reported on an immediate borrower basis; that is, a claim is attributed to the country in which the contracting counter-party resides. Beginning with the data for 2006, claims are reported on an ultimate risk basis; that is, a claim is attributed to the country of the ultimate guarantor of the claim. See http://www.ffiec.gov/ for more details. This reporting change does not appear to affect the value of banks' trade finance claims in a systematic way; consequently, we use the entire time series without explicitly accounting for the change. Statisticians at the Federal Reserve Bank of New York, who are familiar with the reporting instructions, confirm that risk transfers, for which values on an immediate borrower basis diverge from those on an ultimate risk basis, are less relevant for trade finance products.

Columns (1) to (3) of table 4 show the results from OLS regressions, in which the log of banks' total trade finance claims in quarter t in country c is regressed on the log of imports from country c, the log of exports to country c and total non-U.S. imports and exports of country c in quarter t. Columns (2) and (3) include time fixed effects. In column (3), country fixed effects are added. The estimated coefficients suggest that banks' trade finance claims are primarily driven by U.S. exports. Column (1) implies that a 10 percent increase in U.S. exports to a destination raises U.S. banks' trade finance claims by 8.6 percent. Only the coefficient on exports is significant at standard significance levels, and the point estimates on U.S. imports as well as on non-U.S. imports and exports are small or negative.

Trade finance claims reflect letters of credit If a U.S. bank confirms or issues an LC, it pays the exporter before obtaining the payment from the importer. Thus the bank runs the risk that the importer defaults. In a documentary collection, the bank forwards the collection but does not advance or guarantee the payment, so documentary collections do not expose banks to default risk.

The SWIFT data allow us to directly check the extent to which the claims data capture letters of credit and documentary collections. Columns (4)-(9) of table 4 show correlations between banks' trade finance claims and the SWIFT data. In columns (4)-(6), log claims by country are regressed on log exports, on the log number of LC messages and on the log number of DC messages. Columns (7)-(9) use message values instead of counts as regressors. The results indicate a tight link between trade finance claims and LC messages, regardless of which fixed effects are included in the regression. Documentary collections are not correlated with banks' trade finance claims, which confirms our interpretation of the FFIEC 009 reporting instructions. The fact that all coefficients are insignificant in column (9) is due to the limited time variation in the sample (2010 q4 to 2012 q2) and the inclusion of country fixed effects.[17]

We can also compare the total value of LC messages and trade finance claims. In the fourth quarter of 2010, the total value of LC messages corresponded to roughly 67 percent of banks' aggregate trade finance claims.[18] The discrepancy between SWIFT

[17]As discussed above, LC transactions for U.S. imports cannot be captured by the FFIEC 009 data, as they would constitute claims against U.S. residents. We confirmed this by including the number of U.S. import LCs from the SWIFT data as an additional independent variable in the regressions in table 4, which delivered insignificant coefficients.

[18]The actual amount sent through SWIFT is marginally higher than the observed amounts because, to reduce the chance that the data might be used to identify individual institutions, the data released

LC (MT700) values and FFIEC 009 values increases after 2010, with the value of LC messages falling to around 50 percent of bank claims. This is due to the fact that U.S. banks expanded their trade finance business in Asia through foreign affiliates after the global financial crisis. More trade finance in support of third-party trade may therefore be included in the claims data in the most recent years. The majority of claims are, however, related to LCs for U.S. exports, especially before 2011.

In addition to the above analysis, section 6 shows that the FFIEC 009 data and the SWIFT data largely follow the same patterns. The key regression results on letters of credit expected from the theory hold for both LC messages from SWIFT and the claims data. This reinforces our conclusion that banks' trade finance claims capture mostly letters of credit in support of U.S. exports.

Data captures at least 85 percent of total trade finance claims The only institutions required to file the Country Exposure Report are those U.S. banks and U.S. subsidiaries of foreign banks with more than $30 million in foreign assets. However, the reporting threshold is not a major concern. First, the letter of credit business is known to be highly concentrated. In a data set that captures the universe of Italian banks, Del Prete and Federico (2012) find that only 10 large banks provide trade guarantees to Italian firms. The high concentration is also reflected in the claims data. In the first quarter of 2012, we observe 18 banks with positive trade finance claims, whereas 51 banks report no claims. Second, and more importantly, there is a strong positive relationship between the probability of having non-zero trade finance claims and bank size. This suggests that the trade finance claims of banks below the reporting threshold are small. The following back-of-the-envelope calculation supports this conclusion.

Assume that all commercial banks in the United States below the reporting threshold (around 6,000 banks) had $30 million of foreign assets (the reporting threshold), and suppose that 9.4 percent of the foreign assets were trade finance claims (the mean exposure of banks in the data in 2012 q1). Total trade finance claims would then be about $84 billion in 2012 q1. Even under these extremely conservative assumptions, the FFIEC 009 data would still capture about 85 percent of U.S. banks' trade finance claims.

by the SWIFT Institute do not show monthly values that are composed of less than four transactions. Also, although the FFIEC 009 and the SWIFT data are roughly comparable, we should not expect a perfect match between the two data sets because, as discussed in more detail below, the former capture end-of-quarter stocks whereas the latter measure LC flows.

3.3 Mapping between exports and bank claims

The mapping between the SWIFT data and U.S. exports is straightforward. One SWIFT message is sent for each export transaction that employs an LC or a DC. There is also a direct mapping between bank claims and the value of goods exported. If a U.S. bank confirms an LC for, say, a Spanish importer, or if its foreign affiliate issues an LC to that importer, then the U.S. banking group has an exposure to a Spanish party that is equivalent to the value of the goods that are exported from the U.S. to the Spanish importer. The bank reports these in the Country Exposure Report as trade finance claims on Spain.[19]

While the number of SWIFT messages and exports are flow variables, trade finance claims are stocks taken at the end of a quarter. For the period that the bank is exposed to a potential default by the importer, that is, from the extension of the trade guarantee until it receives the payment from the importer, the related claims appear on its books. According to ICC (2013), which uses data from international banks participating in the ICC's Trade Register, the average maturity of a confirmed LC is 70 days, while the average maturity of an importer LC is about 80 days. It thus makes sense to relate quarterly trade finance claims to quarterly exports, which we take from the IMF's Directions of Trade Statistics.[20] Since most of the dependent variables used in the regression analysis vary at only an annual frequency, we sum the data over four quarters and run regressions on yearly data.

4 Empirical Patterns

Before presenting a model and using the data to formally test its predictions for the use of LCs and DCs, we discuss key empirical patterns in those data. We show the evolution of claims and messages over time, explore heterogeneity in the use of LCs and DCs across countries and analyze the structure of the trade finance business at the bank level.

[19]Note that LCs are not double-counted when a U.S. bank confirms an LC of its subsidiary because claims are consolidated and only exposures to non-related entities are reported.

[20]To account for the fact that, for data from 2003 to 2010, we observe only the number of SWIFT messages, not the associated values, we experimented with information on cards from the Census Bureau instead of export values as a control variable. A card reflects an HS 10-digit line item within a shipment. Log cards and export values show a correlation of 0.96, so we use only export values.

4.1 Trade finance claims and SWIFT messages over time

Figure 3 shows the evolution of banks' total trade finance claims together with quarterly U.S. exports in goods from 1997 to 2012.[21] Two features of the data series stand out. First, while trade finance claims were relatively flat for the most part, at about $20-30 billion, there were two peaks; one was in 1998 at the time of the Asian crisis, and the other was in 2008, the most intense period of the global financial crisis.[22] This suggests that exporters demanded more bank guarantees when uncertainty in the global economy was high. Second, trade finance claims have risen sharply since 2010, in part because, as noted earlier, U.S. banks have expanded their trade finance business in Asia through their foreign affiliates. In the aftermath of the financial crisis, several European banks exited the business in this region, allowing U.S. banks to gain market share.[23] The low interest rate environment of the past several years may also have contributed to the rise by decreasing the refinancing costs of letters of credit.

Figure 4 displays the evolution of the number of MT700 and MT400 messages over time. It indicates that the number of messages was stable over the past couple of years, supporting the view that the recent growth in U.S. banks' trade finance claims is related to activity outside the United States. As with banks' trade finance claims, SWIFT traffic dropped considerably during the collapse of trade engendered by the financial crisis.

According to the SWIFT data, the average quarterly value of LC messages received by banks in the United States between 2010 q4 and 2012 q4 was $33.8 billion. This corresponds to 9.6 percent of quarterly U.S. goods exports. The number calculated from the FFIEC 009 data is higher: from 1997 until the middle of 2012, claims corresponded on average to 14 percent of U.S. exports. Given that the claims data can include other trade financing, while the SWIFT data slightly underreport LC values to preserve the confidentiality of the data, the share of U.S. exports that employ LCs should lie between 9 and 14 percent. The share of exports that involve documentary collections is significantly lower, with an average value of 1.2 percent of U.S. exports.

[21] The aggregate numbers exclude observations for one bank that fundamentally changed its trade finance business in the reporting period.

[22] This pattern of trade finance during the 2008-09 financial crisis is consistent with evidence from Italy in Del Prete and Federico (2012) and from Korea in Rhee and Song (2013); those studies also find that trade finance first increased and then decreased.

[23] Decomposing the increase shows that a larger part of the growth was indeed due to activities in Asia. See "The Trade Finance Business of U.S. Banks", Federal Reserve Bank of New York Liberty Street Economics, May 2014.

4.2 Geographical distribution

The extent to which U.S. exporters rely on LCs and DCs varies widely across destinations.[24] The top panel of figure 5 lists the 20 destinations that accounted for the largest share of U.S. exports from 2010 q4 to 2012 q2. For each of these destinations, the panel shows the value of LC messages and DC messages relative to U.S. goods exports they received. While LCs and DCs are barely employed by exporters shipping to Canada or Mexico, they are very important for exports to China, Korea and India. For these destinations, the value of letters of credit corresponds to more than 25 percent of U.S. exports.

The middle panel of figure 5 shows those countries that accounted for the largest share of LC and DC messages over the same period. Not surprisingly, most of the countries that are top trading partners also have large LC and DC amounts. Three export destinations –Turkey, Israel and Taiwan– are not among the top 20 U.S. trading partners (top panel) but appear in the middle panel, which suggests that exports to these destinations rely heavily on bank intermediation. The bottom panel of figure 5 confirms this. On the left, it reports the 10 destinations with the highest ratio of LC values to U.S. exports, a group that includes Turkey. On the right are the 10 destinations with the highest ratio of DC values to U.S. exports. Among them are both Turkey and Israel.

In particular, two factors seems to importantly influence the LC and DC intensity of an export destination: its distance from the U.S. and its riskiness. Export destinations that rely heavily on LCs appear to be riskier than those that use DCs. This pattern is in line with predictions of the payment contract choice model presented in section 5.[25]

[24]Note that offshore financial centers are excluded from our analysis. A closer look at the data reveals that these jurisdictions attract large amounts of trade finance without corresponding trade flows. In the FFIEC 009 data, the share of trade finance claims in offshore centers amounted to 5 percent of banks' total claims in 2012, down from about 9 percent in 2006. For comparison, the share of offshore exports in total U.S. exports was 3.4 percent in 2006 and 3.8 percent in 2012. For a list of countries designated as offshore centers, see the data appendix.

[25]Figure 5 is based on SWIFT data. For comparison, we also rank countries according to their shares in total trade finance claims and their ratio of trade finance claims to exports and calculate rank correlation coefficients. The rank correlation between the numbers obtained based on SWIFT data and those based on the FFIEC 009 data are high. Spearman's rank correlation coefficient is 81 percent when computed for country shares and 65 percent for LC intensities. Differences between the SWIFT and the FFIEC 009 data may come from the fact that the former capture flows while the latter measure stocks. Thus, the overall cross-country patterns are consistent across the two data sets.

4.3 Bank-level statistics

The FFIEC 009 data allow us to study trade finance at the bank level. They indicate that concentration in the LC business is greater than asset concentration in the overall banking industry. In 2012, the top five banks had a joint share of 92 percent in total trade finance claims, and only 18 banks out of 51 reported positive trade finance claims. For comparison, the share of the top five banks in total bank assets was 80 percent in 2012 q1 based on the sample of banks that reported positive trade finance activities in at least one quarter over the sample period.[26] We do not have information on the U.S. banks that conduct documentary collections but we would expect that more banks offer this instrument than letters of credit due to their lower administrative and information requirements.

Figure 6 illustrates the high concentration of the LC business. It shows the average share in total trade finance claims, the average number of destinations and the average balance sheet size of three groups of trade finance banks in 2012 q2: the top five, the middle five, and the bottom eight banks. The top five account, on average, for 18 percent of total claims, serve 70 destinations and have $1.5 trillion in assets. The numbers are much smaller for the other two groups. The middle five banks have, on average, claims in 20 destinations and account for 1.5 percent of aggregate claims. The bottom eight banks each hold less than 0.5 percent of the claims and each is active in around three countries.

5 Theory

We present a model of payment contract choice to explain the circumstances under which trading partners employ LCs and DCs to settle their transactions. The focus of the analysis is on how destination country risk affects their choices. As we will show, the model is fully consistent with the data.

Models of payment contract choice based on Schmidt-Eisenlohr (2013) distinguish three different payment methods: cash-in-advance, open account and LCs.[27] This paper presents several innovations to this theory. First, we introduce documentary collections as a fourth payment type. Second, we present a new formulation of the LC contract,

[26]The actual degree of concentration of the U.S. banking industry is considerably lower. In these calculations, only banks that hold positive trade finance claims are included. Thus practically all small and medium-sized banks are excluded.

[27]See, for example, Antràs and Foley (forthcoming) and Hoefele et al. (2013).

modeling key features of this financial instrument that were not accounted for previously. The LC fee is no longer constant as in Schmidt-Eisenlohr (2013); instead it is a function of the importer's default risk and consists of both a fixed and a variable component. These assumptions are key for matching the empirical patterns. Third, we simulate the model for a continuum of exporters and importers that face random shocks to the profitability of each payment form.

Three new results emerge. First, letters of credit and documentary collections are used the most by exporters selling to destinations with intermediate values of payment risk; exports to high-risk destinations are settled on cash-in-advance terms; and exports to low-risk destinations are conducted with an open account. As the simulations show, this result implies a hump-shaped relationship between contract enforcement in the destination country and the use of LCs and DCs. Second, letters of credit are employed in riskier destinations more than documentary collections. Third, for very small transactions, cash-in-advance terms or an open account are preferred; as the size of transactions rises, those payment arrangements become superseded first by documentary collections and then by letters of credit because of increasing returns to scale.

5.1 Model setup

In the model, one exporter is matched with one importer. They play a one-shot game and have a choice between four payment contract types: cash-in-advance (CIA), open account (OA), documentary collection (DC) and letter of credit (LC). Both firms are risk-neutral. The exporter has all bargaining power and makes a take-it-or-leave-it offer to the importer specifying the payment contract, the price and the quantity of the goods to sell. R denotes the sales value of the goods in the destination country and K the production costs in the source country. $1 + r$ and $1 + r^*$ reflect the financing costs in the source country and the destination country, respectively.

Firms are either good or bad. A good firm always fulfills a contract. A bad firm breaks it whenever doing so is profitable. The share of good firms in the source country is given by η and in the destination country by η^*. If a firm does not voluntarily fulfill a contract, its trading partner can attempt to enforce it in court. This is successful in the source country with probability λ and in the destination country with probability λ^*.

5.1.1 Cash-in-advance

Under cash-in-advance terms, the importer first pays for the goods and then the exporter delivers them. Due to the time delay between the pre-payment and the arrival of the goods at the destination, the importer needs to pre-finance the transaction at its local interest rate $1+r^*$, and the exporter receives the payment before incurring the production costs. This gives rise to a commitment problem because the exporter can decide to keep the money without delivering the goods. Exporters that are of the good type (share η) always fulfill the contract, whereas bad exporters (share $1-\eta$) always try to get away without producing. If an exporter defaults on the contract, the importer goes to court, which enforces the contract with probability λ.

