

Poultry in Motion: A Study of International Trade Finance Practices

POL ANTRÀS AND C. FRITZ FOLEY*

April 2011

Abstract

This paper analyzes the financing terms that support international trade and sheds light on how and why these arrangements affect trade. Using detailed transaction level data from a U.S. based exporter of frozen and refrigerated food products, primarily poultry, it begins by describing broad patterns about the use of alternative financing terms. These patterns help discipline a model in which the trade finance mode is shaped by the risk that an importer defaults on an exporter and by the possibility that an exporter does not deliver goods as specified in the contract. The empirical results indicate that transactions are more likely to occur on cash in advance or letter of credit terms when the importer is located in a country with weak contractual enforcement and in a country that is further from the exporter. Letters of credit, however, are rarely used by the exporter. As an importer develops a relationship with the exporter, transactions are less likely to occur on terms that require prepayment. During the recent crisis, the exporter was more likely to demand cash in advance terms when transacting with new customers, and customers that traded on cash in advance terms prior to the crisis disproportionately reduced their purchases. These results can be rationalized by the model whenever (i) misbehavior on the part of the exporter is of little concern to importers, and (ii) local banks in importing countries are typically more effective than the exporter in pursuing financial claims against importers.

*Harvard University and NBER; Harvard Business School and NBER. The authors are very grateful to numerous employees at the anonymous firm that provided the data and to Matthew Johnson for excellent research assistance. We also thank Kyle Bagwell, Mihir Desai, James Hines, Kalina Manova, Mitchell Petersen, Tim Schmidt-Eisenlohr, Andrei Shleifer, Bob Staiger, and seminar participants at the AEA meetings, Boston University, Columbia, Duke, Harvard, LSE, Mannheim, the NBER ITI Program Meetings, Nottingham, and Oxford for helpful comments. Foley thanks the Division of Research of the Harvard Business School for financial support. Other work also uses the phrase “Poultry in Motion,” including the album by Hasil Adkins and the film “Chicken Run.”

1 Introduction

Managers at firms that engage in international trade must decide which financing terms to use in their transactions. An exporter can require the importer to pay for goods before they are loaded for shipment, can allow the importer to pay at some time after the goods have arrived at their destination, or can use some form of bank intermediation such as a letter of credit. Alternative terms are associated with distinct risks and capital requirements for traders, and they give rise to cross-border capital flows and financial claims. Although similar claims arise for purely domestic transactions, international transactions are unique because longer transportation times often increase working capital requirements and variation in institutional context across countries introduces additional considerations.¹ How do cross-country differences in contractual enforcement affect the terms that are selected and the prices that are charged in transactions that are financed in different ways? Can the development of a relationship between traders mitigate concerns associated with weak institutional environments? How did the manner in which trade is financed shape the impact of shocks like the recent crisis on trade flows? This paper sheds light on the relative use of different kinds of financing terms and addresses these questions.

One of the main challenges in studying the financing arrangements used to support international trade is that detailed data on how different types of transactions are financed are not readily available. This paper begins by presenting some broad patterns that emerge from analyzing a detailed data set on the activities of a single U.S.-based firm that exports frozen and refrigerated food products, primarily poultry. The data set covers roughly \$7 billion in sales to more than 140 countries over the 1996-2009 period and contains comprehensive information on the financing terms used in each export transaction.

Three main facts emerge from this initial exploration. First, the most commonly used financing terms do not involve direct financial intermediation by banks. They are cash in advance terms and open account terms; these are used for 44.0% and 39.2% of the value of transactions, respectively. Cash in advance terms require the importer to pay before goods are shipped and title is transferred. Open account terms allow a customer to pay a certain amount of time following receipt of the goods. Over the sample period, 5.8% of the value of transactions occur on letter of credit terms and 11.0% on documentary collection terms. Under both of these terms, banks intermediate payments. In typical transactions financed with a letter of credit, a bank commits to pay for goods on behalf of the importer, and this commitment is made before goods are shipped. Under the most commonly used documentary collection terms, banks facilitate the collection of payments, but the exporter retains the documents granting title to the goods until the importer pays to obtain them when goods arrive at the importer's location. Foley, Johnson, and Lane (2010) describe these payment terms in detail.

¹A substantial literature seeks to understand trade credit, or the financial relationships between firms that have supply relationships. Much of this work emphasizes the idea that firms have access to better collateral or private information as a consequence of interacting in product markets. Burkart and Ellingsen (2004), Cuñat (2007), Gianetti, Burkart, and Ellingsen (forthcoming), Petersen and Rajan (1997), and Ng, Smith, and Smith (1999) represent recent work in this field.

The second stylized fact that emerges from the data is that the location of the importer has a large impact on the financing terms that are used. Sales to locations with weak contractual enforcement are more likely to occur on cash in advance terms than sales to other locations. This pattern holds for a variety of measures of contractual enforcement, and the differences are large. For example, 63.8% of exports to countries with a civil law legal origin occur on cash in advance terms, but only 4.0% of exports to countries with a common law legal origin do. Survey evidence suggests that these patterns hold generally and are not unique to the firm-specific data used in this paper.

The third main fact is that as the exporter establishes a relationship with an importer through repeated interaction, transactions are less likely to occur on cash in advance terms. As the level of cumulative transactions with a customer increases from values of less than \$25,000 to more than \$5 million, the share of transactions that occur on cash in advance terms falls from 60.3% to 10.9%.

These empirical patterns are used to motivate a model of how trade is financed. The mode of financing chosen by firms in the model is shaped by cross-country differences in contractual enforcement. In particular, there are two fundamental sources of contractual frictions: first, the importer may default and not pay fully for goods he orders, and second, the exporter may not produce and deliver goods as specified. Trading partners choose to trade on cash in advance terms; post shipment terms, which include documentary collection and open account terms; or letter of credit terms. In post shipment term transactions, exporters expect lower revenues, relative to those stated in the sales contract, when transacting with customers that are in environments where contracts are enforced with a lower probability and in environments that are further away. Cash in advance terms eliminate this default risk, but under these terms, importers might have concerns about the quality of goods being shipped and are required to pay funding costs that might be high. Finally, letters of credit reduce the problem of exporter misbehavior and also eliminate importer default risk, but these instruments are associated with high bank fees.

The model identifies a key condition under which exports to locations characterized by weak contractual enforcement are more likely to occur on cash in advance or letter of credit terms as opposed to other terms. Namely, this requires that local banks in the importing country are better able than exporters to pursue financial claims against importers. This condition is plausible given that such banks are likely to be familiar with and close to importers. Regardless of this condition, the model predicts that the effects of contractual enforcement on financing terms is more pronounced for sales to customers located further away from the exporter. It also predicts that, holding constant the volume of sales, prices should be set higher in post shipment term transactions than in cash in advance transactions, especially for transactions with customers in countries with weak contractual enforcement. The theory also indicates that the use of a letter of credit is unlikely to be optimal whenever the exporter's scope for misbehavior is limited, a plausible scenario in the empirical setting considered.

In order to analyze the impact of the development of relationships between traders, a dynamic extension of the theoretical framework considers the possibility that some fraction of importers are

trustworthy and honor a contract even when it is not enforced, and the remaining fraction are not always trustworthy. With a certain probability, these traders face a liquidity shock so they care only about current payoffs and do not honor a contract when it is not enforced. In this set up, the exporter learns which importers are trustworthy and offers post shipment financing terms as a trading relationship develops. Introducing these features allows the model to shed light on the impact of the recent economic crisis. This crisis can be mapped to the model as an increase in the likelihood that importers face liquidity shocks and also as a decrease in demand. When these events occur, new customers are more likely to trade with the exporter on cash in advance or letter of credit terms, and importers that were trading with the exporter on such terms before the shock are the ones that reduce their purchases the most.

Regression analysis explores the robustness of the three basic empirical facts described above and tests the other predictions generated by the model. Results of multinomial logit specifications that explain the choice of financing terms indicate that cash in advance terms and letter of credit terms are each more frequently used for sales to destinations where contracts are less likely to be honored. Linear probability models that include measures of contractual enforcement interacted with distance show that proximity reduces the effects of weak contractual enforcement. Tests find evidence supporting the additional theoretical prediction that transactions that occur on post shipment terms have higher prices per pound than transactions that occur on other terms and that the magnitude of these price differences is larger when customers are located in countries with weak contractual enforcement. Analysis of the financing terms used when transacting with a particular customer illustrates that as customers develop a relationship with the exporter, they trade on cash in advance terms less frequently and on post shipment terms more frequently.

The data also inform the impact of the recent economic crisis. Customers that began to trade with the exporter during the October 2008 to December 2009 period were more likely to trade on cash in advance terms than customers that started to trade with the exporter during earlier periods. Customers that traded on cash in advance terms prior to the crisis reduced their purchases by larger amounts than those that had traded on post shipment terms.

This analysis of the financing of trade reaches three main conclusions. First, to engage in trade, firms that are likely to have the most difficult time obtaining capital appear to be the ones that are most likely to need it. Firms located in countries with weak enforcement of contracts typically finance transactions, yet external capital is often very costly in such environments. This insight contributes to the literature that considers how institutional development affects cross-border financing decisions and trade. Previous work illustrates how institutions that facilitate access to capital give rise to comparative advantage in sectors that require external finance.² Existing work also analyzes how firms adjust their operating, financing, and investment decisions in response to general problems of contract enforcement and to more specific problems that make financial contracting costly.³ Very little work, with the exception of Ahn (2010), Olsen (2010), and Schmidt-

²Papers that develop this idea include Kletzer and Bardhan (1987), Beck (2002), Chaney (2005), Manova (2008, 2010), and Antràs and Caballero (2009).

³Antràs (2003, 2005), Antràs and Helpman (2004, 2008), Levchenko (2007), and Nunn (2007) analyze the impact

Eisenlohr (2009), has considered how institutional context shapes the financing of trade.

The second conclusion is that as a trading relationship develops, it can be a source of capital for firms in countries with poorly functioning institutions. Put differently, the establishment of trading relationships overcomes concerns about the enforcement of contracts and allows capital to flow to places where it is needed. In making this point, the paper contributes to research that considers how relationships and experience can substitute for weak institutions.⁴ Papers in this literature consider how relational mechanisms allow contracting without formal legal protections. Analyses also consider the ways in which trust and the development of networks facilitate trade and cross-border investment.⁵

Third, the results imply that the impact of shocks to demand and the liquidity of trading partners is shaped by how trade is financed. The theory and the data indicate that sales to customers that were trading with the exporter on cash in advance terms experience the largest decline during downturns like the recent economic crisis. Differences in performance are large. Estimates imply that, between the first three quarters of 2008 and the subsequent three quarters, customers that do not make use of post shipment terms decreased sales by 16.5% more than customers that only used such terms. As such, the paper adds to a growing body of work that analyzes how trade responds to macroeconomic and financial shocks.⁶

The remainder of this paper is organized as follows. Section 2 describes the data employed and some general patterns that appear in the data. Sections 3 and 4 lay out a model of the financing of international trade that is motivated by these patterns and that generates several additional predictions. Section 5 presents tests of features of the theory, and Section 6 concludes.

2 Data and Three Empirical Facts

2.1 Basic Characteristics of the Data

To document general patterns in how international trade is financed and to test the implications of the theory developed below, this study employs detailed data on the activities of a single U.S. based exporter. This exporter is a marketer of frozen and refrigerated food products. It does not produce the goods it sells, but it procures them from suppliers who are primarily based in the U.S. and sells them to customers located in more than 140 countries. A small fraction of its products are sold under one of its own brands, and the remainder are sold unbranded. The data are transaction-

of contractual enforcement on trade flows and ownership structure. Desai, Foley, and Hines (2004) and Antràs, Desai, and Foley (2009) study the impact of costly financial contracting on firm operating, financing, and investment decisions.

⁴Papers that make this point include Milgrom, North, and Weingast (1990), Greif (1993), McMillan and Woodruff (1999), Banerjee and Duflo (2000), and Macchiavello (2010).

⁵See, for example, Guiso, Sapienza, and Zingales (2004, 2009) and Rauch (2001).

⁶Amiti and Weinstein (2010), Aboin (2009), Baldwin and Evenett (2009), Chor and Manova (2009), Eaton, Kortum, Neiman, and Romalis (2010), Levchenko, Lewis, and Tesar (2009), Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) each analyze the decline in trade during the recent crisis. Alessandria, Kaboski, and Midrigan (forthcoming), Iacovone and Zavacka (2009), Stephens (1998), and Wang and Ronci (2006) examine earlier crises. Several of these studies consider the role of credit conditions, but none make use of detailed transaction-level data.

level data and cover the 1996-2009 period. Each observation in the data set covers the shipment of a product to a specific customer location. Shipments are primarily seaborne. Data on sales to customers based in the U.S., which comprise 4% of aggregate sales, are removed to maintain the focus on cross-border transactions.

Figure 1 presents information about the share of sales by destination region defined using the World Bank’s grouping of countries into regions. There is wide variation in the destination of exports. As indicated, slightly more than one-third of the products sold over the 1996-2009 period were sold to customer locations in the East Asia and Pacific region, and a similar share of sales was sent to customer locations in the Latin America and Caribbean region. Approximately 20% of sales was destined for Europe and Central Asia. About 3% was sold to the Middle East and North Africa region, and the remainder to Sub-Saharan Africa, North America, and South Asia. Figure 2 provides information about the share of sales by broad product group. Most sales are sales of food products that are sources of protein. Slightly more than half of aggregate 1996-2009 sales were sales of poultry, primarily chicken. Pork accounted for 22% of sales and other meat for an additional 11%. Fruits and vegetables made up about 4% of sales, and a variety of other products comprised the remainder.

The data include information on the date on which the sales transaction was booked and the value and weight of goods sold. Perhaps most importantly for this study, the data indicate the financing terms used for each transaction. Over the 1996-2009 period, the exporter used more than 100 different financing terms when transacting with its customers. These can be grouped into four types of terms: cash in advance terms, letter of credit terms, documentary collection terms, and post shipment terms. Table 1 displays the categorization of the 20 most commonly used terms that cover more than 90% of the sales in the data. Cash in advance terms typically involve a wire transfer or deposit in advance of shipping goods. Open account terms require payment within a 7-30 day period after goods arrive at the importer’s location. Some less frequently used financing terms include a mix of financing arrangements, and these are categorized according to the terms that offer the most security to the exporter. For example, “50% wire transfer in advance / 50% letter of credit” terms are classified as cash in advance terms, but such terms are rarely used.

2.2 Three Facts about How Trade is Financed

Three broad empirical patterns emerge from a descriptive analysis of trends in the financing terms used for different transactions. First, the fraction of the value of transactions that take place on terms involving direct financial intermediation is small. Table 2 provides information about the relative use of different financing terms for the full sample and various subsamples. The share of sales on cash in advance terms, across the years in the sample, is 44.0%, and the open account share is 39.2%. Documentary collections and letters of credit account for 11.0% and 5.8% of sales, respectively. This table also includes information about the relative use of financing terms for customers the first time they appear in the data, excluding those that appear in 1996. 51.2% of these new-customer sales occur on cash in advance terms, 15.2% occur on letter of credit terms,

13.8% occur on sight draft terms, and 19.8% occur on open account terms. Thus, terms tend to give the exporter more security when transacting with new customers.