The exporter, who has all the bargaining power, takes the enforcement probability λ into account and chooses the optimal pre-payment C^{CIA} to maximize its expected profit.[28] The exporter also respects the participation constraint of the importer. The expected profit of a good exporter can be derived as:

$$\mathrm{E}\left[\Pi_E^{CIA}\right] = \frac{\eta + (1-\eta)\lambda}{1+r^*}R - K. \tag{1}$$

Because the importer pre-finances the transaction, the profitability of cash-in-advance terms decreases with the financing costs in the destination country $1+r^*$. Profitability also depends on the degree of contract enforcement λ and the share of good firms η in the source country. Because the importer bears the risk that goods do not get delivered, the higher are λ and η, the higher is the exporter's expected profit.

5.1.2 Open account

With an open account, the exporter first sends the goods and then the importer pays for them. Because the exporter incurs the production costs and delivers the goods to the importer before receiving the payment, the exporter has to pre-finance the working capital at its local interest rate $1+r$. The commitment problem is now on the side of the importer, who may decide not to pay for the goods after receiving them. Good importers (share η^*) pay the agreed price in any case, while bad importers (share $1-\eta^*$) try to

[28] Two bad-exporter strategies need to be distinguished: pooling and separating. Under pooling, a bad exporter imitates the good exporter. Under separating, it chooses a different strategy that reveals its type. Following Schmidt-Eisenlohr (2013), we assume that conditions are such that only the pooling case arises. This is the case if $\frac{R}{K} > \frac{(1+r^*)}{\eta}$. See appendix B for details and a formal derivation of all results.

get away without paying. When faced with a bad importer, the exporter goes to court, which enforces the contract with probability λ^*.

The exporter maximizes expected profit respecting the participation constraint of the importer, which results in:[29]

$$\mathrm{E}\left[\Pi_E^{OA}\right] = \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r}R - K. \tag{2}$$

With an open account, pre-financing is done by the exporter. Consequently, higher financing costs in the source country, $1+r$, reduce the exporter's expected profit. Because the commitment problem is on the importer's side, better contract enforcement and a higher share of good firms in the destination country (higher λ^* and η^*) increase the profitability of an open account.

5.1.3 Documentary collection

In a documentary collection transaction, banks handle documents that transfer the ownership rights from the seller to the buyer. A DC ensures that the importer receives the documents only after paying for the goods. Because the importer typically needs the documents to fully employ the delivered goods, a DC improves the reliability of payment compared with an open account. Even with a DC arrangement, however, the importer may still not pay – for example, when it can take possession of the goods and divert them without demonstrating legal ownership.[30]

We make two assumptions to capture these features of a documentary collection. First, we assume that with a documentary collection fewer firms try to cheat. More specifically, the share of firms that voluntarily fulfill their contracts increases by a factor of $\phi^{DC} \in \left(0, \frac{1-\eta^*}{\eta^*}\right)$. Payment then happens with probability $\eta^*(1+\phi^{DC}) + (1-\eta^*(1+\phi^{DC}))\lambda^*$. More generally, define the probability of payment as a function of ϕ as:

$$\Lambda(\phi) = \eta^*(1+\phi) + (1-\eta^*(1+\phi))\lambda^*. \tag{3}$$

Second, the exporter needs to pay a fixed transaction fee F^{DC} to the bank for its handling

[29] Because we focus on the case in which both types of importers participate in trade, the relevant constraint is the participation constraint of good importers. See appendix B for the details.

[30] Alternatively, the importer may not pay because it no longer wants the goods or because it simply does not have the funds (for example in bankruptcy). We abstract from the latter case in the analysis here.

of the documentary collection. Expected profits are then as follows:

$$\mathrm{E}\left[\Pi_E^{DC}\right] = \frac{\Lambda(\phi^{DC})}{1+r}R - F^{DC} - K. \tag{4}$$

Relative to an open account, the exporter's expected profit increases due to the higher probability of being paid. However, the profit is reduced by the fee F^{DC}, which the exporter pays at the beginning of the transaction. Note that the fee is not proportional to the value of the trade so that a documentary collection features increasing returns to scale.

5.1.4 Letter of credit

When a trade is settled with an LC, banks do not only hand over documents to the importer as in a DC but they may also advance the importer's payment. The exporter is paid as soon as it proves that it has delivered the goods. Because banks may incur a loss if the importer does not pay, they screen importers much more actively when they issue an LC than when they engage in a DC.[31] Accordingly we assume that the share of importers that try to get away without paying decreases by more with an LC than with a documentary collection. At the same time, the fixed fee that the bank charges for an LC to cover screening, monitoring and document handling costs is higher than for a DC.

Specifically, assume that the share of importers that always pay increases by a factor of $\phi^{LC} > \phi^{DC}$. There remains a risk that the bank does not get paid, which happens with probability $1-\Lambda(\phi^{LC})$. The cost that the bank incurs for screening and monitoring is given by $m > F^{DC}$ and is independent of the value of the transaction.[32] Under perfect competition, banks charge an importer the monitoring cost m plus the expected loss from extending the guarantee. The letter of credit fee is thus given by:

$$F^{LC} = m + \frac{1-\Lambda(\phi^{LC})}{1+r^*}C^{LC}. \tag{5}$$

Note that the fee is paid in the first period by the importer while the potential loss arises only after a time delay. Therefore the expected loss is discounted by $1+r^*$. The

[31] Additionally, to reduce the risk that the importer does not pay, banks can require the importer to put down a cash deposit equivalent to the value of the guarantee.

[32] While certainly more realistic, $m > F^{DC}$ also ensures that LCs do not always dominate DCs.

exporter's expected profits with an LC can be derived as:

$$\Pi^{LC} = \frac{1 - (m/R)(1 + r^*)}{(1 + r)[2 - \Lambda(\phi^{LC})]} R - K. \tag{6}$$

Profits with an LC decrease both in the financing costs in the source country and in the destination country, $1 + r$ and $1 + r^*$, since the exporter needs to pre-finance the transaction and the importer needs to pre-finance the LC fee. Because the risk that the exporter does not deliver is eliminated by an LC, expected profits are independent of the enforcement probability λ. However, profits depend on the enforcement probability λ^* in the importing country through the fee F^{LC}. Recall that the probability $\Lambda(\phi)$ that the importer pays increases in λ^*. Thus, under this payment form, the higher the risk that the importer does not pay, the lower are the profits. As with a documentary collection, the LC case contains an element of increasing returns to scale since the monitoring cost m is fixed. The average cost of an LC decreases in transaction size R.

The formulation of the letter of credit fee here is different from that in Schmidt-Eisenlohr (2013) and is arguably more realistic. In that paper, the LC fee is exogenous and proportional to the value of the trade transaction. Here the letter of credit fee consists of a fixed component and a variable component; the latter is a function of the importing country's risk. Although information on the pricing of LCs is not available, we have data on average insurance premia charged by the U.S. Export-Import Bank for export transactions to 29 countries. Figure 7 shows a strong negative relationship between a destination's insurance premium and a measure of its rule of law in the year 2004.[33] There is a strong negative relationship. It is likely that the fee for an LC behaves similarly and also decreases with the rule of law in the importing country, as modeled in this paper. Anecdotal evidence suggests that the fee of an LC indeed increases with the riskiness of the issuing bank and the riskiness of the importing country.[34]

Before formally deriving the new predictions of the model, it is useful to summarize the key trade-offs exporters and importers face when choosing a payment contract. Each of the payment forms varies in terms of how the risk and the financial burden are allocated between trading partners as well as in the levels of risk and costs they imply. Table 3

[33]The data on insurance premia were first used in Hale et al. (2013) and were kindly provided to us by the authors of that paper. Information on rule of law is from the World Banks' World Government Indicators.

[34]See, for example, http://opentoexport.com/article/a-guide-to-letter-of-credit-charges/. The cost of an LC consists of a fixed fee that covers banks' administrative costs and additional charges proportional to the value of the transaction and the validity period of the LC.

summarizes the trade-offs. CIA terms allocate all the risk and all the financing costs to the importer. With an open account, the exporter bears both the risk and the financial costs. A DC reduces the risk for the exporter but increases its costs due to the document handling fee. An LC eliminates the risk for both the importer and the exporter, but the financial costs increase substantially because the bank has to be compensated for the guarantee it extends and for the administrative costs that arise. In the following section, we focus on contract enforcement in the importing country and analyze in detail how it affects the payment contract choice.

5.2 Trade finance and destination country risk

Proposition 1 states how expected profits under each payment contract change with the probability λ^* that a contract is enforced in the destination country.

Proposition 1 *Expected profits from cash-in-advance, an open account, a documentary collection and a letter of credit change in destination country enforcement λ^* in the following way:*

$$\frac{\partial E\left[\Pi^{OA}\right]}{\partial \lambda^*} > \frac{\partial E\left[\Pi^{DC}\right]}{\partial \lambda^*} > \frac{\partial E\left[\Pi^{LC}\right]}{\partial \lambda^*} > \frac{\partial E\left[\Pi^{CIA}\right]}{\partial \lambda^*} = 0.$$

Proof. *See appendix A.* ■

Corollary 1 follows directly from proposition 1:[35]

Corollary 1 *Suppose that each contract type $C \in \{CIA, OA, DC, LC\}$ is used for some $\lambda^* \in [0, 1]$. Then, there exist $\bar{\lambda}_3^* > \bar{\lambda}_2^* > \bar{\lambda}_1^*$, such that:*

- *(i) Cash-in-advance is used if $\lambda^* \leq \bar{\lambda}_1^*$.*
- *(ii) A letter of credit is used if $\lambda^* \in (\bar{\lambda}_1^*, \bar{\lambda}_2^*)$.*
- *(iii) A documentary collection is used if $\lambda^* \in [\bar{\lambda}_2^*, \bar{\lambda}_3^*)$.*
- *(iv) An open account is used if $\lambda^* \geq \bar{\lambda}_3^*$.*

Proof. *Follows immediately from proposition 1.* ■

[35] Assume, without loss of generality, that if indifferent between multiple payment contracts, an exporter chooses in the following order: OA, CIA, DC, LC.

Figure 8 illustrates the findings of proposition 1 and corollary 1. It shows exporter profits under each payment form as a function of the probability λ^* that a contract is enforced in the destination country. Proposition 1 is about the ordering of the slopes of the curves in figure 8, which is unique. To understand the ordering, recall that under each payment contract the exporter is differently exposed to the risk that the importer does not pay. The higher the exporter's exposure, the larger is the effect of a change in the probability λ^* on expected profits, and the steeper is the profit line in the figure. An open account allocates all the risk to the exporter. Profits under this payment form therefore respond the most to changes in λ^*. Since a documentary collection and a letter of credit reduce the risk that the importer gets away without paying, expected profits with an LC or a DC are less responsive to changes in λ^*. When the trade is settled on cash-in-advance terms, the commitment problem on the importer's side is eliminated, so CIA profits are independent of the degree of contract enforcement in the destination country, resulting in a flat line in the figure.

The unique ordering of the slopes implies that if each payment contract is optimal for some value of $\lambda^* \in [0, 1]$, then CIA is chosen for the lowest values of contract enforcement that is for all $\lambda^* \leq \lambda_1^*$. As the probability that a contract is enforced rises, first LCs dominate (for $\lambda^* \in [\lambda_1^*, \lambda_2^*]$), then DCs (for $\lambda^* \in [\lambda_2^*, \lambda_3^*]$). An open account is optimal when the risk that the importer does not pay is low, that is when $\lambda^* \geq \lambda_3^*$.

Figure 8 illustrates that firms rely on banks to settle their payments when the degree of contract enforcement in the destination country is neither too low nor too high. Figure 9 shows how much better is the profitability of LCs and DCs in this range relative to the other payment forms. The graph plots the difference between profits from an LC and its best alternative (dotted line) and the difference between profits from a DC and its best alternative (solid line). Each of the two lines exhibits a kink. The kink is at the value of λ^* at which a firm is indifferent between its two second-best alternatives. At the kink of the LC line ($\lambda^* = \lambda_{LC}^*$), expected profits from cash-in-advance and documentary credit are equal. At the kink of the DC line ($\lambda^* = \lambda_{DC}^*$), an LC and an open account imply the same expected profits.

To build intuition for the kinks, focus on the LC line. The higher the contract enforcement λ^* in the destination country, the more profitable are LCs compared with cash-in-advance terms. At the same time, at any point, a higher λ^* implies a lower profitability of LCs relative to DCs. Moving from the left to the right in the graph, the relative profitability of an LC therefore increases compared with cash-in-advance terms

but decreases compared with a DC. The maximum distance between the expected profits of an LC and its alternatives is therefore reached when an exporter is indifferent between cash-in-advance terms and a DC.

In the baseline model, where all firms face exactly the same decision, changes in the profitability advantage of a payment form do not matter. Firms always choose the most profitable contract, independently of the profitability of any alternatives. However, the relative profitability of a payment form matters when we want to take the model to the data. To illustrate this point, we simulate an extended version of the model. Assume now that there is a continuum of exporters and importers in the source and the destination country. Each exporter draws a random, multiplicative shock to the profitability of each payment form that captures its idiosyncratic business circumstances. With a sufficiently large support of the shock distribution, there is always an exporter that is indifferent between an LC (DC) and an alternative payment method when trading with an importer in a given destination country.[36] As a consequence, the share of exporters that use LCs (DCs) increases with the relative profitability of LCs (DCs), which is highest for intermediate values of contract enforcement. Therefore the relationship between the share of exporters that use LCs (DCs) and contract enforcement λ^* in the destination country is hump-shaped.

Figure 10 shows the share of exporters that use each payment form in a simulated example.[37] Contract enforcement λ^* in the destination country is on the x-axis. In line with the intuition developed earlier, the share of exporters that offer cash-in-advance terms decreases with the degree of contract enforcement in the destination while the share of exporters that settle payments on an open account increases. There is a clear hump-shaped relationship between the use of LCs (DCs) and λ^*. The DC curve lies to the right of the LC curve, which implies that the share of exports that are settled with LCs peaks at a lower level of contract enforcement than the share of exports that rely on DCs. We show in the next section that these are exactly the patterns that we observe in the data.

Instead of four individual shocks to the profitability of each payment form, we can also introduce exporter-importer-pair specific shocks to the strength of contract enforcement in the source country and in the destination country. While the shocks underlying the

[36] Any single-peaked distribution with mean zero and a sufficiently large support can be used.

[37] Parameter values are: $\eta = \eta^* = 0.75$, $\lambda = 0.65$, $R = 1.5$, $K = 1$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\lambda^* \in [0.3, 1]$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$. The shocks to the profitability of the four contracts are assumed to be independently normally distributed with variance 0.1 and mean 1.

simulations imply that the profitability of the different contracts varies across firms, shocks to λ and λ^* allow for differences in the degree to which exporters and importers can enforce contracts. The hump shapes also result under this alternative formulation of the shocks.

5.3 Trade finance and transaction size

In the model, DCs and LCs imply fixed document handling, screening and monitoring costs. These give rise to increasing returns to scale. Therefore, the higher the value of a contract is, the more attractive DCs and LCs become. Let production cost K be a constant fraction of revenues R, that is $K = \gamma R$. Then, the following proposition can be derived:

Proposition 2 *Suppose that each contract type* $C \in \{OA, DC, LC\}$ *(or* $C \in \{CIA, DC, LC\}$*) is used for some* R*. Then, there exist* $\bar{R}_2 > \bar{R}_1$*, such that:*

- *(i) An open account (or cash-in-advance). is used if* $R \leq \bar{R}_1$
- *(ii) A documentary collection is used if* $R \in [\bar{R}_1, \bar{R}_2]$*.*
- *(iii) A letter of credit is used if* $R > \bar{R}_2$*.*

Proof. *See appendix A.* ■

The model predicts that for small transaction sizes (low R), firms should rely on an open account or cash-in-advance terms to save on fixed costs. Transactions with intermediate values should be settled with documentary collections. When transactions are very large, letters of credit are most attractive; they imply the highest fixed costs but at the same time reduce payment risk the most. The trade-off between CIA and OA is independent of R.