The second trend in the data is that sales to destinations with weak enforcement of contracts are more likely to occur on terms that offer the exporter more security. Figure 3 displays the share of sales that occur on different terms for sales made to locations classified using four different measures of the enforcement of contracts. Panel A characterizes countries by whether they are common or civil law countries. Panels B, C, and D split countries according to whether their measures of contract viability, payment delay, and the enforceability of contracts are above or below sample medians. Countries with a common law legal tradition are identified using data from the CIA World Factbook, and this classification is available for the broadest set of countries. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) and Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003) show that common law countries offer stronger protections to holders of financial claims and more efficient and high quality legal systems. Contract viability is a measure of the risk of contract modification or cancellation with higher values indicating lower risks, and it is drawn from the International Country Risk Guide. Payment delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and removing payments from a country with higher values indicating lower risks. Enforcement of contracts comes from Knack and Keefer (1995), and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement. Within each panel, four bars with different levels of shading are presented for each subset of countries. The unshaded bars illustrate the share of sales that occur on cash in advance terms, the lightly shaded bars illustrate the letter of credit share, the darker bars illustrate the documentary collection share, and the darkest bars illustrate the open account share.

For each of the proxies of contractual enforcement, the cash in advance share is lower and the open account share is higher where the strength of enforcement of contracts is higher. In common law countries, 4.0% of sales occur on cash in advance terms and 78.2% of sales occur on open account terms, while in civil law countries these shares are 63.8% and 20.4%. Similar differences appear when the sample is split using measures of contract viability, payment delay, and the enforceability of contracts. Letters of credit and documentary collections are used much less frequently than cash in advance and open account, and differences in their use across institutional environments is small. The effects of the strength of contract enforcement are empirically analyzed in a more rigorous way in Section 5.2.

The third finding that emerges from a descriptive look at the data relates to relationships between traders. As a relationship with a customer develops, transactions are less likely to occur on cash in advance terms. This pattern is illustrated in Figure 4. Each bar in this figure indicates the share of transactions that occur on cash in advance terms for a particular range of values of cumulative sales to a customer that have taken place since the year the data coverage begins, 1996. For the first \$25,000 of sales, 60.0% of transactions are cash in advance transactions, and this share falls monotonically, reaching 10.9% for sales that bring cumulative sales to values exceeding

\$5 million. Although this pattern suggests that the financing terms offered to customers change as a relationship matures, it could also reflect a selection effect. Customers that trade on cash in advance terms may buy less. Tests below study these possibilities more carefully and use fixed effects to illustrate that financing terms indeed appear to change for customers as they establish their trustworthiness.

2.3 Representativeness of Sample

One question that arises about these facts is whether they are specific to the sample or whether they hold more generally. Prior academic work does not identify the relative use of alternative financing terms for trade and therefore offers little guidance. Furthermore, many surveys, including recent ones conducted by the International Chamber of Commerce, the International Monetary Fund, and the Bankers' Association for Finance and Trade, are surveys of financial institutions and therefore are based on limited information about transactions financed on cash in advance and open account terms. Fortunately, a survey conducted by FCIB, a trade association of export credit and trade finance specialists, provides some insight. Its 2009 International Credit & Collection Survey asks respondents to report "the top payment method" used in each of a set of countries. FCIB provides the country-level distribution of replies for 44 countries. In this survey, cash in advance terms and open account terms are also more commonly used than other terms. The average share of respondents reporting cash in advance as the top payment method is 22.2% across countries, and this figure is 53.9% for open account, 13.2% for letters of credit, and 10.7% for documentary collections.

There is also evidence that exporters that respond to the FCIB survey use less secure terms when selling to markets where contractual enforcement is stronger. This evidence appears in Panel A of Figure 5. The bars reflect the average, computed across countries, of the share of FCIB survey respondents that report open account terms as the top payment method. Within each pair of bars, the unshaded one displays data for countries with relatively strong contractual enforcement and the shaded one for countries with relatively weak contractual enforcement. The four pairs of bars represent sample splits using a different proxies for contractual enforcement. For each of the measures, open account terms are more prevalent in countries where the likelihood that contracts are honored is higher.

Panel B presents results of performing similar calculations using the data analyzed elsewhere in this paper. In order to meaningfully compare these data to the results of the FCIB survey, information on 2009 transactions is used to classify each country according to the top payment method. Subsamples of countries are generated using the same criteria used to generate the subsamples that appear in Panel A. The figure reveals that the same pattern in the use of open account emerges; open account terms are used more frequently where contractual enforcement is stronger.⁷

⁷It is notable that the measure of the use of open account terms presented in Figure 5 differs from that presented in Figure 3. Figure 5 presents the share of countries in which open account terms are used more than other terms, so this approach effectively equally weights country-level measures. Figure 3 presents value-weighted measures of the use of different terms. The differences in these approaches matter because the exporter makes more extensive use of

In sum, the FCIB survey results indicate that the first two facts described above do not merely hold in the detailed data we analyze. Unfortunately, the nature of the data from FCIB or from other sources does not allow one to verify how financing terms change as relationships develop.

2.4 Additional Features of the Data

A few other features of the data are helpful in shedding light on the use of alternative financing terms and disciplining the theory developed in Section 3. First, the exporter charges importers higher prices when transactions occur on open account as opposed to other terms. The data from the exporter include measures of the value and weight of goods sold, and the ratio of these is the price charged per pound. Figure 6 illustrates the value-weighted average price per pound for all products, calculated over the entire sample period. As indicated, the price per pound is \$0.51 for transactions that occur on cash in advance terms, \$0.47 for transactions that occur on letter of credit terms, \$0.53 for transactions that occur on documentary collection terms, and \$0.67 for transactions that occur on open account terms. This pattern in prices likely reflects the risk that the importer might default in open account transactions and the fact that customers take more time to make payments in transactions that occur on open account, and to a lesser extent, on documentary collection terms. The theory developed below considers how prices should vary across different kinds of customers, and Section 5.3 presents the results of tests of predictions of this theory that control for other potential determinants of price including the country and product composition of sales.

Aspects of the exporter's business require a cautious approach when transacting on open account terms. Industry margins are around 3-4%. Low margins reduce the attractiveness of offering customers open account terms on an experimental basis because the exporter could lose all of the expected revenues in a transaction if an importer defaults when transacting on these terms. Put differently, one bad transaction on open account terms could offset the profits associated with 25 successful ones. Furthermore, there is significant turnover among importers. In an average year, 39.5% of customers that buy from the exporter do not do so in the following year, and 43.2% of customers did not transact with the exporter in the previous year. These customers that enter and exit the data do, however, make smaller purchases than those that remain in the data so exit and entry shares are 13.2% and 17.6% respectively. Nevertheless, low margins and significant customer turnover imply substantial risks for open account transactions. In sum, using open account terms as an experimentation tool to screen buyers does not appear to be a particularly beneficial strategy for the exporter, and as a consequence the model abstracts from this possibility.

cash in advance terms in larger markets with weak institutions and makes more extensive use of open account terms in larger markets with strong contractual enforcement.

3 A Basic Framework

This section develops a partial-equilibrium model of how the financing terms traders pick are shaped by the institutional environments in which exporters and importers reside, by the nature of the relationship between them, and by shocks to the demand and liquidity of trading partners.

3.1 Model Setup

Environment The model considers the problem of an exporter that markets a measurable set of varieties within an industry. These varieties are differentiated in the eyes of consumers, so the exporter faces a downward sloping demand for each of these varieties. Preferences are such that the revenue obtained from the sale of a particular variety in country $j = 1, \dots, N$ can be expressed as a strictly increasing and concave function of the quantity sold in that country, and as an increasing function of a demand shifter θ which may vary across varieties, i.e.,

$$R_j = R(x_j, \theta), \text{ with } \frac{\partial R(x_j, \theta)}{\partial x_j} > 0, \frac{\partial^2 R(x_j, \theta)}{\partial (x_j)^2} \leq 0, \frac{\partial R(x_j, \theta)}{\partial \theta} > 0, \quad (1)$$

with $R(0, \theta) = R(x_j, 0) = 0$. The measure of varieties produced by the firm is assumed to be exogenous, but it could easily be endogenized in a monopolistically competitive environment akin to that in Melitz (2003).

On the supply side, the exporter faces a marginal cost normalized to 1 for all varieties regardless of whether it produces and sells a given variety or it acts as an intermediary buying the goods from suppliers and then exporting them. The exporter cannot access foreign consumers directly and needs to contract with an importer in order to make varieties available to consumers in other markets. Importers only handle one variety for the exporter. Shipping goods between any two countries i and j is costly and entails iceberg costs equal to $\tau_{ij} > 1$. An additional fixed cost f_{ij} associated with exporting is introduced later on.

Exporting Lags and Trade Finance In order to allow a role for how trade is financed, the model incorporates a delay between the time that goods are produced and the time they are consumed in foreign markets. This captures the fact that it takes a considerable amount of time not only to transport goods but also to fulfill all the customs, administrative, and port requirements associated with shipping.⁸ To simplify matters, goods are assumed to be produced and shipped at some initial time $t = 0$ and to reach foreign countries and be consumed at a later period $t = 1$. Although there are a variety of ways of financing international trade, the model begins by considering two extreme cases that feature prominently in the data and then introduces a third, letters of credit.

If the exporter gets paid at $t = 1$, then the exporter acts as if it were lending the exported

⁸For instance, the trade-weighted average of shipping times for all exporters to the U.S. in 1999 was 22 days (see Hummels and Schaur, 2010). This estimate excludes the time spent clearing U.S. customs and other administrative requirements.

goods to the importer before the latter can sell these goods to repay the loan. These kinds of financing term are often referred to as open account terms. Such terms entail financing costs on the part of the exporter, who must fund working capital requirements. In transactions that occur on documentary collection terms, the exporter typically exchanges the goods for payment when the goods reach the importer’s location so that such terms can also be mapped to payments occurring at $t = 1$. In the empirical part of the paper, these two types of financing terms are combined to create what is referred to as post shipment terms.

If the exporter is paid in advance at $t = 0$, then it is as if the importer is lending to the exporter. Transactions that occur on these terms are called cash in advance transactions. They require the importer to fund working capital needs associated with prepayment.

Contractual Frictions We capture contractual frictions by assuming that contracting is imperfect due to a problem of limited commitment, as in Hart and Moore (1994) or Thomas and Worrall (1994). In particular, contracts signed at $t = 0$ are only enforced with probability $\gamma_j \in (0, 1)$, where γ_j is an index of the quality of institutions in country j . When a contract is not enforced, parties cannot commit to abide by the initial terms of the contract. For example, when the exporter sells on post shipment terms, the importer is not compelled to honor contractual obligations concerning payment at $t = 1$. Analogously, when an importer buys on cash in advance terms the exporter is not compelled to honor contractual obligations concerning the amount or type of goods that are traded. These contractual frictions also affect the financial relationships of traders and their banks, and this issue is discussed in Section 3.3 below.

When financing terms are post shipment terms and the contract is not enforced in the importing country, the importer can threaten to refuse to pay.⁹ This leads to a renegotiation process that reduces the cash flows that the exporter expects to obtain at $t = 1$. For simplicity, in such a case, we let the exporter receive a fraction $\mu_X(\tau_{ij}) \in (0, 1)$ of the revenues that would have been generated if the initial contract had been honored. It is assumed that this fraction is a decreasing function of the distance as proxied by transport costs between the two markets. Anecdotally, it is more costly for an exporter to enforce a claim against an importer who is located further away and who refuses to make payments because exporters tend to be less informed about the importer’s business practices, and it is more time consuming for the exporter to make use of the dispute resolution mechanisms in the importer’s country. In some industries, exporters’ main recourse involves shipping goods back to the home market.

In cash in advance transactions, there is no risk that the importer will not pay because payment occurs before the shipment. However, in those transactions exporters might be tempted to shave the quality or otherwise reduce the value of the goods being shipped.¹⁰ This is captured by assuming that with probability $1 - \gamma_i$, with i being the exporting country, the initial contract is not enforced,

⁹Although contracts governing payments related to trade can specify a dispute resolution process and legal system that should be used in case of a disagreement, enforcing awards ultimately requires the support of the law in the country where the party that must make amends has assets. See Foley, Johnson, and Lane (2010) for additional information about resolution dispute mechanisms.

¹⁰This possibility does not imply that this opportunistic behavior characterizes the marketer in the data.

and the exporter is able to avoid an infinitesimally small effort cost without which the value of the shipment is reduced by a factor δ_X . In such a circumstance, the exporter ships the full value initially agreed at $t = 1$ whenever it is privately optimal to do so, which is never the case in a cash in advance transaction but always the case when trade occurs on post shipment terms.¹¹

The initial contract signed by the exporter and the importer specifies a volume of trade x_j and a payment $P_{t,ij}$ from the importer to the exporter that occurs either at $t = 0$ or at $t = 1$. The analysis of endogenous financing costs is significantly simplified when the exporter is allowed to make a take-it-or-leave-it offer to the importer, so this assumption is made throughout the analysis. Finally, it is assumed that the importer has no wealth and is protected by limited liability, in the sense that the amount paid by the importer can never exceed the market value of the goods being purchased.

3.2 Trade Finance Choice with Exogenous Financing Costs

To build intuition, it is useful to begin by studying the choice between a transaction that occurs on post shipment terms and one that occurs on cash in advance terms while taking the costs of financing working capital requirements as exogenous, although these are endogenized later. In a cash in advance transaction, the importer in country j pays the exporter in i at $t = 0$. Denote that payment by $P_{0,ij}^{CIA}$. If r_j denotes the financing cost faced by the importer, the participation constraint of this agent is

$$(1 + r_j) P_{0,ij}^{CIA} \leq (\gamma_i + (1 - \gamma_i) \delta_X) R(x_j, \theta), \quad (2)$$

where the right-hand-side of the inequality equals the expected revenues that the importer anticipates obtaining at $t = 1$. The expression reflects that with probability $1 - \gamma_i$ the exporter is not required to abide by the initial contract and optimally reduces the value of the shipment by a factor δ_X . Given that at $t = 0$ the exporter makes a take-it-or-leave-it offer to the importer, $P_{0,ij}^{CIA}$ is set so that the above inequality holds with equality and the exporter chooses the level of exports x_j to be included in the initial contract that solves

$$\pi_{ij}^{CIA} = \max_{x_j} \left\{ \frac{(\gamma_i + (1 - \gamma_i) \delta_X)}{1 + r_j} R(x_j, \theta) - \tau_{ij} x_j \right\}. \quad (3)$$

Next, consider a transaction that occurs on post shipment terms. When making a take-it-or-leave-it offer, the exporter demands that the importer pay all revenue obtained in country j at $t = 1$. However, the contract is only honored with probability γ_j , and when it is not, the exporter only recoups a share $\mu_X(\tau_{ij})$ of sale revenues. This implies that the exporter does not anticipate a $t = 1$ payment larger than

$$P_{1,ij}^{PSP} = (\gamma_j + (1 - \gamma_j) \mu_X(\tau_{ij})) R(x_j, \theta).$$

¹¹This assumes that the exporter learns whether or not the contract is enforced in his country before he ships the goods to the importer.

In order to generate that payment at $t = 1$, the exporter finances its working capital need at a cost given by r_i . The exporter thus chooses the level of exports x_j to be included in the initial contract to solve

$$\pi_{ij}^{PSP} = \max_{x_j} \left\{ \frac{(\gamma_j + (1 - \gamma_j) \mu_X(\tau_{ij}))}{1 + r_i} R(x_j, \theta) - \tau_{ij} x_j \right\}. \quad (4)$$

When transacting on post shipment terms, the exporter has no incentive to shave the quality of the goods being exported because doing so would only reduce his payoff.