Figure 14 illustrates this finding graphically. It shows a simulated example in which firm revenues vary between zero and three. Parameters are chosen such that firms are on average indifferent between cash-in-advance and open account terms.[38] The graph shows that, for small revenues, only cash-in-advance and open account terms are used, each for half of the transactions. As the value of the transaction rises, the share of documentary collections increases. Finally, for large transactions, LCs dominate.

[38]The exact parameters are $\eta = \eta^* = 0.75$, $\lambda = 0.65$, $R = 1.5$, $K = 1$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\lambda^* \in [0.3, 1]$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$. The shocks to the profitability of the four contracts are assumed to be independently normally distributed with variance 0.1 and mean 1.

6 Empirical Analysis

In section 4, our first look at the data indicated that destination country risk is a key determinant of payment contract choice in international trade. In this section, we conduct a regression analysis to systematically explore the relationship between country risk and the use of LCs and DCs for exporting. According to the theory, firms should rely the most on banks to facilitate international trade when shipping to countries with intermediate degrees of contract enforcement. In addition, letters of credit should be employed more than documentary collections by exporters that sell to riskier destinations. The theory also states that the size of a trade transaction affects the profitability of the different payment contracts. We show that these model predictions are strongly supported by the data. We also investigate the role of distance and time to trade for firms' choices.

6.1 The effect of destination country risk

To test for the effect of destination country risk on the choice of payment contract, we estimate the following equation:

$$\begin{aligned} \log(Y_{ct}) &= \beta_1 \log(\text{exp}_{ct}) + \beta_2 \log(\text{distance}_c) + \beta_3 \text{ law}_{ct} + \beta_4 (\text{law}_{ct})^2 \\ &+ \beta_5 \log(\text{GDP per capita}_{ct}) + \beta_6 (\text{GDP per capita}_{ct})^2 \\ &+ \beta_7 \log(\text{fin. development}_{ct}) + \alpha_t + \epsilon_{ct}, \end{aligned} \tag{7}$$

where Y_{ct} stands either for banks' trade finance claims in country c at time t or for the number of LC or DC messages sent to banks in the United States. The dependent variables are regressed on the log of exports, on the log of distance, and on a measure of the degree to which contracts are enforced in destination c denoted by law_{ct}. We use as a proxy for contract enforceability the rule of law index from the World Bank's World Governance Indicators. Since the index takes negative values for some countries, it is mapped on the interval between 0 and 1, where 1 corresponds to the highest degree of the rule of law observed.[39] We also include rule of law squared in equation 7 to allow for the non-linear relationship predicted by the theory. As the quadratic specification may seem restrictive, we show in section 6.4 that a semi-parametric estimation that allows for an entirely flexible form delivers very similar results.

[39]The mapping is done through a simple linear transformation, where $law_{new} = \frac{law_{old} - \min(law_{old})}{\max(law_{old}) - \min(law_{old})}$.

According to the model, interest rates should affect firms' choices of payment contracts. We therefore control for the importing country's stage of financial development in the regressions. In line with the extensive literature on the topic, we measure financial development by the variable *private credit by financial institutions over GDP* taken from the World Bank's Financial Structure Database.[40] GDP per capita and GDP per capita squared are also added as regressors to ensure that the effect of contract enforceability is not due to omitted factors that are correlated with a country's overall development. Moreover, all regressions control for time fixed effects. Standard errors are clustered by country.

Table 4 presents the results. Columns (1) to (3) show the relationship between banks' trade finance claims and the degree of contract enforcement in the importing country. Column (1) includes the variable rule of law but not rule of law squared; column (2) adds the squared term. In column (3), the financial development variable as well as GDP per capita and GDP per capita squared are included as regressors. While the coefficient of the squared rule of law term is negative in columns (2) and (3), the coefficient of the linear term is positive, and both coefficients are highly significant. They indicate a non-linear relationship between a destination's rule of law and the use of letters of credit in U.S. exports. That is, controlling for other factors, letters of credit are used the most for exports to countries with intermediate levels of risk, a finding consistent with the predictions of the theory.

The relationship is quantitatively relevant. To see this, consider the following example based on the point estimates in column (3): if Guatemala (normalized rule of law of 0.28) had the same rule of law as Brazil (normalized rule of law of 0.51 in 2012), the trade finance claims of U.S. banks would increase by 15.5 percent. In contrast, if Brazil had the same rule of law as Israel (normalized rule of law of 0.75 in 2012), trade finance claims toward Brazil would decline by 41.1 percent. The moves from Guatemala to Brazil and from Brazil to Israel correspond to roughly one standard deviation of the rule of law index. Thus, the magnitudes are economically significant.

The hump-shaped relationship between the use of LCs and contract enforceability in the destination country is confirmed by regressions run on the SWIFT data shown in column (4). The coefficients of rule of law and rule of law squared barely change when the number of LC messages is the dependent variable. The only notable difference relative to column (3) is that the coefficient of financial development is now highly significant. This

[40] See, for example, Beck (2003), Manova (2013).

indicates that LCs are used more for exports to more financially developed countries.[41]

According to the theory, the use of DCs in international trade should also be hump-shaped in destination country risk. This prediction is tested in column (5) of table 4, which shows results for the number of DC messages. The coefficients of rule of law and rule of law squared are again highly significant, with the linear term being positive and the quadratic term being negative as expected. Compared to the results for the number of LC messages in column (4), the estimated coefficient associated with the linear rule of law term is much larger.

To further explore differences in the relationship between the use of DCs and LCs and a country's rule of law, we estimate the following pooled regression:

$$\begin{aligned} \log(Y_{mct}) &= \beta_1 \log(\exp_{ct}) + \beta_2 \log(\text{distance}_c) + \beta_3 \ \text{law}_{ct} + \beta_4 \left(\text{law}_{ct}\right)^2 \\ &+ \beta_5 \text{DC message dummy}_{mct} + \beta_6 \ \text{law}_{ct} \times \text{DC message dummy}_{mct} + \quad (8) \\ &+ \beta_7 \left(\text{law}_{ct}\right)^2 \times \text{DC message dummy}_{mct} + \beta_8 \log(X_{ct}) + \alpha_t + \epsilon_{ct}. \quad (9) \end{aligned}$$

Now $\log(Y_{mct})$ stands for the number of messages of type m received by U.S. banks from country c in year t. X_{ct} collects additional control variables. The regression includes a dummy that takes the value of 1 if the message refers to a documentary collection and zero if the message is related to a letter of credit as well as interactions between the dummy and the rule of law variables.

Columns (5) and (6) of table 4 confirm that the coefficient of the linear term is significantly different for DCs and LCs, being twice as large for DCs. The coefficient on the quadratic term is the same for both message types. Figure 12 illustrates what this means. It shows the relationship between the use of LCs and DCs, respectively, and the rule of law index based on the results in column (6). The use of LCs in U.S. exports first rises and then falls with a destination's rule of law, with a peak at a value of 0.48, which is equivalent to Morocco's rule of law index in 2012.[42] In contrast, the use of DCs largely increases with a country's rule of law. The relationship is not log-linear but concave. An improvement in the degree to which a contract can be enforced in the destination has a

[41] The model does not predict the sign of this coefficient. One would typically expect financing costs to decrease in financial development. While an increase in the destination country financing costs improves the relative profitability of LCs compared with cash-in-advance, it reduces relative profitability compared with open account. The positive correlation between financial development and LC use may arise because the number of potential correspondent banks is likely to be increasing in destination country financial development. This channel is, however, outside the scope of the model presented here.

[42] The mean rule of law in the sample is 0.55.

larger positive effect on the use of DCs when contract enforceability is low. The share of exporters that use DCs is highest for a rule of law index of 0.93, which corresponds to Ireland's index in 2012. Thus the use of DCs in exports reaches its maximum at a higher value of contract enforceability than the use of LCs. Exactly this pattern is predicted by the theory (see again corollary 1 and figure 10).

Next, we present a more direct way to test whether LCs are used more for exports to riskier destinations than DCs. We compute the share of LC messages in total SWIFT messages (LC+DC) to destination c in year t and regress this variable on the rule of law index and other controls. Regression results are presented in table 5. Column (1) includes only the rule of law index as an explanatory variable. This regressor alone explains 37.5 percent of the variation in the share of LC messages in total messages. The highly significant, negative coefficient indicates that the share of LCs decreases as the ability to enforce a contract in the importing country increases. Column (2) shows that this result is robust to the inclusion of other country variables as well as time fixed effects, which interestingly add hardly any explanatory power. In column (3), rule of law squared is added as a regressor; its coefficient is insignificant, which suggests that the share of LC messages indeed decreases linearly with the rule of law index.

6.2 The effect of distance

All regressions in the previous section controlled for the distance of an export destination from the United States and indicated a strong positive relationship between the use of letters of credit (documentary collections) and this variable. In this section, we explore the link between distance, trading times, contract enforceability and payment contract choice in more detail.[43]

In the literature, the costs of an export transaction are considered to increase with the time to trade. Amiti and Weinstein (2011) and Schmidt-Eisenlohr (2013), for example, argue that this is the case because working capital requirements are proportional to the time it takes to transport goods from the producer in the source country to the final consumer in the destination country.[44] A similar mechanism should also increase the cost

[43]The role of time to trade was first studied empirically in Hummels and Schaur (2013). Schmidt-Eisenlohr (2013), Bourgeon et al. (2012), and Paravisini et al. (forthcoming) investigate how trading time affects the response of trade to changes in financial conditions. Also related is Berman et al. (2012), who study how distance influences the adverse effects of financial crisis on trade.

[44]There is some indirect evidence for the relevance of the working capital channel. See, for example, Schmidt-Eisenlohr (2013), who introduces an interaction between distance and a country's average net

of a letter of credit. The longer a transaction takes, the longer the guarantee must be granted by the bank and the longer it remains on the bank's book. As banks have to hold capital against guarantees, a bank's cost associated with the provision of an LC should thus increase with the time to trade. Consequently, bank fees and, hence, firms' trade finance costs should also rise with the time required for the underlying export transaction to be completed.[45]

A positive relationship between trade finance and distance from the United States can, however, also come through another channel. If the risk of a transaction increases with the distance between trading partners, firms' incentives to use LCs and DCs will plausibly also increase, for several reasons. First, it is probably harder to communicate and to litigate a contract dispute when the trading partner is far away. Second, it may be more difficult to thoroughly screen foreign sellers and buyers.[46] Finally, long shipping times may increase the risk that the importer will no longer want the traded goods or will go bankrupt before the transaction is completed.

In the following we show that both of these channels are at work. We are able to disentangle them because the SWIFT data and the FFIEC 009 data capture banks' trade finance activities in distinct ways. The effect of trading time that is related to the duration of a guarantee or loan is reflected in the FFIEC 009 data but not in the SWIFT data. Recall that the FFIEC 009 data contain the end of quarter stocks of banks' trade finance claims and that guarantees appear as claims as long as they are granted. In contrast, a letter of credit message is counted once when the LC is issued so the number of messages is not mechanically linked to the duration of the associated guarantees.

To test for the effect of the time to trade, we introduce into equation 7 a measure of the time that goods take to enter a destination country due to customs procedures and other processes. This variable comes from the World Bank's Doing Business Indicators.[47] Table 6 presents the results. As before, all regressions include time fixed effects and control for GDP per capita. Standard errors are clustered at the destination country.

interest rate margin into a standard gravity equation. He finds that the longer the distance between trading partners, the larger is the negative impact of financing costs on trade. This result has also been obtained with French firm-level data by Bourgeon et al. (2012).

[45]Bank guarantees represent an additional channel through which time can affect the relationship between finance and trade above and beyond working capital requirements. With or without a guarantee, firms always need to pre-finance working capital. In addition to obtaining financing from the bank, firms may use an LC to reduce the risk of the trade transaction.

[46]For example, Krautheim (2012) shows theoretically that obtainable information should decline in distance because learning through networks gets weaker.

[47]For details on the variable, see Djankov et al. (2010).

Column (1) of table 6 shows that time to import has a positive effect on bank claims. The standard error of the coefficient on time to import increases when GDP per capita squared and financial development are controlled for – as shown in column (2)– due to a high correlation between financial development and the time to import, so the coefficient is significant at a level of only 11 percent. As expected, time to import does not have a significant effect on the number of SWIFT messages. The corresponding coefficient is insignificant and negative when regressions are based on the number of LC and DC messages, respectively (see columns (3) and (4)). These results indicate the presence of a mechanical relationship between bank claims and time to trade.

Consider again table 6. The distance coefficient is large and highly significant in all columns. Since there is no mechanical link between the number of LC transactions and the time to trade, the positive effect of distance must be driven by the second channel discussed above, that is, distance magnify the risks inherent in international trade transactions. To explore this mechanism further, we split the sample of countries according to whether their distance from the United States is below or above the median and reestimate equation 7. Columns (1), (4) and (7) of table 7 include destinations with a log distance from the United States greater then 8.94. Columns (2), (5) and (8) display results based on countries with a distance equal to or less than this value. The first three columns of the table show the results for bank claims, the middle three for LC messages, and the last three for DC messages.

Columns (1), (2), (4) and (5) of table 7 clearly indicate that the hump-shaped relationship between the use of LCs and a destination's rule of law is present only for those countries that are far away from the United States.[48] In contrast, the effect of risk on the use of DCs is the same regardless of the destination's distance. To formally test for differences in the relationship between contract enforceability and payment contract choice across export destinations, we run regressions on the full sample in columns (3), (6), and (9) and introduce a dummy variable that takes value 1 if a country has an above-median distance from the United States and zero otherwise. The dummy is interacted with rule of law and rule of law squared. This exercise confirms what the other columns already conveyed: The relationship between the use of LCs and a destination's rule of law depends on its distance from the United States, indicated by the large and highly

[48] Antràs and Foley (forthcoming) provide related evidence when studying the choice between cash-in-advance and open account. They split the sample into countries with above and below sample mean distance from the United States and find that for countries that are far away, enforcement measures matter more for the contract choice.

significant interaction terms in columns (3) and (6). In contrast, destination country risk always has the same effect on the use of DCs, given that the interaction terms are small and insignificant in column (9).

Figures 13 illustrates these results. The dotted lines in both panels show how the use of bank-intermediated trade finance changes with a country's rule of law when destinations are close to the United States. The dashed line depicts the relationship when countries are far away. Consider first the left-hand chart, which plots the relationship for LCs. The use of LCs in exports to countries close to the United States barely varies with a destination' rule of law. In contrast, there is a strong hump-shaped relationship between the use of LCs and payment risk for long-distance destinations. Proximity appears to mitigate risk. Results are different for documentary collections, as the right panel shows. Regardless of whether importers are close to or far from the United States, the use of DCs rises with the ease of enforcing contracts. Note also that the elasticity of the number of SWIFT messages with respect to log distance is larger for DCs than for LCs (see again table 7). Therefore, LCs appear to be central in the mitigation of payment risk; and DCs seem to be particularly relevant for addressing risks that arise from long transport routes.

We conclude that longer geographic distances have two effects on the use of trade finance. First, they increase the duration of a bank guarantee or loan and therefore the cost of trade finance. Second, they are associated with greater risks, making the use of letters of credit and documentary collections more desirable.