Applying the envelope theorem to expressions (3) and (4) reveals that, for given financing costs r_i and r_j , institutional parameters γ_i and γ_j , and transport costs τ_{ij} , the exporter of variety θ prefers the use of cash in advance terms over post shipment terms if and only if

$$\frac{\gamma_i + (1 - \gamma_i) \delta_X}{1 + r_j} > \frac{\gamma_j + (1 - \gamma_j) \mu_X(\tau_{ij})}{1 + r_i}. \quad (5)$$

The choice is governed by the relative magnitude of the contractual frictions and exogenous financing costs associated with each financing mode. The likelihood that a transaction occurs on cash in advance terms as opposed to post shipment terms is decreasing in the strength of contractual enforcement in the importing country (γ_j) and is increasing in the distance between the importing and exporting countries (τ_{ij}). Both of these are associated with larger frictions stemming from limited commitment on the part of the importer. Furthermore, the negative effect of weak contractual enforcement in the importer's country on the expected relative profitability of post shipment terms is alleviated by proximity between markets. The relative attractiveness of cash in advance terms is also enhanced by a strong contractual environment in the exporting country (high γ_i), as well as by high financing costs in the exporting country or low financing costs in the importing country.

The theoretical result regarding the effect of the importer country's institutional quality provides a simple explanation for the second stylized fact described in Section 2. Buyers in countries with weaker contracting are tempted to default with higher probability, and, for given financing costs, this induces the exporter to make more extensive use of cash in advance terms. As intuitive as the result might appear, it carries an important qualification when financing costs are endogenized.

3.3 Trade Finance Choice with Endogenous Financing Costs

As explained above, cash in advance terms require importers to fund working capital needs and post shipment terms require the exporter to fund working capital needs. If funding costs are higher in weak institutional environments, cash in advance terms may not be as desirable for transactions involving importers in such environments. It is therefore informative to endogenize financing costs.

In order to satisfy the up-front payment $P_{0,ij}^{CIA}$ in a transaction that occurs on cash in advance terms, assume that the importer approaches a local bank to borrow the value of this payment. Assume also that the banking sector is competitive, and the cost of funds is equal to $1 + \rho_j$. The level of ρ_j can be interpreted as an inverse measure of the technological efficiency of the banking sector in the importing country. Banks are not, however, willing to lend at an interest rate equal

to ρ_j because of the same limited commitment constraints that induce exporters to favor cash in advance over post shipment terms. The importer cannot credibly pledge all the revenue obtained at $t = 1$ to a local bank, and this in turn implies that the exporter is not able to extract all surplus from the importer even when making a take it or leave it offer. More formally, assume that when the $t = 0$ financial contract between the bank and the importer is not enforced, the importer defaults, or threatens to default, and the bank can only recoup a payment that equals a fraction μ_B of the revenues generated at $t = 1$. The importer's bank thus anticipates that the maximum expected repayment that it can obtain from the importer is equal to a fraction $\gamma_j + (1 - \gamma_j) \mu_B$ of the expected revenues in a transaction that occurs on cash in advance terms. Recall that these revenues are given by $(\gamma_i + (1 - \gamma_i) \delta_X) R(x_j, \theta)$. In sum, the participation constraint of the local bank imposes the following financial constraint on the importer

$$(1 + \rho_j) P_0^{CIA} \leq (\gamma_j + (1 - \gamma_j) \mu_B) (\gamma_i + (1 - \gamma_i) \delta_X) R(x_j, \theta),$$

which in light of equation (2) delivers

$$1 + r_j = \frac{1 + \rho_j}{\gamma_j + (1 - \gamma_j) \mu_B}. \quad (6)$$

Quite intuitively, the importer's financing costs are higher in countries with weaker institutions (lower γ_i) and with less efficient banking sectors (higher ρ_j). Plugging this value into (3) the profitability of a Cash-in-Advance transaction with endogenous financing costs is given by

$$\pi_{ij}^{CIA} = \max_{x_j} \left\{ \frac{(\gamma_i + (1 - \gamma_i) \delta_X) (\gamma_j + (1 - \gamma_j) \mu_B)}{1 + \rho_j} R(x_j, \theta) - \tau_{ij} x_j \right\}. \quad (7)$$

Next, consider the financing costs faced by exporters when transactions occur on post shipment terms. Remember that the exporter anticipates obtaining expected revenues equal to $\gamma_j R(x_j) + (1 - \gamma_j) \mu_X (\tau_{ij}) R(x_j)$ at $t = 0$. However, the exporter can only pledge a fraction of these revenues to its local bank because financial contracts are only enforced with probability γ_i , and when they are not, the bank can at most obtain a fraction μ_B of these revenues. The level of x_j chosen by the exporter must hence satisfy the inequality

$$(1 + \rho_i) \tau_{ij} x_j \leq (\gamma_i + (1 - \gamma_i) \mu_B) (\gamma_j + (1 - \gamma_j) \mu_X (\tau_{ij})) R(x_j, \theta) \quad (8)$$

where ρ_i is the cost of funds in the exporting country. One can show that for sufficiently large γ_i or μ_B , this inequality does not bind and $r_i = \rho_i$ because the exporter is able to pledge a sufficiently large ex-post payoff to the bank. We focus on this case for three reasons: first, it simplifies the exposition of the main results; second, the exporter in the data is based in the U.S. where institutions are particularly strong; and third, the emphasis in the paper is on the effects of variation in the importer's financing costs on the choice of financing terms.

Plugging $r_i = \rho_i$ into (4) and using the envelope theorem reveals that, with endogenous financing

costs, the exporter prefers cash in advance terms to post shipment terms if and only if

$$\gamma_i + (1 - \gamma_i) \delta_X > \frac{1 + \rho_j}{1 + \rho_i} \frac{\gamma_j + (1 - \gamma_j) \mu_X(\tau_{ij})}{\gamma_j + (1 - \gamma_j) \mu_B}. \quad (9)$$

Simple differentiation delivers:

Proposition 1 *With endogenous financing costs, the likelihood that a transaction occurs on cash in advance terms as opposed to post shipment terms is decreasing in the institutional quality of the importing country (γ_j) if and only if $\mu_X(\tau_{ij}) < \mu_B$, that is if only if local banks in the importing country are more effective than exporters in pursuing financial claims against importers.*

Proposition 1 indicates that the patterns unveiled in Section 2.2 can be explained by the model but only when local banks are more effective in pursuing claims in the case of default, that is when $\mu_B > \mu_X(\tau_{ij})$. This seems a natural assumption to make given that a local bank is likely to be familiar with an importer's business and is more able to use local dispute resolution mechanisms because it is close by and familiar with them. Still, there may be situations in which exporters are better able to pursue these claims than local banks. This could occur, for instance, in situations in which the exporter ships highly specialized machines or inputs so that it is easier for that exporter than for a local bank to redeploy those machines in case of default. Burkart and Ellingsen (2004) develop this idea in their model of trade credit.

Thus, the modelling of endogenous financing costs leads to an important qualification of the effect of the importer's country institutional quality on the mode of financing. However, the remaining comparative statics discussed in the case of exogenous financing costs hold regardless, implying:

Proposition 2 *With endogenous financing costs, the likelihood that a transaction occurs on cash in advance terms as opposed to post shipment terms is increasing in the distance between the importing and exporting countries (τ_{ij}). Furthermore, the negative effect of weak importer institutions on the expected relative profitability of transactions that occur on post shipment terms is alleviated by proximity between markets.*

3.4 Letters of Credit

Letters of credit can be incorporated into the model by assuming that they accomplish two objectives. First, a letter of credit ensures that the exporter only receives payment whenever his shipment is in accordance with the initial contract. Hence, a letter of credit eliminates, or at least reduces, the limited commitment problem on the part of the exporter. Second, a letter of credit substitutes the trustworthiness of the importer's bank for that of the importer, and it is assumed that the exporter necessarily gets paid if it meets its contractual obligations. However, in a letter of credit transaction, the importer must make a payment to the importer's bank. Following the modelling choices above, the importer cannot commit not to renege on its promised payment, and if

it fails to meet its obligation, the bank can collect a share of the importer's revenues, $\mu_B > \mu_X(\tau_{ij})$. Furthermore, letters of credit are associated with a processing cost incurred by the importer's bank, and this cost is modelled as an increase in the cost of funding by a factor $\psi_j > 1$. As indicated above, the banking sector in the importer's country is assumed to be competitive and to break even.