6.3 Transaction size

Importers and exporters have to pay a fee for LCs and DCs. Because a part of the fee is fixed (covering document handling, screening and monitoring costs), the attractiveness of these payment forms increases with the size of an export transaction. Proposition 2 predicts that the largest transactions should be settled with letters of credit. Transactions with intermediate values should rely to a greater extent on documentary collections. Smaller transactions, in contrast, should be conducted through cash-in-advance terms or an open account.

While we do not observe the transaction value for single letters of credit and documentary collections, we can use the SWIFT data to study the average size of LC and DC transactions in the aggregate and by country. We have information on both the total

value of LCs and DCs and on the corresponding number of SWIFT messages sent by importing country. In addition, we know the total value of U.S. exports to a destination and the number of shipments (Census Bureau cards) so we can compare the average size of LC and DC transactions to the average value of an export transaction.

In a first step, we calculate the average transaction size of letters of credit, documentary collections and aggregate trade for the period in which SWIFT value data are available, that is, from 2010 q4 to 2012 q4.[49] In this period, the average value of an LC is $716.2 thousand. The average value of a DC is $138.7 thousand. For all trade transactions, the average value is $42.7 thousand.[50] Thus, an average LC transaction is more than sixteen times as large as an average trade transaction, while an average DC transaction is more than three times as large.

One may be concerned that this ranking is driven by countries with particularly large LC transactions. To account for this possibility, we also calculate average transaction sizes by country. Figure 14 presents kernel density estimates of the log of the average transaction value of LCs, DCs and aggregate exports. Each curve is based on 84 country observations. The LC density is clearly to the right of the DC density, which is to the right of the density for all transactions, in line with the model predictions.

As a final check, we compute the share of countries for which the ordering of transaction sizes is consistent with the theory. Table 8 summarizes the results. There are 84 countries with positive DC, LC and export values and numbers. For 92.9 percent of these countries, LCs have a higher average value than DCs. For 95.2 percent of the countries, LCs have a higher average value than other trade transactions, and for 78.6 percent of the countries, DCs are on average larger than other trade transactions. These numbers increase to 97.6, 100 and 90.5 percent, respectively, when we focus exclusively on countries with above median average exports. In other words, when we abstract from measurement error in smaller countries, LC transactions are always the largest, followed by DCs. Transactions that use neither LCs nor DCs are the smallest. These results strongly support our modeling assumptions and suggest that LCs and DCs involve substantial fixed costs.

[49] To compare transaction sizes across payment types, we restrict the sample to countries for which each payment type is observed. This reduces the number of countries to 84. Results are basically identical when we calculate the numbers for the unbalanced data set with over 184 countries.

[50] We can also calculate the average value of trade transactions that are neither LC nor DC. For this, we first deduct the value (number) of LCs and DCs, respectively, from the total export value (number of shipments). The average value of the remaining transactions then falls to $39.2 thousand.

6.4 Robustness

In this section, we present robustness checks, which show that our results to do not change when we semi-parametrically estimate the relationship between the use of LCs, DCs and a country's rule of law. We also address concerns of endogeneity and employ alternative proxies for contract enforceability in the destination country. Finally, we add more control variables to the regressions and work with only one year of data.

Semi-parametric estimation To check that our finding of a hump-shaped relationship between the use of LCs and country risk is not due to the quadratic form assumed before, we estimate the relationship semi-parametrically. We allow for an entire flexible functional form, employing Robinson's (1988) double residual estimator. Log distance, log exports, log financial development, log GDP per capita, and log GDP per capita squared enter the regression linearly. Rule of law enters non-linearly. Precisely:

$$\log(Y_{ct}) = \alpha + \beta' X_{ct} + f(law_{ct}) + \epsilon_{ct}, \tag{10}$$

where X_{ct} denotes the control variables listed before. Given the results presented in section 6.2., we estimate equation 10 for countries that are above the median distance from the United States separately from those that are below the median. The results are shown in figure 15. The panels on the left (right) are for countries that are far from (close to) the United States. In line with the earlier findings, the top and middle panels show that the use of LCs does not respond much to changes in country risk when trading partners are close. In contrast, a clearly hump-shaped relationship between the use of LCs and a destination's rule of law emerges for countries with long distances from the United States. Our findings on the use of DCs in exporting are also confirmed. The two bottom panels of figure 15 show that the use of DCs increases with a country's rule of law and that this relationship holds for destinations both close to and far from the United States.

Alternative measures of contract enforcement While the variable for rule of law from the World Bank's World Governance Indicators is widely used as a proxy for the degree to which contracts can be enforced in a country, we show that results also hold when we replace this variable with other measures of country risk. As alternatives, we employ a measure of investor protection from the World Bank's Doing Business Indicators as well

as an index of country risk provided by the Economist Intelligence Unit (EIU), which takes into account sovereign, currency and banking risk associated with a destination. Table 9 reports the results.[51] Regressions in columns (1)-(3) are based on the measure of investor protection. Columns (4)-(6) show results for the EIU risk index. All regressions are in line with the previous findings. In particular, columns (1), (2), (4) and (5) confirm that the use of LCs is hump-shaped in the degree of investor protection and country risk. Note that the negative coefficient in column (6) is also consistent with our expectations, since a higher EIU risk measure reflects a lower likelihood of being repaid.

Ratios as dependent variables One might be worried that U.S. exports are correlated with unobserved factors that also affect firms' choices of payment contracts, which would generate an endogeneity problem. To address this concern, we normalize the left-hand-side variable by dividing FFIEC 009 claims by U.S. exports, and dividing the number of LC (DC) messages by the number of shipments; the new dependent variables reflect the share of U.S. exports to destinations that use LCs and DCs, respectively. These are regressed on the various explanatory variables as before. Results are presented in columns (1)-(3) of table 10. While the normalizations naturally change the magnitudes of the coefficients, the results imply the same qualitative relationships as before.

Results based on one year of cross-sectional data As a final exercise, we show that all of our results also hold when we add additional control variables or look at a simple cross-section only. Columns (4)-(6) include dummy variables that control for whether a destination country has the same legal origin as the United States, shares a border with the United States or had a common colonizer. The addition of these variables does not affect the results.[52] Columns (7)-(9) in table 10 show results when regressions are run on one year of data only. We pick the year 2006, but results are very similar if we use a cross-section from another year. Standard errors increase because we ignore substantial amounts of information by focusing on a single cross-section, but the estimated coefficients are in line with the previous estimates. Together these exercises show that the presented patterns are highly robust features of the data.

[51] We leave out financial development as control variable to increase the sample size since the EIU risk measure and the investor protection measure are only available for a limited number of countries.

[52] We also experimented with several other control variables, for example, with a dummy for common language or a variable that indicates whether regulation requires some or all import transactions to use letters of credit. The associated coefficients were always insignificant.

7 Conclusions

This paper analyzes the role of banks in reducing the risk of exporting in international trade. We exploit two new data sets, one of regulatory filings maintained by the Federal Reserve Board and the other of transactions data provided by the SWIFT Institute. We quantify, for the first time, the size of the trade finance business for U.S. banks, shed light on its structure and show the extent to which U.S. exporters use trade guarantees in the form of letters of credit (LCs) and documentary collections (DCs) to protect their interest when shipping to foreign markets. We also present a model that explains the trade-offs for firms when they choose between different payment contracts, and we demonstrate that the model is fully consistent with the patterns in the data.

Several key results emerge. In 2012, U.S. banks provided LCs and DCs for about 10 percent, or $153 billion, of U.S. exports. The LC business is very concentrated, with the top five banks accounting for more than 92 percent of trade guarantees. Whether exporters use LCs and DCs principally depends on the degree to which contracts are enforced in the destination country and on how far the country is from the United States. Notably, almost 100 percent of U.S. shipments to some destinations are settled with LCs.

Our findings have several implications for ongoing discussions around trade finance. First, high concentration in the provision of trade finance suggests that the pricing and business decisions of the major trade finance banks can influence the export behavior of firms and the extent to which foreign countries import from the United States. Hence, increases in the cost of trade finance that may come from increased due diligence requirements and new rules on capital and leverage have the potential to impact real economic activity not only in the United States but also abroad. The results on the role of distance for the use of trade finance products suggest that the effects would be stronger for long-distance trade.

Second, policymakers have interpreted the low usage of trade finance for shipments to less-developed economies as evidence of a gap in the provision of trade finance by commercial banks. Our theory shows that there are other reasons why LCs may be used little for such destinations, which present a relatively high risk of non-payment by importers. The high risk means that LCs for these countries are expensive, and firms may optimally decide to use cash-in-advance terms instead of an LC.[53]

[53]To the extent that high-risk countries have less developed financial markets and local banks charge higher interest rates, the choice of cash-in-advance may be less feasible (because higher interest rates in the importing country make cash-in-advance terms more costly).

The relative importance of supply and demand factors cannot be disentangled in our data, but it is crucial to distinguish between them for policy interventions. A further exploration of which firms, industries and countries are especially constrained in their access to bank guarantees and other trade finance instruments is a key question for future research.

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A Proofs

Expected profits of good exporters are given by:[54]

$$\begin{aligned}
\mathrm{E}\left[\Pi^{CIA}\right] &= \frac{\eta + (1-\eta)\lambda}{1+r^*}R - K, && \text{(A.1)}\\
\mathrm{E}\left[\Pi^{OA}\right] &= \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r}R - K, && \text{(A.2)}\\
\mathrm{E}\left[\Pi_E^{DC}\right] &= \frac{\Lambda(\phi^{DC})}{1+r}R - F^{DC} - K, && \text{(A.3)}\\
\mathrm{E}\left[\Pi^{LC}\right] &= \frac{1-(m/R)(1+r^*)}{(1+r)[1+(1-\Lambda(\phi^{LC}))]}R - K, && \text{(A.4)}
\end{aligned}$$

with $\Lambda(\phi) = \eta^*(1+\phi) + (1-\eta^*(1+\phi))\lambda^*$.

Proof of proposition 1 **Proof.** It is easy to see that $\frac{\partial \mathrm{E}[\Pi^{CIA}]}{\partial \lambda^*} = 0$ and that $\frac{\partial \mathrm{E}[\Pi^{LC}]}{\partial \lambda^*} > 0$, $\frac{\partial \mathrm{E}[\Pi^{OA}]}{\partial \lambda^*} > 0$, and $\frac{\partial \mathrm{E}[\Pi^{DC}]}{\partial \lambda^*} > 0$. It therefore remains to be shown that $\frac{\partial \mathrm{E}[\Pi^{OA}]}{\partial \lambda^*} > \frac{\partial \mathrm{E}[\Pi^{DC}]}{\partial \lambda^*}$ and that $\frac{\partial \mathrm{E}[\Pi^{DC}]}{\partial \lambda^*} > \frac{\partial \mathrm{E}[\Pi^{LC}]}{\partial \lambda^*}$.

Begin by taking the difference between expected profits under open account and documentary collection:

$$\mathrm{E}\left[\Pi^{OA} - \Pi^{DC}\right] = \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r}R - \frac{\Lambda(\phi^{DC})}{1+r}R - F^{DC}. \quad \text{(A.5)}$$

Taking the derivative with respect to λ^* gives:

$$\frac{\partial \mathrm{E}\left[\Pi^{OA} - \Pi^{DC}\right]}{\partial \lambda^*} = \frac{\eta^* \phi^{DC}}{1+r}R > 0. \quad \text{(A.6)}$$

Next, take the difference between the expected profits from documentary collection and LC:

$$\mathrm{E}\left[\Pi^{DC} - \Pi^{LC}\right] = \frac{\Lambda(\phi^{DC})}{1+r}R - F^{DC} - \frac{1-(m/R)(1+r^*)}{(1+r)[1+(1-\Lambda(\phi^{LC}))]}R. \quad \text{(A.7)}$$

Taking the derivative with respect to λ^* delivers:

$$\frac{\partial(\mathrm{E}\left[\Pi^{DC} - \Pi^{LC}\right])}{\partial \lambda^*} = \frac{1-\eta^*(1+\phi^{DC})}{1+r}R - \frac{1-\eta^*(1+\phi^{LC})}{1+r}R\frac{(1-(m/R)(1+r^*))}{[1+(1-\Lambda(\phi^{LC}))]^2} \quad \text{(A.8)}$$

[54] These are sufficient because under pooling the equilibrium contract only depends on the optimal choice of good exporters. Bad exporters imitate whichever contract is optimally chosen by good firms.

It is easy to see that this term is positive since $\phi^{LC} > \phi^{DC}$ and $\frac{(1-(m/R)(1+r^*))}{[1+(1-\Lambda(\phi^{LC}))]^2} < 1$. ■

Proof of proposition 2 **Proof.** Expected profits over revenues are:

$$\begin{aligned}
\mathrm{E}\left[\Pi^{CIA}\right]/R &= \frac{\eta + (1-\eta)\lambda}{1+r^*} - \gamma, && \text{(A.9)}\\
\mathrm{E}\left[\Pi^{OA}\right]/R &= \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r} - \gamma, && \text{(A.10)}\\
\mathrm{E}\left[\Pi_E^{DC}\right]/R &= \frac{\Lambda(\phi^{DC})}{1+r} - F^{DC}/R - \gamma,\\
\mathrm{E}\left[\Pi^{LC}\right]/R &= \frac{1-(m/R)(1+r^*)}{(1+r)[1+(1-\Lambda(\phi^{LC}))]} - \gamma.
\end{aligned}$$

Now, take the limit of these expressions when $R \to \infty$ for DC and LC:

$$\begin{aligned}
\lim_{R\to\infty} \mathrm{E}\left[\Pi_E^{DC}\right]/R &= \frac{\Lambda(\phi^{DC})}{1+r} - \gamma, && \text{(A.11)}\\
\lim_{R\to\infty} \mathrm{E}\left[\Pi^{LC}\right]/R &= \frac{1}{(1+r)[1+(1-\Lambda(\phi^{LC}))]} - \gamma. && \text{(A.12)}
\end{aligned}$$

Expressions for CIA and OA do not change with R. Note that we can either be in case 1 ($C \in \{OA, DC, LC\}$) or case 2 ($C \in \{CIA, DC, LC\}$). For given parameters $\eta, \eta^*, \lambda, \lambda^*, r, r^*$, either CIA dominates over OA or vice versa, independent of the transaction size R.

Start with case 1, where, for some R, OA, DC or LC are used. Step 1: for R sufficiently large, DC dominates OA. This directly follows from comparing equations (A.10) and (A.11). Step 2: for R sufficiently large, LC dominates DC. For this, we need to compare equations (A.11) and (A.12). The following holds:

$$\lim_{R\to\infty} \left(\mathrm{E}\left[\Pi^{LC}\right]/R - \mathrm{E}\left[\Pi_E^{DC}\right]/R\right) > 0 \Leftrightarrow \Lambda(\phi^{DC})(2-\Lambda(\phi^{LC})) < 1.$$

This can be rewritten as:

$$\lim_{R\to\infty} \left(\mathrm{E}\left[\Pi^{LC}\right]/R - \mathrm{E}\left[\Pi_E^{DC}\right]/R\right) > 0 \Leftrightarrow \Lambda(\phi^{DC})(1-\Lambda(\phi^{LC})) < 1-\Lambda(\phi^{DC}).$$

This always holds because $1-\Lambda(\phi^{LC}) < 1-\Lambda(\phi^{DC})$ and $\Lambda(\phi^{DC}) < 1$. Step 3: for R sufficiently small, OA dominates DC and LC. This is easy to see: for $R \to 0$, $\mathrm{E}\left[\Pi_E^{DC}\right]/R$ and $\mathrm{E}\left[\Pi_E^{LC}\right]/R$ go to $-\infty$. We have shown that for very small values of R, open account dominates the two alternatives and for very large values of R, letter of credit is the best contract type. If DC is used for some R, this has to be the case for intermediate values

of R.

The proof of case 2 is analogous. DC and LC become relatively more profitable the higher R. Hence, for very low values of R, cash-in-advance is chosen. For very high values of R, LC dominates, and at intermediate values, a DC is chosen. ■

B Derivation of the Model

In the following, we derive the optimal contract choice between cash-in-advance, open account, documentary collection and letter of credit. The assumptions on cash-in-advance and open account are as in Schmidt-Eisenlohr (2013). δ, the parameter that captures enforcement costs in the original model, is set to zero. For more details, including an extensive discussion of the underlying assumptions, see Schmidt-Eisenlohr (2013). Documentary collections were not part of the original model and are studied here for the first time.

B.1 Cash-in-advance

There are two possible cases: a pooling case and a separating case. In the following, we first derive the optimal decision under pooling. We then study the separating case and derive the condition that assures pooling.

Pooling case Under pooling, the exporter maximizes her expected profits, respecting the participation constraint of the importer. Expected profits between good and bad exporters differ because bad exporters are only forced to produce with probability λ:

$$\text{Good type: } \max_C \mathrm{E}\left[\Pi_{E,g}^{CIA,p}\right] = C^{CIA,p} - K, \tag{B.1}$$

$$\text{Bad type: } \max_C \mathrm{E}\left[\Pi_{E,b}^{CIA,p}\right] = C^{CIA,p} - \lambda K, \tag{B.2}$$

$$\text{s.t.}$$

$$\mathrm{E}\left[\Pi_I^{CIA,p}\right] = \frac{\eta + (1-\eta)\lambda}{1+r^*} R - C^{CIA,p} \geq 0 \tag{B.3}$$

(participation constraint importer),

$$\mathrm{E}\left[\Pi_{E,g}^{CIA,p}\right] = C^{CIA,p} - K \geq 0 \tag{B.4}$$

(participation constraint good exporter).

The optimal payment $C^{CIA,p}$ and optimal expected profits of a good and bad exporter, respectively, are:

$$C^{CIA,p} = \frac{\eta + (1-\eta)\lambda}{1+r^*}R, \tag{B.5}$$

$$\text{Good type: } \mathrm{E}\left[\Pi_{E,g}^{CIA,p}\right] = \frac{\eta + (1-\eta)\lambda}{1+r^*}R - K, \tag{B.6}$$

$$\text{Bad type: } \mathrm{E}\left[\Pi_{E,b}^{CIA,p}\right] = \frac{\eta + (1-\eta)\lambda}{1+r^*}R - \lambda K. \tag{B.7}$$

Separating First, note that if a good exporter chooses cash-in-advance, a bad exporter always chooses it as well and imitates the good type. This is strictly preferable to revealing her type as a higher pre-payment is received at no additional cost. If, however, good firms do not choose cash-in-advance, a bad firm might want to deviate and choose this contract. This case is considered in the following.

Suppose a good exporter does not choose cash-in-advance. Given the ability to default on the contract, a bad firm might still consider it optimal to offer a cash-in-advance contract, even though this implies revelation of her type. In this case, the importer understands that she deals with a bad firm and adjusts her expected revenue downwards. Her participation constraint becomes:

$$\mathrm{E}\left[\Pi_{I}^{CIA,s}\right] = \frac{\lambda}{1+r^*}R - C^{CIA,s} \geq 0. \tag{B.8}$$

The pre-payment that makes the participation constraint of the importer bind is:

$$C^{CIA,s} = \frac{\lambda}{1+r^*}R. \tag{B.9}$$

The expected profit of a bad exporter in the separating case with CIA is thus:

$$\mathrm{E}\left[\Pi_{E,b}^{CIA,s}\right] = \frac{\lambda}{1+r^*}R - \lambda K. \tag{B.10}$$

A sufficient condition for the bad exporter not to choose cash-in-advance is that her expected profits in the separating case are less than the expected profits of a good firm in the pooling case. That is if:

$$\mathrm{E}\left[\Pi_{E,g}^{CIA,p}\right] > \mathrm{E}\left[\Pi_{E,b}^{CIA,s}\right]. \tag{B.11}$$

Substituting the expected profits into the inequality above and rearranging delivers the condition from the main text:

$$\frac{R}{K} > \frac{1+r^*}{\eta}. \tag{B.12}$$

B.2 Open account

Now, the exporter can choose between a pooling and a separating strategy. Pooling refers to the case where good and bad importers accept the proposed contract. In the separating case, only bad importers agree to buy the goods at the offered price. In the following, both cases are analyzed and then the pooling condition is derived.

Pooling case

$$\begin{aligned} \max_C \mathrm{E}\left[\Pi_E^{OA}\right] &= \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r} C^{OA} - K, && \text{(B.13)} \\ \text{s.t.} & \\ \mathrm{E}\left[\Pi_{I,g}^{OA}\right] &= R - C^{OA} \geq 0 && \text{(B.14)} \\ & \text{(participation constraint good importer).} \end{aligned}$$

It is optimal for the exporter to choose C^{OA} such that the participation constraint of the good importer binds. This implies:

$$\begin{aligned} C^{OA} &= R, && \text{(B.15)} \\ \mathrm{E}\left[\Pi_E^{OA}\right] &= \frac{\eta^* + (1-\eta^*)\lambda^*}{1+r} R - K. && \text{(B.16)} \end{aligned}$$

Separating The separating case implies the following participation constraint for a bad importer:

$$\mathrm{E}\left[\Pi_{I,b}^{OA,s}\right] = \frac{R - \lambda^* C^{OA,s}}{1+r^*} \geq 0. \tag{B.17}$$

A binding participation constraint of a bad importer implies:

$$C^{OA,s} = \frac{R}{\lambda^*}. \tag{B.18}$$

The prepayment C^{OA} exactly offsets the risk of non-payment by the importer. In expectation, the importer thus pays R to the exporter. Expected profits of the exporter are, however, reduced as good importers reject the contract and only bad importers (share $1-\eta^*$) accept it. Thus expected profits are:

$$\mathrm{E}\left[\Pi_E^{OA,s}\right] = (1-\eta^*)\left(\frac{1}{1+r}R - K\right). \tag{B.19}$$

Comparing profits, an exporter strictly prefers a pooling contract if:

$$\frac{R}{K} > \frac{\eta^*(1+r)}{\eta^* - (1-\eta^*)(1-\lambda^*)}. \tag{B.20}$$

B.3 Documentary collection

A documentary collection reduces but does not eliminate the risk that the importer does not pay. To capture this aspect in the model, we assume that with a documentary collection, the share of firms that try to cheat decreases by a factor $\phi^{DC} \in \left(0, \frac{1-\eta^*}{\eta^*}\right)$. The probability of payment therefore increases to $\eta^*(1+\phi^{DC}) + (1-\eta^*(1+\phi^{DC}))\lambda^*$. A documentary collection, however, comes at a cost F^{DC}. Similar to open account, we have to distinguish between a pooling and a separating case.

Pooling case The pooling case in the documentary collection is very similar to open account. The only difference is a higher probability of payment and the additional fixed cost:

$$C^{DC} = R, \tag{B.21}$$

$$\mathrm{E}\left[\Pi_E^{DC}\right] = \frac{\Lambda(\phi^{DC})}{1+r}R - F^{DC} - K, \tag{B.22}$$

with $\Lambda(\phi) = \eta^*(1+\phi) + (1-\eta^*(1+\phi))\lambda^*$.

Separating case The separating case does only change compared to open account in that fewer firms are trying to deviate.

$$\mathrm{E}\left[\Pi_{I,b}^{DC,s}\right] = \frac{R - \lambda^* C^{DC,s}}{1+r^*} \geq 0. \tag{B.23}$$

A binding participation constraint of a bad importer implies:

$$C^{DC,s} = \frac{R}{\lambda^*}. \tag{B.24}$$

As before, the prepayment C^{DC} exactly offsets the risk of non-payment by the importer. In expectation the importer thus pays R to the exporter. Expected profits of the exporter are reduced because good importers and bad importers that do not cheat under a documentary collection reject the contract, and only the remaining bad importers (share $1-\eta^*(1+\phi^{DC})$) accept it. Expected profits are:

$$\mathrm{E}\left[\Pi_E^{DC,s}\right] = (1-\eta^*(1+\phi^{DC}))\left(\frac{1}{1+r}R - F^{DC} - K\right). \tag{B.25}$$

Comparing profits, an exporter strictly prefers a pooling contract if:

$$\frac{R}{K+F^{DC}} > \frac{\eta^*(1+\phi^{DC})(1+r)}{\eta^*(1+\phi^{DC}) - (1-\eta^*(1+\phi^{DC}))(1-\lambda^*)}. \tag{B.26}$$

B.4 Letter of credit

With a letter of credit, the payment is guaranteed by the issuing bank. The exporter therefore gets paid with certainty if she delivers the goods. Again, we need to distinguish between a pooling and a separating case.

Pooling case The maximization problem is:

$$\max_C \mathrm{E}\left[\Pi_E^{LC}\right] = \frac{C^{LC}}{1+r} - K, \tag{B.27}$$

$$\text{s.t. } \mathrm{E}\left[\Pi_{I,g}^{LC}\right] = \frac{R-C^{LC}}{1+r^*} - F^{LC} \geq 0 \quad \text{(participation constraint importer)}. \tag{B.28}$$

In the optimum, the participation constraint of the good importer binds. The optimal payment and expected profits are:

$$C^{LC} = R - F^{LC}(1+r^*). \tag{B.29}$$

Plugging in the the expression for F^{LC} from the main text in equation (5) delivers:

$$C^{LC} = R - m(1+r^*) + (1-\Lambda(\phi^{LC}))C^{LC} = \frac{1-(m/R)(1+r^*)}{2-\Lambda(\phi^{LC}))}R. \tag{B.30}$$

This implies the following exporter profits:

$$\Pi^{LC} = \frac{1-(m/R)(1+r^*)}{(1+r)[2-\Lambda(\phi^{LC}))]}R - K. \tag{B.31}$$

Separating case The exporter chooses $C^{LC,s}$ that makes the participation constraint of a bad importer bind:

$$\mathrm{E}\left[\Pi_{I,b}^{LC,s}\right] = \frac{R-\lambda^* C^{LC,s}}{1+r^*} - F^{LC} \geq 0. \tag{B.32}$$

Plugging in F^{LC}, we get:

$$C^{LC,s} = \frac{R-(1+r^*)m}{\lambda^*+1-\Lambda(\phi^{LC})}. \tag{B.33}$$

The prepayment C^{LC} depends on the probability that the importer does not pay and the letter of credit fee m. The exporter's expected profits are reduced as good importers and bad importers that do not cheat under a letter of credit reject the contract and only the remaining bad importers (share $1-\eta^*(1+\phi^{LC})$) accept it. Expected profits are:

$$\mathrm{E}\left[\Pi_{E}^{LC,s}\right] = (1-\eta^*(1+\phi^{LC}))\left(\frac{(1-(m/R)(1+r^*))}{(1+r)[\lambda^*+(1-\Lambda(\phi^{LC}))]}R - K\right). \tag{B.34}$$

Comparing profits, an exporter strictly prefers a pooling contract if:

$$\frac{R}{K} > \frac{\eta^*(1+\phi^{LC})(1+r)(1+\kappa_2)(\lambda^*+\kappa_2))}{(1-\kappa_1)[(\lambda^*+\kappa_2)-(1-\eta^*(1+\phi^{LC}))(1+\kappa_2)]}, \tag{B.35}$$

with $\kappa_1 = \frac{m}{R}(1+r^*)$ (fixed monitoring component of letter of credit fee) and $\kappa_2 = 1-\Lambda(\phi^{LC})$ (risk component of letter of credit fee).

Discussion: pooling and separating cases: In the main text of the paper, we follow Schmidt-Eisenlohr (2013) and focus on the pooling cases for all contracts. This is reasonable for two reasons. First, the pooling case dominates for relatively weak conditions on the ratio R/K. As long as revenues over production costs are sufficiently large, it is optimal to offer contracts also acceptable by good type firms.

Second and more importantly, the pooling case is intuitively the economically relevant one. In the pooling case, the agreed payment is lower or equal than the final sales price, that is, $C \leq R$. Also, the price is not so high to generate adverse selection and leave only

bad firms in the market. In the separating case, the exporter demands a payment that exceeds the final sales value of the goods R because she knows with certainty that she is dealing with a bad counter-party. This generates adverse selection and only bad trading partners are left.

Except for a few extreme countries in which the rule of law is extremely weak and the fraction of good firms is very low, we should not expect to observe this pattern. Hence, we concentrate on the pooling cases and assume that the relevant conditions are satisfied. This is the case if there are sufficiently many good firms reflected in high η, η^*, and if the profit opportunities R/K in international trade are sufficiently large.

C Data Appendix

Data sources

- FFIEC 009 data: Statistics Group, Federal Reserve Bank of New York.
- SWIFT MT400 and MT700 message: SWIFT Institute.
- Trade data: Quarterly trade data is from the IMF's Directions of Trade Statistics; yearly data is obtained by summing over 4 quarters.
- Rule of law: World Government Indicators from the World Bank normalized as follows: $law_{new} = \frac{law_{old} - \min(law_{old})}{\max(law_{old}) - \min(law_{old})}$.
- Nominal GDP per capita: Annual numbers are from the World Bank's World Development Indicators.
- Time to import and investor protection index: Doing Business Indicators from the World Bank.
- Distance and other gravity variables: CEPII. For a description, see Mayer and Zignago (2005).
- EIU country risk: Quarterly index that combines banking, sovereign and currency risk, provided by the Economist Intelligence Unit, downloaded from Thomson Reuters Datastream.
- Financial development: proxied by private credit by deposit money banks over GDP from Financial Structure Database provided by the World Bank. For a description, see Beck et al. (2009).

Offshore Centers (excluded)

Netherlands Antilles, United Arab Emirates, Bahrain, Bahamas, Belize, Bermuda, Barbados, Cayman Islands, Cyprus, Grenada, Hong Kong, Oman, Ireland, Jordan, Lebanon, Macao, Monaco, Maldives, Malta, Mauritius, Seychelles, Taiwan, Vanuatu, Samoa

D Tables

Table 1: Different forms of trade finance and corresponding trade transactions that could be captured in the FFIEC009 claims data

	U.S. exports	U.S. imports	Third party trade
Pre-export financing	-	X	X
Pre-import financing (affiliate)	X	-	X
LC issuance (affiliate)	X	-	X
LC confirmation	X	-	X
forfeiting/ factoring	X	-	X

Note: - indicates that this combination of instrument and underlying transaction cannot be captured in the data by definition. X means that it could be included in the data.