Following the same steps as above reveals that the profits for the exporter in a letter of credit transaction are given by:

$$\pi_{ij}^{LC} = \max_{x_j} \left\{ \frac{(\gamma_j + (1 - \gamma_j)\mu_B)}{\psi_j(1 + \rho_j)} R(x_j, \theta) - \tau_{ij}x_j \right\}.$$

Comparing this with expressions for π_{ij}^{CIA} and π_{ij}^{PSP} above reveals that the exporter prefers using a letter of credit as opposed to (i) cash in advance terms whenever

$$\frac{1}{\psi_j} > \gamma_i + (1 - \gamma_i)\delta_X, \quad (10)$$

and (ii) post shipment terms whenever

$$\frac{1}{\psi_j} > \frac{1 + \rho_j}{1 + \rho_i} \frac{\gamma_j + (1 - \gamma_j)\mu_X(\tau_{ij})}{\gamma_j + (1 - \gamma_j)\mu_B}.$$

From this the following conclusion follows:

Proposition 3 *Letters of credit are unlikely to be optimal whenever the exporter's scope for misbehavior is limited (in the sense that either γ_i or δ_X are close to 1). The level of contractual enforcement of the importing country, as captured by γ_j , is irrelevant for the choice between a letter of credit and cash in advance terms. Conversely, the choice between a letter of credit and post shipment terms is shaped by the institutional quality of the importing country and by distance in a manner identical to the choice between cash in advance and post shipment terms.*

The first statement in Proposition 3 helps rationalize the fact that letters of credit are not prevalent in the data used in this paper. The model suggests that this is because the exporter is located in the U.S. where contractual enforcement is strong and, perhaps more importantly, because the type of goods that it sells are not prone to quality manipulation. Intuitively, in such cases, the only benefit of a letter of credit is to substitute the trustworthiness of the importer's bank for that of the importer, but the same can be achieved at lower cost with a cash in advance contract. With regards to the second statement in Proposition 3, it should be emphasized that although inequality (10) is independent of γ_j , to the extent that the fees ψ_j charged on letters of credit are affected by the quality of institutions in the importing country, these institutional variables may in fact significantly affect the choice between a letter of credit and cash in advance terms. Finally, the last statement suggests that in empirical applications where the key variation is in importer characteristics, there is little loss in grouping cash in advance and letters of credit into a single type

of financing terms, an approach that is used at times in the econometric analysis.¹²

3.5 Equilibrium Prices and the Trade Finance Mode

Section 2.4 above provides suggestive evidence that the prices charged by the exporter are higher in post shipment term transactions. A comparison of prices is complicated by the fact that these are determined by variety of product and importing country characteristics, some of which may not be observed. Analysis presented below provides evidence of systematic price differences that appear even after controlling for product/country/Incoterm/year fixed effects.¹³ In anticipation of that analysis, it is informative to compare the price that the exporter would charge to the importer under different financing modes while holding all the model parameters fixed.¹⁴ The data include the price that the exporter quotes the importer in the initial contract at $t = 0$.

For the case of cash in advance terms, this price is straightforward to compute; the exporter charges an ex-ante amount equal to P_0^{CIA} (pinned down by constraint (2)), so the implied price is

$$p_j^{CIA} = \frac{P_0^{CIA}}{x_j^{CIA}} = \frac{(\gamma_j + (1 - \gamma_j) \mu_B) (\gamma_i + (1 - \gamma_i) \delta_X) R(x_j^{CIA}, \theta)}{1 + \rho_j x_j^{CIA}}. \quad (11)$$

In the case of post shipment terms transactions, the price agreed at $t = 0$ is the one that the exporter expects to obtain if the contract is enforced in the importing country. In that case, the exporter demands a payment equal to the total sales receipts obtained at $t = 1$, implying a price of

$$p_j^{PSP} = \frac{R(x_j^{PSP}, \theta)}{x_j^{PSP}}. \quad (12)$$

A comparison between the two prices in (11) and (12) is not completely straightforward because sale volumes and revenues need not be equal across financing modes even for common parameter values. Notice, however, that holding constant the volume of sales x_j , it is clear that prices are higher in post shipment transactions than in cash in advance transactions. There are three reasons for this. First, because of the potential for exporter misbehavior, the expected quality of the good is lower in cash in advance transactions (i.e., $\delta_X < 1$). Second, the inability of the importer to commit to repaying loans from its bank in cash in advance transactions constrains the ability of the exporter to extract surplus from the importer. Limited commitment problems also reduce the ability of the exporter to extract surplus from the importer in post shipment term transactions, but this problem

¹²The costs of letters of credit are modelled as increases in the marginal cost of fund provision. If these were modelled as fixed costs, the analysis would be a bit more cumbersome, but it would deliver the prediction that, ceteris paribus, letters of credit transactions should be larger than transactions involving other financing terms. This is consistent with the data that appear in Appendix Table 1.

¹³Incoterms terms refer to the international standard trade terms that govern which trading party is responsible for which aspects of transport. The data contain information about which terms are used in each transaction.

¹⁴This raises the question of why, in light of the model, one might observe both cash in advance and post shipment terms transactions given the same parameter values. It would be straightforward to add a source of idiosyncratic preferences for particular financing modes into our model so as to generate the observed heterogeneity in the data.

is not reflected in the price observed for these transactions, which is the price conditional on defaults not occurring. A third factor reducing the price of cash in advance transactions relative to post shipment term transactions relates to the higher cost of funds faced by the importer in cash in advance transactions (i.e., $\rho_j > 0$), which again limits the extent to which the exporter can extract surplus from the importer.¹⁵

Notice also that, again holding constant the value of sales, the difference in prices $p_j^{PSP} - p_j^{CIA}$ is predicted to be lower when contractual enforcement is stronger in the importer's country. Furthermore, larger transactions should be associated with lower prices. Section 5.3 presents tests that explore the empirical validity of these predictions.

Finally, it is informative to consider prices in letter of credit transactions. These are determined in a manner similar to prices in cash in advance transactions. Following analogous steps to those used to derive equation (11) reveals

$$p_j^{LC} = \frac{(\gamma_j + (1 - \gamma_j)\mu_B) R(x_j^{LC}, \theta)}{\psi_j(1 + \rho_j) x_j^{LC}}.$$

Because $\psi_j > 1$, we again expect prices in letter of credit transactions to be lower than prices in post shipment term transactions, but the relative magnitude of prices in letter of credit transactions and cash in advance transactions is ambiguous and depends on the relative size of the processing fees of letters of credit, as captured by ψ_j , and the scope for misbehavior on the part of the exporter, as reflected by δ_X .¹⁶

4 Relationship Dynamics and the Crisis

This section introduces a simple extension of our framework that sheds light on the effect of relationships on the choice of financing terms. This extension is also useful in generating predictions about the effects of the recent economic crisis. For simplicity, this section rules out the possibility of misbehavior on the part of the exporter by assuming $\delta_X = 1$, so that letters of credit are a dominated financing mode. This seems reasonable for the empirical setting considered, given the fact that letters of credit are rarely used in the data. The analysis also assumes, as before, that the exporter is not credit constrained and thus $r_i = \rho_i$. There is substantial customer turnover in

¹⁵It may seem surprising that the cost of funds faced by the exporter is not a relevant factor in the comparison of prices. This parameter would be central to a comparison of prices that left the exporter indifferent between financing modes. Yet, because the exporter is assumed to make take-it-or-leave-it-offers to importers, its indifference between terms is irrelevant in the computation of prices. In variants of the model with a more balanced distribution of bargaining power, the wedge between the two prices would also be affected by the cost of funds of the exporter. Although a strong one, the assumption of full bargaining power on the part of the exporter allows the focus to be on variation in price gaps stemming from importer characteristics, which maps to variation observed in the data that are analyzed.