Table 2: Exploring the claims data

	(1) $\log(\text{claims}_{ct})$	(2) $\log(\text{claims}_{ct})$	(3) $\log(\text{claims}_{ct})$	(4) $\log(\text{claims}_{ct})$	(5) $\log(\text{claims}_{ct})$	(6) $\log(\text{claims}_{ct})$	(7) $\log(\text{claims}_{ct})$	(8) $\log(\text{claims}_{ct})$	(9) $\log(\text{claims}_{ct})$
$\log(\text{exports}_{ct})$	0.861***	0.851***	0.245***	0.482***	0.411***	0.320***	0.278**	0.273**	0.381
	(0.0886)	(0.0903)	(0.0595)	(0.0473)	(0.0506)	(0.106)	(0.116)	(0.117)	(0.231)
$\log(\text{imports}_{ct})$	-0.0274	-0.0310	0.0193						
	(0.0712)	(0.0741)	(0.0438)						
$\log(\text{non-U.S. exports}_{ct})$	0.0672	0.0405	-0.0339						
	(0.140)	(0.142)	(0.119)						
$\log(\text{non-U.S. imports}_{ct})$	-0.112	-0.0538	0.173						
	(0.155)	(0.163)	(0.172)						
$\log(\text{GDP per cap}_{ct})$	-0.224**	-0.217**	0.931***						
	(0.0891)	(0.0902)	(0.232)						
$\log(\#\ \text{LC}_{ct})$				0.591***	0.636***	0.283***			
				(0.0521)	(0.0558)	(0.0823)			
$\log(\#\ \text{DC}_{ct})$				-0.0875*	-0.0569	0.0187			
				(0.0453)	(0.0453)	(0.0559)			
$\log(\text{value LC}_{ct})$							0.596***	0.600***	0.0426
							(0.0842)	(0.0839)	(0.0488)
$\log(\text{value DC}_{ct})$							-0.0402	-0.0432	0.0382
							(0.0628)	(0.0634)	(0.0533)
Time FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Country FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	6,599	6,599	6,599	3,383	3,383	3,383	555	555	555
R-squared	0.550	0.559	0.833	0.678	0.699	0.870	0.639	0.647	0.936

Note: This table analyzes the relationship between trade finance claims from the FFIEC 009 reports and the number and values of LC and DC messages from the SWIFT Institute. The dependent variable is the log of the sum of the trade finance claims of all U.S. banks by quarter and destination country. $\log(\text{value LC}_{ct})$ and $\log(\text{value DC}_{ct})$ are the logs of the sums of the values of all MT700 messages (LC issuance) and MT400 (DC issuance), respectively, with the U.S. as counter-party by quarter and issuing country. $\log(\#\ \text{LC}_{ct})$ and $\log(\#\ \text{DC}_{ct})$ are the log of the number of MT700 and MT400 messages received by U.S. banks, respectively. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 3: Tradeoffs between different payment forms

	OA		CIA		DC		LC	
	risk	financial costs	risk	financial costs	risk	financial costs	risk	financial costs
exporter	++	+	-	-	+	++	-	+
importer	-	-	++	+	-	-	-	+

Note: The table illustrates the differences between the four payment contracts in terms of risk allocation and financing costs. The notation has the following interpretation. Risk: ++ all risk, + some risk, - no risk. Financial costs: ++ interest expenses and fees, + interest expenses or fees, - zero costs.

Table 4: Letters of credit, documentary collections and rule of law

	(1) $\log(\text{claims}_{ct})$	(2) $\log(\text{claims}_{ct})$	(3) $\log(\text{claims}_{ct})$	(4) $\log(\#\ \text{LC}_{ct})$	(5) $\log(\#\ \text{DC}_{ct})$	(6) $\log(\#\ \text{SWIFT}_{mct})$	(7) $\log(\#\ \text{SWIFT}_{mct})$
$\log(\text{exports}_{ct})$	1.022***	1.025***	1.039***	0.896***	0.896***	0.877***	0.877***
	(0.0439)	(0.0441)	(0.0533)	(0.0609)	(0.0581)	(0.0433)	(0.0432)
$\log(\text{distance}_{c})$	0.651***	0.550***	0.414**	0.710***	1.314***	0.943***	0.941***
	(0.184)	(0.173)	(0.186)	(0.171)	(0.366)	(0.178)	(0.178)
rule of law_{ct}	-2.291***	5.039**	6.967***	7.361***	12.49***	5.419***	5.076**
	(0.441)	(2.065)	(2.284)	(2.740)	(3.598)	(1.690)	(2.151)
rule of law^2_{ct}		-6.153***	-7.667***	-7.304***	-5.961**	-5.613***	-5.296***
		(1.700)	(2.072)	(2.101)	(2.696)	(1.289)	(1.718)
DC message dummy_{mct}						-3.455***	-3.660***
						(0.433)	(1.027)
rule of law_{ct} * DC dummy_{mct}						5.055***	5.949
						(0.658)	(3.698)
rule of law^2_{ct} * DC dummy_{mct}							-0.787
							(2.946)
$\log(\text{GDP per cap}_{ct})$			-0.745	-1.291	1.075	-0.434	-0.429
			(0.792)	(0.780)	(0.963)	(0.536)	(0.539)
$\log(\text{GDP per cap}_{ct})^2$			0.0425	0.0556	-0.0738	0.00857	0.00819
			(0.0520)	(0.0481)	(0.0589)	(0.0332)	(0.0333)
$\log(\text{fin. development}_{ct})$			0.00373	0.588***	0.0609	0.422***	0.423***
			(0.141)	(0.174)	(0.215)	(0.146)	(0.146)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,425	1,425	1,257	1,159	838	2,015	2,015
R-squared	0.677	0.695	0.697	0.685	0.726	0.691	0.691

Note: This table analyzes the relationship between the use of letters of credit and documentary collections and a destination's rule of law. $\log(\text{claims}_{ct})$ is the log of the sum of the trade finance claims of all U.S. banks by year and destination country. $\log(\#\ \text{LC}_{ct})$ and $\log(\#\ \text{DC}_{ct})$ are the logs of the number of MT700 and MT400 messages received by U.S. banks, respectively. $\log(\#\ \text{SWIFT}_{mct})$ is the log of the number of SWIFT messages of type $m \in \{LC, DC\}$. Rule of law is from the World Bank's World Development indicators and mapped onto the interval $[0, 1]$. Financial development is proxied by private credit over GDP from the World Bank's Financial Structure Database. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 5: Share of letters of credit in bank intermediated trade

	(1)	(2)	(3)
	LC share$_{ct}$	LC share$_{ct}$	LC share$_{ct}$
rule of law$_{ct}$	-0.848***	-0.602***	-0.260
	(0.0886)	(0.214)	(0.639)
log(exports$_{ct}$)		-0.00150	-0.000749
		(0.0110)	(0.0111)
log(distance$_{c}$)		-0.0278	-0.0332
		(0.0470)	(0.0468)
log(GDP per cap$_{ct}$)		0.0205	-0.0267
		(0.139)	(0.166)
log(fin. development$_{ct}$)		0.00470	0.00555
		(0.0323)	(0.0323)
log(GDP per cap$_{ct}$)^2		-0.00386	-0.000947
		(0.00909)	(0.0108)
rule of law$^2_{ct}$			-0.299
			(0.550)
Time FE	No	Yes	Yes
Observations	933	933	933
R-squared	0.375	0.391	0.392

Note: This table shows how the importance of letters of credit relative to documentary collections changes with a destination's rule of law. The dependent variable is the share of letter of credit messages (MT700) in total trade finance messages sent (MT700+MT400). Rule of law is from the World Bank's World Development indicators and mapped onto the interval $[0, 1]$. Financial development is proxied by private credit over GDP from the World Bank's Financial Structure Database. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 6: The effect of time to import and distance on payment contract choice

	(1) $\log(\text{claims}_{ct})$	(2) $\log(\text{claims}_{ct})$	(3) $\log(\#\ \text{LC}_{ct})$	(4) $\log(\#\ \text{DC}_{ct})$
$\log(\text{exports}_{ct})$	1.098***	1.106***	0.901***	0.883***
	(0.0607)	(0.0630)	(0.0643)	(0.0635)
$\log(\text{distance}_{c})$	0.748***	0.697***	0.703***	1.403***
	(0.199)	(0.217)	(0.182)	(0.385)
rule of law_{ct}	7.039***	8.132***	8.034***	9.636**
	(2.688)	(2.772)	(3.002)	(4.534)
$\text{rule of law}^2_{ct}$	-6.504***	-8.147***	-7.962***	-4.781
	(2.092)	(2.433)	(2.285)	(3.467)
$\text{time to import}_{ct}$	0.508**	0.416	-0.308	-0.313
	(0.240)	(0.254)	(0.311)	(0.293)
$\log(\text{GDP per cap}_{ct})$	-0.0488	-1.329	-1.814*	0.572
	(0.124)	(1.133)	(0.944)	(1.192)
$\log(\text{GDP per cap}_{ct})^2$		0.0790	0.0823	-0.0426
		(0.0709)	(0.0577)	(0.0715)
$\log(\text{fin. development}_{ct})$		0.0417	0.439**	0.140
		(0.176)	(0.192)	(0.248)
Time FE	Yes	Yes	Yes	Yes
Observations	664	636	767	551
R-squared	0.700	0.704	0.677	0.705

Note: This table analyzes the role of time to trade and distance on the payment contract choice. $\log(\text{claims}_{ct})$ is the log of the sum of the trade finance claims of all U.S. banks by year and destination country. $\log(\#\ \text{LC}_{ct})$ and $\log(\#\ \text{DC}_{ct})$ are the logs of the number of MT700 and MT400 messages received by U.S. banks, respectively. Rule of law is from the World Bank's World Development indicators and mapped onto the interval $[0, 1]$. Financial development is proxied by private credit over GDP from the World Bank's Financial Structure Database. $\text{time to import}_{ct}$ is from the World Bank's Doing Business Indicators. It measures the average time it takes to clear customs and to complete all other requirements necessary for imports to enter a destination country. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 7: Distance and risk

	(1) log(claims$_{ct}$)	(2) log(claims$_{ct}$)	(3) log(claims$_{ct}$)	(4) log(# LC$_{ct}$)	(5) log(# LC$_{ct}$)	(6) log(# LC$_{ct}$)	(7) log(# DC$_{ct}$)	(8) log(# DC$_{ct}$)	(9) log(# DC$_{ct}$)
log(exports$_{ct}$)	1.012***	1.034***	1.011***	0.959***	0.756***	0.920***	0.870***	1.013***	0.904***
	(0.0643)	(0.0747)	(0.0503)	(0.0857)	(0.0606)	(0.0614)	(0.0678)	(0.105)	(0.0586)
log(distance$_c$)	-0.662	0.624**	0.361	2.029***	0.213	0.818***	0.470	1.327	0.992
	(0.649)	(0.257)	(0.282)	(0.647)	(0.223)	(0.213)	(0.757)	(0.842)	(0.624)
long dist. dummy$_c$			-1.882			-3.777***			0.194
			(1.157)			(1.243)			(2.373)
rule of law$_{ct}$	10.89***	1.229	1.795	13.95***	-1.574	0.567	14.04***	15.27***	14.00***
	(3.344)	(2.475)	(2.394)	(2.993)	(2.487)	(3.202)	(5.008)	(5.128)	(5.091)
rule of law$^2{}_{ct}$	-10.92***	-3.094	-3.176*	-9.714***	-1.237	-0.637	-8.427**	-6.872*	-7.446**
	(2.998)	(1.927)	(1.847)	(2.576)	(2.126)	(2.475)	(3.907)	(3.733)	(3.643)
dummy$_c$ * rule of law$_{ct}$			9.275**			12.80***			0.898
			(4.139)			(4.190)			(7.194)
dummy$_c$ * rule of law$^2{}_{ct}$			-8.600**			-9.298***			-1.283
			(3.518)			(3.339)			(5.407)
log(GDP per cap$_{ct}$)	-0.112	0.0481	-0.0230	-0.636***	0.280*	-0.421***	0.0413	-0.567*	-0.0727
	(0.140)	(0.148)	(0.107)	(0.159)	(0.153)	(0.135)	(0.172)	(0.325)	(0.158)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	652	649	1,301	650	555	1,205	426	428	854
R-squared	0.709	0.711	0.703	0.695	0.747	0.682	0.779	0.673	0.723

Note: This table analyses how the relationship between trade finance and destination country risk changes with distance. log (claims$_{ct}$) is the log of the sum of the trade finance claims of all U.S. banks by year and destination country. log (# LC$_{ct}$) and log (# DC$_{ct}$) are the logs of the number of MT700 and MT400 messages received by U.S. banks, respectively. Rule of law is from the World Bank's World Development indicators and mapped onto the interval $[0, 1]$. long dist. dummy$_c$ (short: dummy$_c$) is equal to one if country c is further away from the U.S. than the median country. It is equal to zero otherwise. Columns (1), (4) and (7) are run only on countries with above median distance to the U.S. Columns (2), (5) and (8) are run only on countries with below median distance to the U.S. Columns (3), (6) and (9) show results for pooled regressions where interaction terms between $dummy_c$ and rule of law$_{ct}$ and rule of law$^2_{ct}$ are added. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 8: Transaction size and choice of payment contract

	(1) all cntrs	(2) large cntrs
LC > DC	0.9286	0.9762
LC > TR	0.9524	1.0000
DC > TR	0.7857	0.9048
N	84	42

Note: This table reports the share of countries in which average transaction sizes are ordered as predicted by the theory. The first column reports the shares based on all 84 countries for which data on the numbers and values of letters of credit (LCs), documentary collections (LCs) and overall exports (TR) are available. The second column reports the statistics for those countries with above median exports. The first row reports which share of countries has an average LC value that is higher than the average DC value. Rows 2 and 3 compare LC and DC average values with overall exports, respectively.

Table 9: Robustness checks I: alternative measures of risk and contract enforcement

	(1)	(2)	(3)	(4)	(5)	(6)
	$\log(\text{claims}_{ct})$	$\log(\#\ \text{LC}_{ct})$	$\log(\#\ \text{DC}_{ct})$	$\log(\text{claims}_{ct})$	$\log(\#\ \text{LC}_{ct})$	$\log(\#\ \text{DC}_{ct})$
$\log(\text{exports}_{ct})$	1.105***	0.920***	0.849***	1.022***	1.012***	0.781***
	(0.0589)	(0.0619)	(0.0651)	(0.0683)	(0.0723)	(0.0919)
$\log(\text{distance}_{c})$	0.834***	0.774***	1.324**	0.184	0.828***	2.002***
	(0.211)	(0.170)	(0.529)	(0.265)	(0.263)	(0.391)
inv. protection_{ct}	0.741**	0.629**	0.142			
	(0.315)	(0.301)	(0.138)			
inv. protection^2_{ct}	-0.0754***	-0.0545**				
	(0.0282)	(0.0248)				
risk_{ct}				0.116**	0.0619	-0.0394*
				(0.0554)	(0.0561)	(0.0206)
risk^2_{ct}				-0.00128**	-0.000940*	
				(0.000519)	(0.000556)	
$\log(\text{GDP per cap}_{ct})$	-0.282***	-0.384***	0.440***	-0.326**	-0.585***	0.293
	(0.0855)	(0.0952)	(0.106)	(0.162)	(0.177)	(0.179)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	664	799	567	910	736	615
R-squared	0.683	0.640	0.655	0.624	0.676	0.596

Note: This table reports robustness checks on the relationship between the use of trade finance and a destination's rule of law. $\log(\text{claims}_{ct})$ is the log of the sum of the trade finance claims of all U.S. banks by year and destination country. $\log(\#\ \text{LC}_{ct})$ and $\log(\#\ \text{DC}_{ct})$ are the logs of the number of MT700 and MT400 messages received by U.S. banks, respectively. In columns (1)-(3), the measure investor protection from the World Bank Doing Business Indicators proxies contract enforcement. In columns (4)-(6), the total risk measure from the Economist Intelligence Unit (EIU) is used instead. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 10: Robustness checks II: ratios, additional controls and cross-section

	(1) tfovexp	(2) trafLCcard	(3) trafDCcard	(4) log(claims$_{ct}$)	(5) log(# LC$_{ct}$)	(6) log(# DC$_{ct}$)	(7) log(claims$_{ct}$)	(8) log(# LC$_{ct}$)	(9) log(# DC$_{ct}$)
log(exports$_{ct}$)				1.064***	0.920***	0.839***	1.052***	0.867***	0.777***
				(0.0577)	(0.0642)	(0.0652)	(0.0791)	(0.0732)	(0.0822)
log(distance$_{c}$)	0.130***	0.0149**	0.00591	0.321	0.511**	1.571***	0.687***	0.552**	0.842**
	(0.0438)	(0.00749)	(0.00359)	(0.196)	(0.209)	(0.325)	(0.246)	(0.220)	(0.392)
rule of law$_{ct}$	1.468**	0.353*	0.0944**	7.529***	7.253***	11.73***	9.247**	11.24***	15.50***
	(0.642)	(0.187)	(0.0418)	(2.323)	(2.695)	(3.494)	(4.065)	(3.726)	(5.511)
rule of law$^2_{ct}$	-1.077**	-0.317*	-0.0505**	-8.018***	-7.425***	-5.447**	-9.952***	-10.82***	-7.823**
	(0.536)	(0.172)	(0.0247)	(2.047)	(2.075)	(2.699)	(3.352)	(2.805)	(3.833)
log(time to import$_{ct}$)	0.138**	0.00501	0.00107						
	(0.0609)	(0.0102)	(0.00276)						
log(GDP per cap$_{ct}$)	-0.128	-0.236*	0.0154	-0.862	-1.459*	1.306	-0.845	-1.772	0.829
	(0.290)	(0.128)	(0.0162)	(0.801)	(0.810)	(0.948)	(1.277)	(1.185)	(1.196)
log(GDP per cap$_{ct}$)^2	0.00642	0.0127*	-0.00108	0.0481	0.0683	-0.0862	0.0439	0.0898	-0.0615
	(0.0177)	(0.00731)	(0.00105)	(0.0521)	(0.0506)	(0.0583)	(0.0797)	(0.0701)	(0.0729)
log(fin. development$_{ct}$)	-0.0211	0.0177	0.000313	-0.0338	0.548***	0.110	0.0708	0.564**	0.190
	(0.0482)	(0.0111)	(0.00267)	(0.140)	(0.174)	(0.219)	(0.257)	(0.231)	(0.252)
comm. legal origin$_{c}$				-0.110	0.469*	-0.125			
				(0.208)	(0.248)	(0.264)			
contig				-1.140***	-1.295***	1.985			
				(0.388)	(0.411)	(1.424)			
common colonizer$_{ct}$				0.0767	-0.331	0.899*			
				(0.334)	(0.352)	(0.461)			
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	636	773	557	1,256	1,159	838	107	131	100
R-squared	0.167	0.203	0.095	0.701	0.694	0.735	0.693	0.654	0.733

Note: This table reports additional robustness checks. In columns (1)-(3), the trade finance measures are normalized by total exports (column (1)) or the number of export transactions (columns (2) and (3)). Columns (4)-(6) report results when dummies for a common legal origin, contiguity and a common colonizer are added as controls. Columns (7)-(9) show regressions based on a single cross section from 2006. Rule of law is from the World Bank's World Development indicators and mapped onto the interval $[0, 1]$. Financial development is proxied by private credit over GDP from the World Bank's Financial Structure Database. time to import$_{ct}$ is from the World Bank's Doing Business Indicators. It measures the average time it takes to clear customs and to complete all other requirements necessary for imports to enter a destination country. Standard errors are clustered at the country level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

E Figures

Figure 1: How a letter of credit works

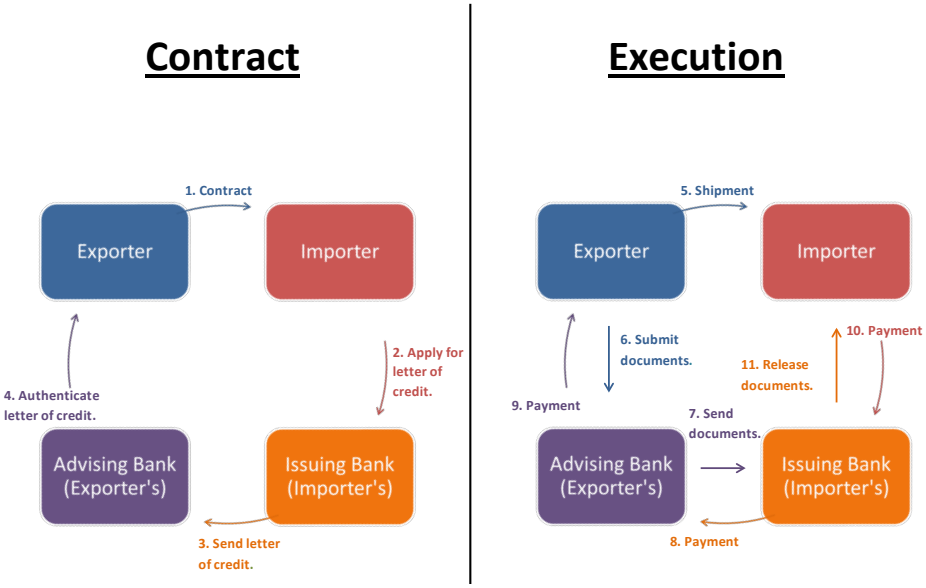


Figure 2: How a documentary collection works

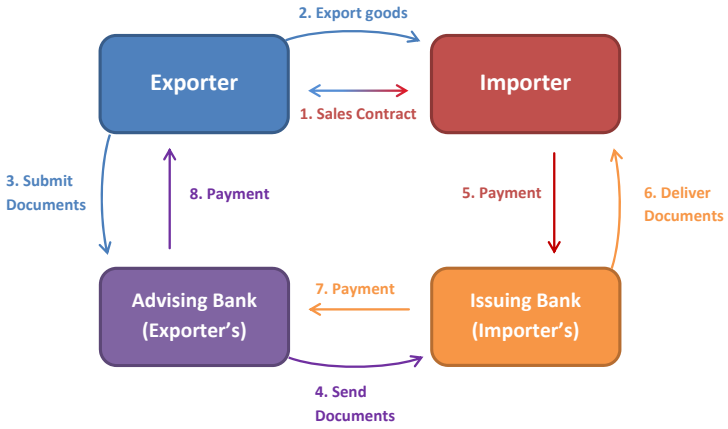
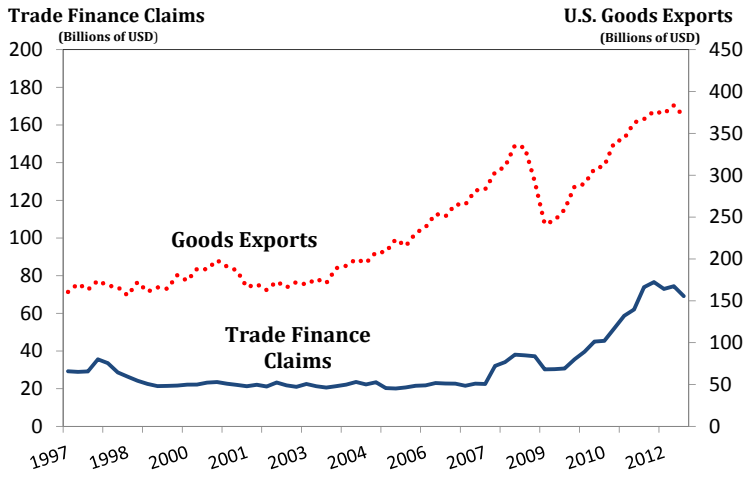
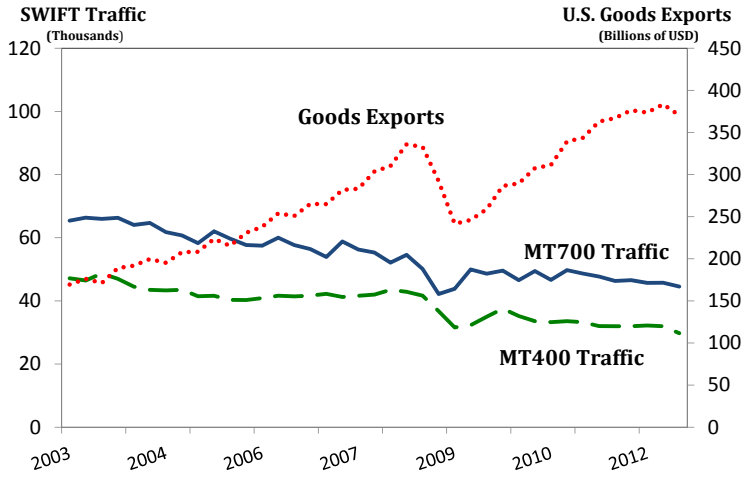


Figure 3: Evolution of bank's trade finance claims over time



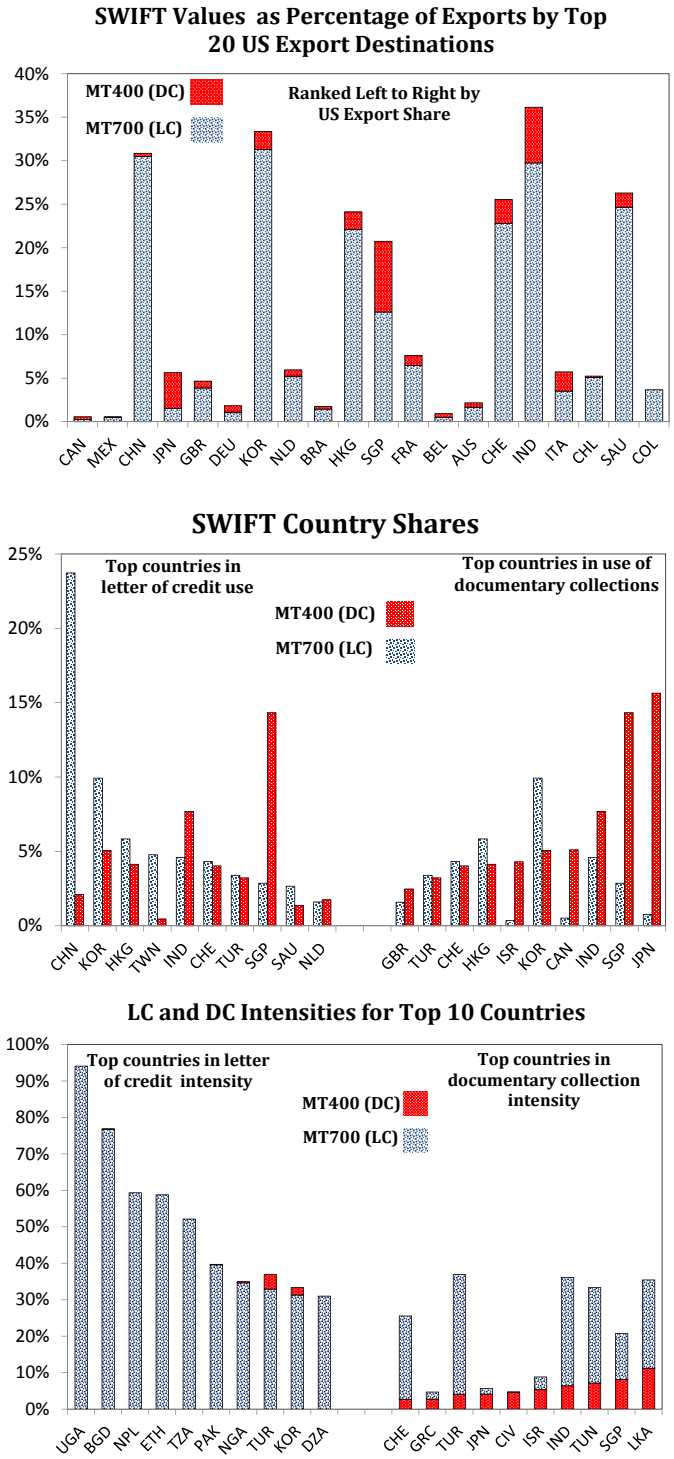
Note: The solid line in the graph shows the evolution of total trade finance claims from 1997 to 2012 (left y-axis). The dotted line depicts total U.S. exports in goods (right y-axis). Data sources: FFIEC 009 Reports, IMF Directions of Trade Statistics.

Figure 4: Evolution of SWIFT messages over time



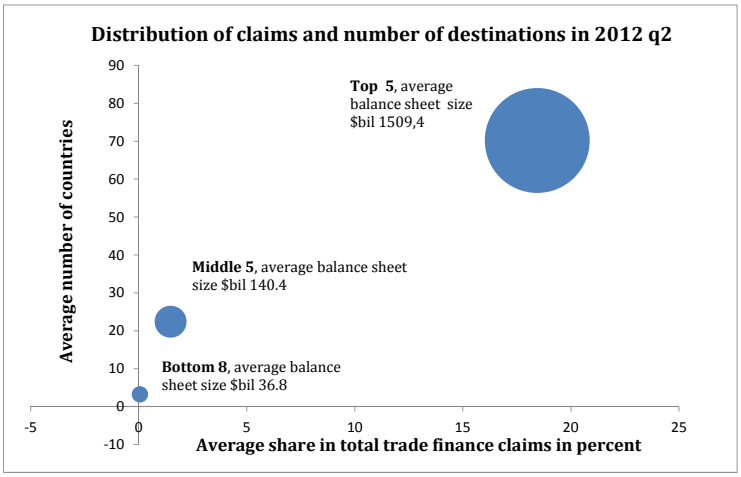
Note: The solid line in the graph shows the number of LC (MT700) messages and the dashed line the number of DC (MT400) messages sent to U.S. banks from 2003 to 2012 (left y-axis). The dotted line depicts total U.S. exports in goods (right y-axis). Data sources: SWIFT Institute, IMF Directions of Trade Statistics.

Figure 5: Geographical distribution of SWIFT messages



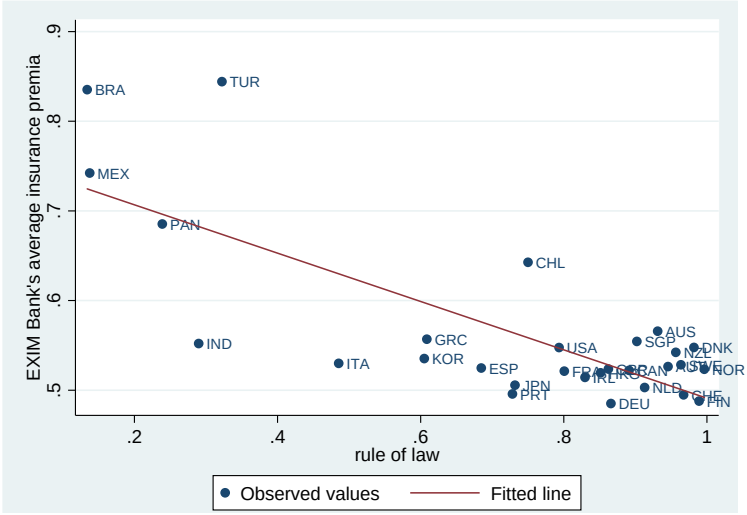
Note: The top chart shows the top 20 U.S. export destinations ranked from the left to the right together with each destination's ratio of LC and DC messages to U.S. exports over the period from 2010 q4 to 2012 q2. The chart in the middle displays the top ten countries in terms of total LC message values (on the right) and DC message values (on the left). The bottom chart shows the countries with highest LC intensity (on the left) and DC intensity (on the right) defined as the value of messages divided by total U.S. exports to that country. Data sources: FFIEC 009 Reports, SWIFT Institute, IMF Directions of Trade Statistics.

Figure 6: Concentration in banks' trade finance claims



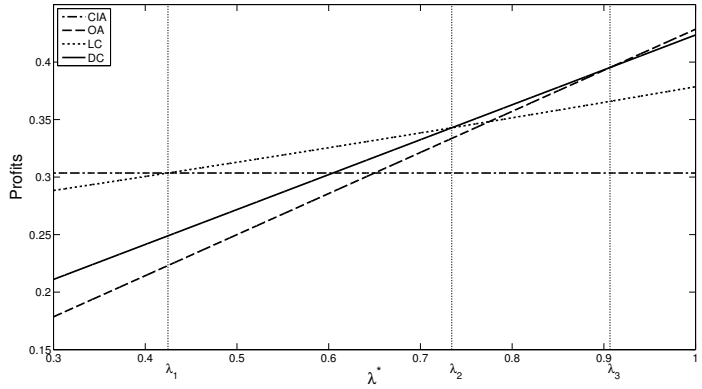
Note: This chart shows the average number of countries in which U.S. banks are active, and the average balance sheet size of three different groups of banks: the top five banks, the middle five and the bottom eight banks in terms of their trade finance claims in the second quarter of 2012. Data sources: FFIEC 009 Reports, FFIEC 031 and Y-9C Reports.