¹⁶Although the model also characterizes the equilibrium volume of sales in the initial contract, it does not yield sharp predictions for how sale volumes differ depending on financing modes. For example, comparing (7) and (4) with $r_i = \rho_i$, reveals that $x_j^{CIA} > x_j^{PSP}$ whenever $\pi_{ij}^{CIA} > \pi_{ij}^{PSP}$ but $x_j^{CIA} < x_j^{PSP}$ whenever $\pi_{ij}^{CIA} < \pi_{ij}^{PSP}$. Consistently with this ambiguity, unreported analysis indicates that there are not differences between the yearly volumes of sales for customers using these types of trade finance terms.

the data, and to generate this a fixed cost f_{ij} associated with exporting from country i to country j is introduced. If the exporter incurs this cost, this modification simply amounts to adding a term $-f_{ij}$ in the profit functions derived above and has no bearing on the results in Propositions 1 through 3.¹⁷

4.1 Dynamics

In the previous setup in which the exporter and the importer transact only once, it is optimal for importers to deviate from their contractual obligations if contracts are not enforced. Suppose instead that these agents interact on a repeated basis, and for simplicity, assume that the game played between these agents is or is perceived to be infinitely repeated. Assume also that importers come in two types: they are either always patient and discount the future at a very low rate, or they are stochastically myopic in which case, with certain probability λ , they care only about current payoffs and with the complementary probability $1 - \lambda$ they are patient.¹⁸ Shocks to importers' discount factors can be interpreted as liquidity shocks. When an importer is hit by a liquidity shock he threatens to default when given the chance, which occurs with probability $1 - \gamma_j$. Conversely, the exporter and the importer's bank can use the threat of discontinuing the relationship to get patient importers to meet their contractual obligations. Provided that the discount rate of patient importers is sufficiently low, the folk theorem implies that an equilibrium exists in which patient importers never threaten to default. It is assumed that this is the case, and thus patient agents are always trustworthy.¹⁹

While defaults are publicly observed, whether an agent is always patient or stochastically myopic is private information to that agent, and the exporter, as well as the importer's bank, can only form beliefs on the type of the particular importer they are dealing with.²⁰ How are these beliefs formed? First, it is common knowledge that, at any point in time, a fraction $1 - \chi$ of the population of importers is stochastically myopic. Hence, a new importer is perceived to be always patient with probability χ . In repeated relationships, however, the probability assigned to the importer being always patient evolves over time and increases with a history of no defaults. Denoting by $\hat{\chi}(T)$ the particular posterior probability assigned to the importer being always patient in a relationship of

¹⁷Nevertheless, because $R(x_j, \theta) \rightarrow 0$ when $\theta \rightarrow 0$, some exporters now optimally decide not to sell certain low-demand varieties in foreign markets where fixed costs of exporting are substantial. Furthermore, the likelihood that an exporter finds it optimal to sell to a foreign market is decreasing in the distance between the two countries, increasing in the demand shifter θ , and increasing in the institutional quality of the importing country γ_j .

¹⁸This formulation is related to the model of reputation building developed in Araujo and Ornelas (2007).

¹⁹This requires that the importer obtains some positive payoff when he chooses to honor the contract. Still, for a discount factor close enough to 1, this required payoff can be made arbitrarily close to 0. This limiting case is considered for simplicity.

²⁰The analysis rules out the possibility of the exporter offering a menu of contracts to screen the importer's type. One could envision that repeated interactions might also alleviate the scope for opportunism on the part of the exporter and might increase the profitability of transactions that occur on cash in advance terms. This type of effect, however, is not likely to be relevant when δ_X is close to 1, as the data suggest.

length T , and using Bayes' reveals that

$$\hat{\chi}(T) = \frac{\chi}{\chi + (1 - \chi)(1 - \lambda + \lambda\gamma)^T} > \chi$$

when there have been no defaults up to length T , and $\hat{\chi}(T) = 0$ otherwise. Whenever an importer fails to meet its contractual obligations, the exporter and the importer's bank optimally choose to stop trading with the importer and begin to trade with a new importer, who is perceived to be patient with probability χ . Note that, as long as there are no defaults, $\hat{\chi}(T)$ is increasing in T and thus as relationships evolve with no defaults, the exporter and the importer's bank assign a higher and higher probability to the importer being always patient.

How does this reputation-building process affect the profitability of different trade financing arrangements? Consider first the case of post shipment payment terms. In a relationship of length T with no prior defaults, profits of this option are given by

$$\pi_{ij}^{PSP}(T) = \max_{x_j} \left\{ \frac{[\gamma_j + (1 - \gamma_j)(\hat{\chi}(T) + (1 - \hat{\chi}(T))(1 - \lambda + \lambda\mu_X(\tau_{ij})))] R(x_j, \theta)}{1 + \rho_j} - \tau_{ij}x_j - f_{ij} \right\}, \quad (13)$$

where the term in square brackets captures the probability with which the exporter believes that he will be paid the initially contracted price at $t = T$. This probability is increasing in the length of an existing relationship, as the trust in the importer grows over time in the absence of defaults.

Consider next the case of cash in advance transactions, in which there exists the possibility of the importer defaulting on its bank, though again this probability is perceived to decrease with a history of no prior defaults. Given public information on past defaults, the exporter and the importer's bank terminate and reinitiate relationships in a similar manner. As a result, the length of the exporter-importer relationship coincides with the length of the importer-bank relationship and the profits associated with a cash in advance transaction in a relationship of length T with no prior defaults are given by:

$$\pi_{ij}^{CIA}(T) = \max_{x_j} \left\{ \frac{(\gamma_j + (1 - \gamma_j)(\hat{\chi}(T) + (1 - \hat{\chi}(T))(1 - \lambda + \lambda\mu_B))) R(x_j, \theta)}{1 + \rho_i} - \tau_{ij}x_j - f_{ij} \right\}. \quad (14)$$

Comparing equations (13) and (14), reveals that:

Proposition 4 *Provided that $\mu_X(\tau_{ij}) < \mu_B$, the likelihood that a transaction with a particular importer occurs on post shipment terms increases with the number of past interactions between the exporter and that particular importer. Furthermore, in importing countries where contractual enforcement is close to perfect, that is when $\gamma_j \rightarrow 1$, the effect of past interactions on the relative profitability of transactions that occur on post shipment terms vanishes.*

Intuitively, the reputation-building process that occurs through repeated interaction substitutes

for strong institutions, so the result bears a clear analogy to that in Proposition 1.²¹ A corollary of Proposition 4 is that, other things equal, the likelihood that a transaction occurs on post shipment terms is lower for transactions involving new customers relative to transactions involving repeat customers. This prediction is consistent with the patterns documented in Table 2.

The solid curves presented in Figure 7 provide a graphical illustration of the effect of past interactions on the choice of financing mode. This graph is constructed for the interesting case in which γ_j is such that $\pi_{ij}^{PSP} < \pi_{ij}^{CIA}$ for $T = 0$, and hence, there exists a unique relationship length T^* , such that cash in advance terms are optimal for $T < T^*$, while post shipment terms are optimal for $T > T^*$. If instead we had $\pi_{ij}^{PSP} > \pi_{ij}^{CIA}$ for $T = 0$, then cash in advance would never be optimal.²²

4.2 A Crisis

The dynamic extension of the model is also helpful for understanding patterns in customer turnover and the effects of the recent crisis. The recent crisis can be interpreted as a fall in demand, that is a fall in θ in the model, or as an increase in expected default stemming from an increase in the probability of a liquidity shock λ faced by stochastically myopic importers.²³ Figure 7 illustrates the effects of a fall in θ on the prevalence of the use of cash in advance terms and post shipment terms. Equations (13) and (14) indicate that the fall in θ reduces the profits of transactions that occur on both types of terms and increase the probability that an export relationship is terminated because the fixed costs of exporting cannot be covered. In the figure, the dashed lines indicate negative profits for values of T below \underline{T} . This implies that importers that traded on cash in advance terms before the demand shift are more likely to stop trading with the exporter than importers that traded on post shipment terms. In other words, the extensive margin response to a fall in demand should, other things equal, be larger for cash in advance transactions. The fall in θ also reduces the

²¹It should be noted, however, that an improvement in the quality of institutions does not always diminish the effect of an increase in a relationship length on the relative profitability of post shipment versus cash in advance terms. The reason for this is that the level of γ_j affects the speed of learning within relationships. For example, in contractual weak (low- γ) environments, an increase in T starting from $T = 0$ quickly raises the relative profitability of post-shipment terms because there is significant information in the importer not defaulting; but, by the same token, in those environments, little is learned once T is sufficiently high.