Figure 7: Relationship between a country's insurance premium and country risk



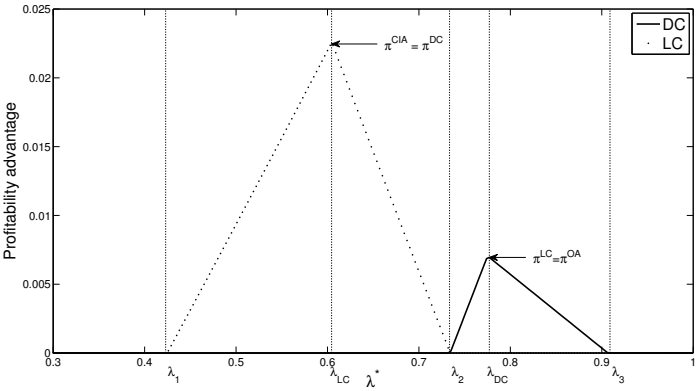
Note: The graph shows the average insurance premium charged by the U.S. Export-Import Bank for export transactions in the year 2004 plotted against a measure of the rule of law in the importing country form the World Bank's World Government Indicators. Sources: ExIm Bank, World Government Indicators.

Figure 8: Profits as a function of contract enforcement in the destination country



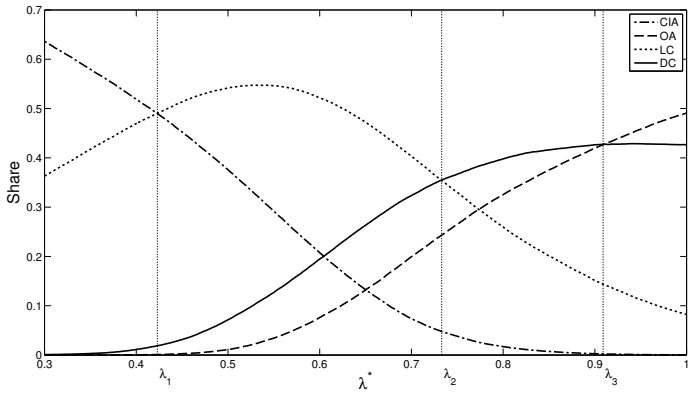
Note: The graph plots the expected exporter profits under the four payment forms (cash-in-advance, open account, documentary collection and letter of credit) as a function of contract enforcement λ^* in the destination country. Parameters are: $\eta = \eta^* = 0.75$, $\lambda = 0.65$, $R = 1.5$, $K = 1$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\lambda^* \in [0.3, 1]$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$.

Figure 9: Relative profitabilities of letters of credit and documentary collections



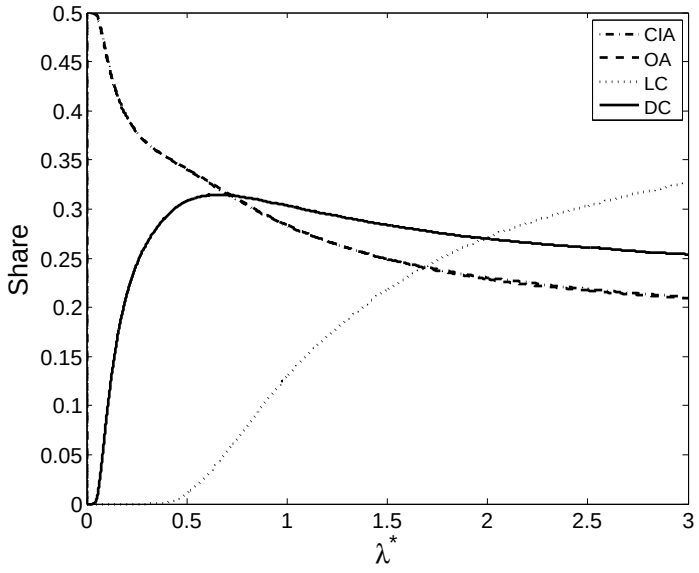
Note: The graph displays the relative profitabilities of a letter of credit and a documentary collection as functions of contract enforcement λ^* in the destination country. It depicts the difference between profits when a letter of credit (documentary collection) is used and the profits with the most preferred alternative payment method. At $\lambda *_{LC}$, the exporter is indifferent between a documentary collection and cash-in-advance terms. At $\lambda *_{DC}$, the exporter is indifferent between a letter of credit and an open account. Parameters are: $\eta = \eta^* = 0.75$, $\lambda = 0.65$, $R = 1.5$, $K = 1$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\lambda^* \in [0.3, 1]$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$.

Figure 10: Simulated shares of the four payment forms



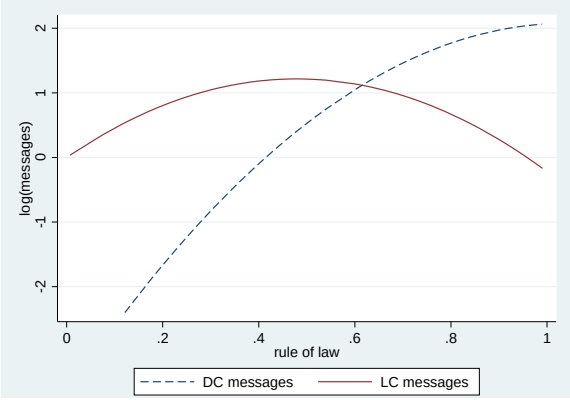
Note: The graph shows the shares of the four payment contracts in total transactions for different levels of contract enforcement λ^* in the destination country in a simulated example. Parameters are: $\eta = \eta^* = 0.75$, $\lambda = 0.65$, $R = 1.5$, $K = 1$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\lambda^* \in [0.3, 1]$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$. The shocks to the profitability of the four contracts are assumed to be independently normally distributed with variance 0.1 and mean 1.

Figure 11: Transaction size and payment contract choice



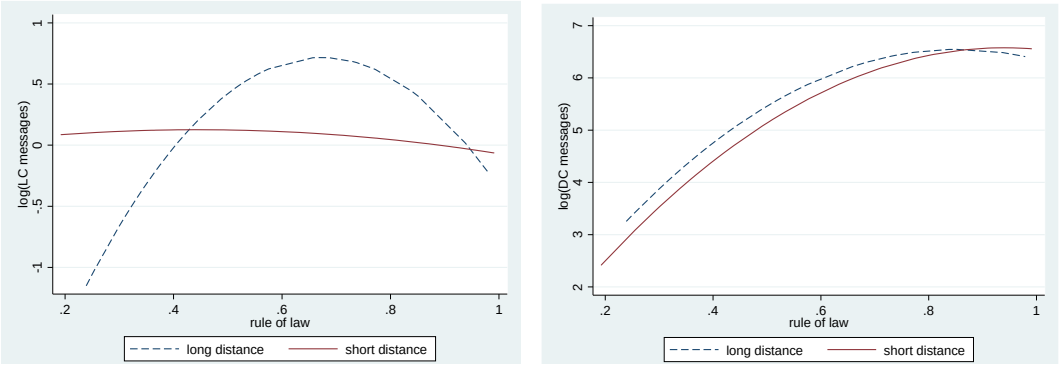
Note: The graph shows the shares of the four payment contract in total transactions for different levels of revenues R, holding the ratio R/K fixed at 2. Parameters are: $\eta = \eta^* = 0.75$, $\lambda = \lambda^* = 0.8$, $R \in [0, 3]$, $K = 0.5R$, $r^* = r = 0.05$, $f^{DC} = 0.5\%$, $m = 5\%$, $\phi^{DC} = 0.05$ and $\phi^{LC} = 0.2$. The shocks to the profitability of the four contracts are assumed to be independently normally distributed with variance 0.1 and mean 1.

Figure 12: Estimated relationship between the use of LCs and DCs and the rule of law



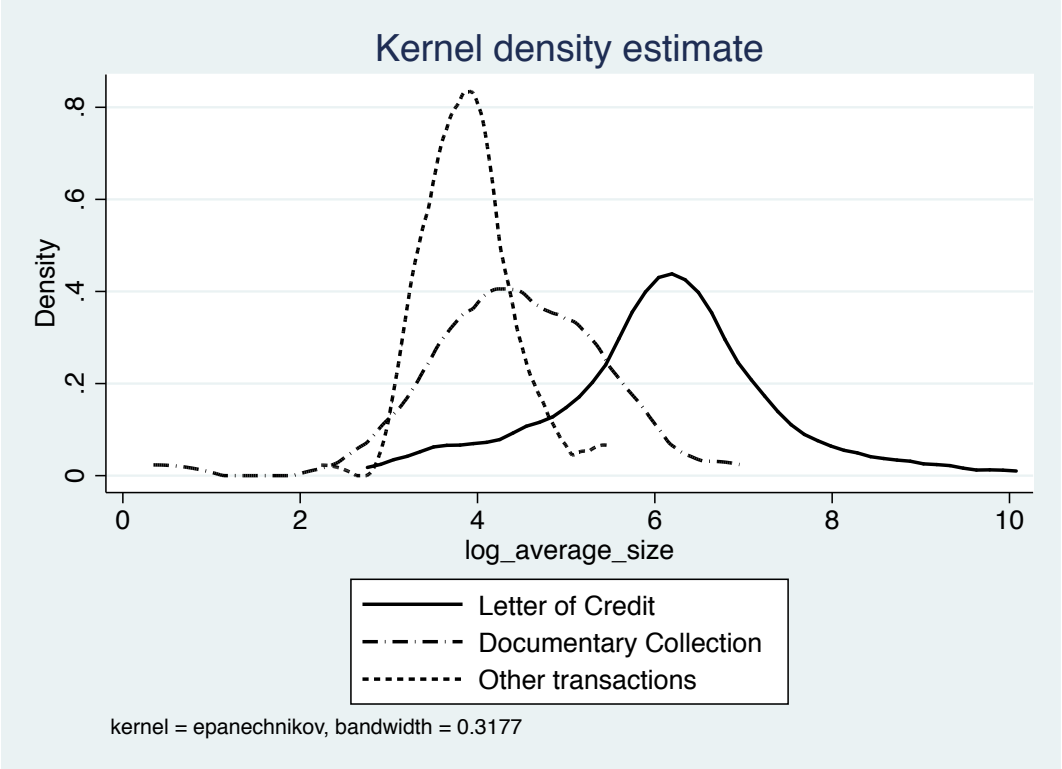
Note: The figure illustrates how the use of letters of credit and documentary collections varies with the rule of law in the destination country based on the estimated coefficients in column (7) of table 4. The solid line shows the log number of LC messages. The dashed line depicts the log number of DC messages.

Figure 13: Interaction between a country's rule of law and distance from the U.S.



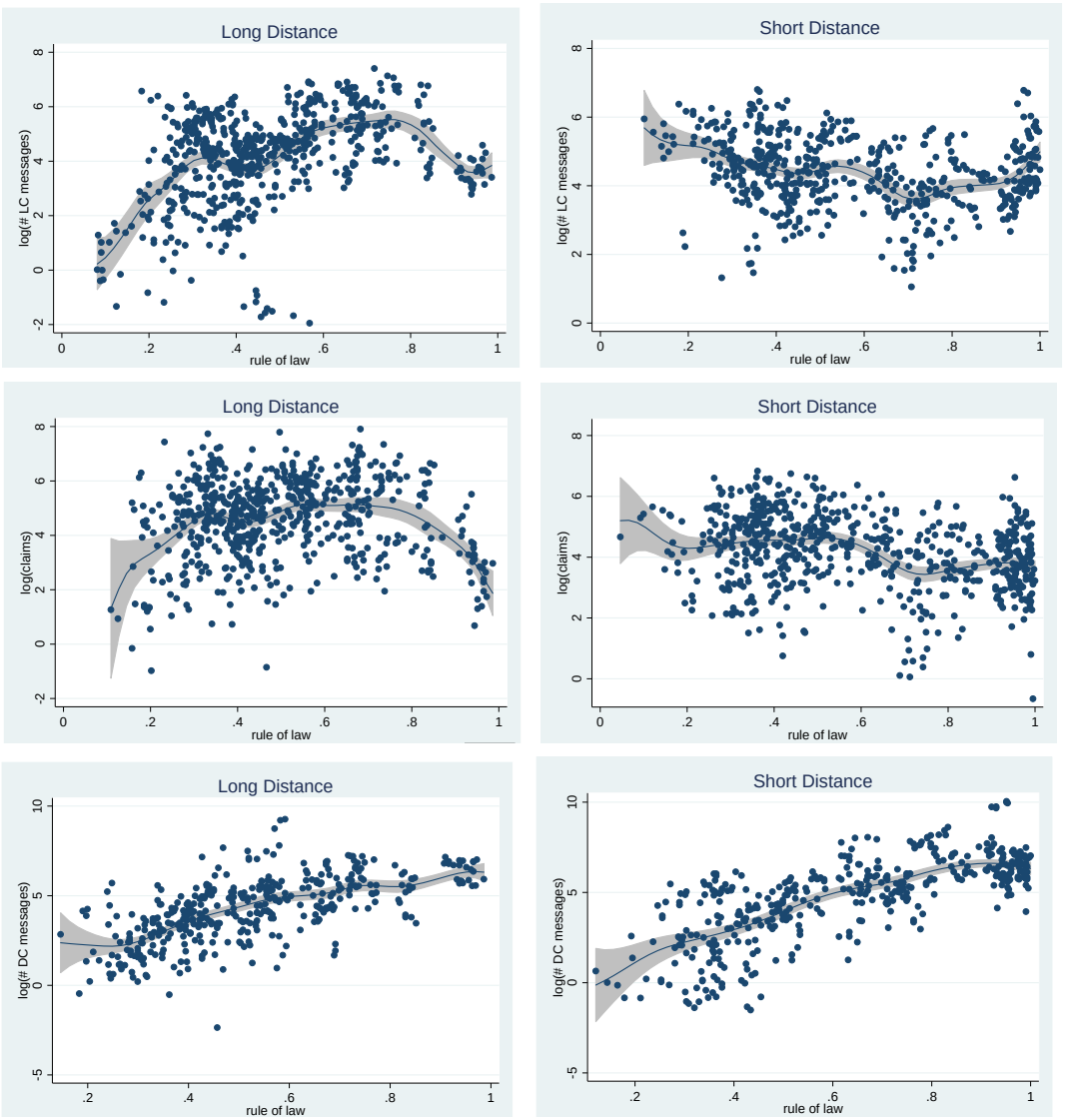
Note: The charts in this figure illustrate how the relationship between LC use (DC use) and the rule of law in the destination country varies with distance to the U.S. They are based on the estimated coefficients in columns (6) and (9) of table 7, respectively. The solid line in each of the two charts shows the relationship between the use of LCs and DCs, respectively, and the rule of law in the importing country for countries with a log distance form the U.S. below the median. The dashed line depicts the same relationship but for countries with a log distance above the median.

Figure 14: Average transaction size in the data



Note: This figure depicts the kernel density estimates of the average transaction size by country for the period from 2010 q4 to 2012 q4. Densities are estimated for those 84 countries for which data is available on both the numbers and the total values of letters of credit, documentary collections and export transactions.

Figure 15: Semi-parametric estimation



Note: Each chart in the figure shows the relationship between either banks' trade finance claims, the number of LC messages or the number of DC messages and the rule of law in the importing country and is obtained from semi-parametric estimation. Charts on the left (right) display the relationship for importing countries with an above (below) median log distance from the United States. In the charts at the top, U.S. banks' trade finance claims are regressed on log exports, log distance, log GDP per capita, log GDP per capital squared and financial development, which enter the regressions as linear terms. Rule of law enters non-linearly. The charts in the middle are based on regression of LC messages on the aforementioned variables. The charts at the bottom use the number of DC messages as the dependent variable.