²²The analysis makes the strong assumption that the exporter and the importer's bank update their beliefs on the importer's type in a symmetric fashion. The trade credit literature (e.g., Petersen and Rajan, 1997, Ng, Smith and Smith, 1999) has argued that, in some cases, sellers might have a comparative advantage (relative to financial intermediaries) in learning about the trustworthiness of their buyers. A simple way to incorporate this feature into the model would be to assume that the importer's bank has a worse understanding of the industry than the exporter and in particular believes that the size of liquidity shocks is always large enough to induce all agents (not just myopic ones) to default. In such a case, a bank would believe that the importer defaults with a probability equal to the average default rate across importers in the country and would not update this expected default rate based on the importer's past history of defaults. As a result, the financial constraint faced by the importer would not be relaxed over time and the profitability of cash-in-advance terms for the exporter would not increase with the length of the relationship between the exporter and the importer (conditional on no defaults). Nevertheless, the fact that the exporter continues to update his belief on the importer type by observing his history of defaults implies that the result in Proposition 4 would continue to hold in this modified environment.

²³The approach here is very much reduced form. The fall in demand and increase in defaults would interact with each other in a more detailed model.

intensive margin or volume of export sales of surviving relationships. Without further restrictions on the function $R(x_j, \theta)$, it is unclear if decreases are larger for importers that were transacting on cash in advance terms or post shipment terms. In fact, for the often-used case of isoelastic revenue functions, the effect is proportionate for all firms, as illustrated in Figure 7.

An increase in the probability that stochastically myopic importers face liquidity shocks generates richer effects which are depicted in Figure 8. First, note from equations (13) and (14) that the increase in λ reduces the profitability of transactions that occur on both cash in advance and post shipment terms.²⁴ As in the case of a fall in θ , the fall in λ implies that trade with importers that were transacting on cash in advance terms before the shock is more likely to become unprofitable than trade with importers that were transacting on post shipment terms. Differentiation demonstrates a second effect; for a given length of the relationship T , the profitability of transactions that occur on post shipment terms is more severely affected than that of transactions that occur on cash in advance terms. Intuitively, the increase in λ has a similar effect as a decrease in the strength of contractual enforcement in the importer's country in the static model. As a consequence of this result, the exporter becomes more likely to use cash in advance terms when transacting with new customers during the crisis than before it. It is also important to note that an increase in λ reduces profits by lower amounts for more established trading relationships, or relationships where T is higher. The probability the exporter assigns to the importer being stochastically myopic is very low in long-term relationships without prior defaults. An implication of this result is that importers that transacted with the exporter on cash in advance terms prior to the crisis and continue to trade tend to disproportionately decrease their purchases.

5 Econometric Evidence

The model has several testable implications. The data that are analyzed cover exports of a single U.S. based firm that serves importers in varied institutional environments. As the model does not differentiate between documentary collection and open account transactions, these are aggregated into a category called post shipment terms. Most of the tests employ the invoice-level data and include product variety fixed effects to control for any differences in how trade of different varieties takes place.

Propositions 1-3 predict that cash in advance transactions and letter of credit terms are preferred to post shipment terms when contractual enforcement is weak in the importer's country and that the institutional quality of the importer's country does not affect the choice between cash in advance and letter of credit terms. The patterns displayed in Figure 3 which is described above are roughly consistent with these ideas, but they are tested more rigorously using the specifications presented in Table 4. Propositions 2 and 3 point out that cash in advance terms and letters of credit terms are preferred to post shipment terms when there is more distance between the exporter and the

²⁴In computing the effect of the increase in λ on the profits in equations (13) and (14), one should hold $\hat{\chi}(T)$ fixed because that belief is shaped by past default probabilities not by current or future ones. Of course, the new default probability $\lambda' > \lambda$ affects how future beliefs $\hat{\chi}(T')$ for $T' > T$ are formed.

importer and that the impact of weak institutions is alleviated by proximity. Table 5 presents tests of these predictions.

Section 3.5 includes several predictions about prices of transactions that occur on different terms and how price differences vary with contractual enforcement in the importer's country. Table 6 presents results of tests of these ideas.

The model also has implications for how the development of trading relationships affects the terms used. Proposition 4 predicts that transactions are more likely to occur on post shipment terms as a relationship develops and the impact of relationships is largest when contractual enforcement is weak. Figure 4 provides suggestive evidence of the impact of the development of a trading relationship, and tests in Tables 7 and 8 analyze the effects of past interactions more carefully. Finally, Section 4.2 also formulates predictions about the effects of the recent economic crisis. Empirical facts related to these predictions appear in Tables 9 and 10. Before turning to the tests, the text describes other data items that are used.

5.1 Other Data Items

Additional data items are based on the exporter's data and a variety of other sources. The transaction-level data from the exporter can also be used to infer attributes of trading relationships between the exporter and importers. It is possible to compute several measures of the extent to which the exporter has established a base of trading experience with a customer. One such measure is the sum of the value of past sales that the exporter has made to a particular customer. Another is the count of the number of past transactions the exporter has engaged in with a particular customer. Each of these provides a proxy for the extent to which the exporter has been able to collect information about a customer and the likely value of the ongoing trade relationship. However, these measures are subject to the concern that the sample begins in 1996 so it is not possible to determine the extent of trade prior to this date. Tests below therefore use 1996 data to compute proxies for trading relationships, but then drop observations from 1996 to test for the effects of relationships. The analysis below also considers if new customers appearing in the data after 1996 receive distinctive financing terms.

Measures of institutional development are merged into the transaction data. In addition to the four proxies for the strength of the enforcement of contracts described above, the analysis below considers four other proxies for institutional quality. Confidence in legal system is drawn from a World Bank Survey of managers on the degree to which they believe the system will uphold contracts and property rights in a business dispute, and higher values imply greater confidence. Duration of legal procedure is taken from Djankov, La Porta Lopez-de-Silanes, and Shleifer (2003), and it measures the total estimated duration in calendar days to pursue a claim on a bounced check. Two outcome based measures of the development of institutions that protect financial claimants are drawn from the World Bank's Financial Structure database. Private Credit is the ratio of private credit by deposit money banks and other financial institutions to GDP, and Stock Market Capitalization is the value of listed shares to GDP.

The analysis also makes use of two other country measures. Distance measures the number of miles from the capital of each country to Washington, DC, and GDP per capita is measured in nominal US dollars and comes from the Economist Intelligence Unit. Several of the areas that the exporter serves are protectorates of other countries, and for these, the analysis assigns the institutional features of the independent state that governs the nonindependent entity. For example, American Samoa is assigned the legal institutions of the U.S. because it is a U.S. territory. Table 3 displays descriptive statistics for the tests described below.²⁵

5.2 The Enforcement of Contracts, Distance, and Financing Terms

The extent to which contractual obligations are likely to be enforced features prominently in the theory developed above. Table 4 presents results of some coefficients generated by multinomial specifications that analyze how proxies for the enforcement of contracts affect the type of financing terms that are chosen. These specifications consider three groupings of financing terms: cash in advance terms, letter of credit terms, and post shipment terms. Measures of the strength of contract enforcement are the dependent variables of interest, and eight different measures are considered, one at a time. Each specification includes a fixed effect for each year and each of the product types depicted in Figure 2 and controls for the log of the distance between Washington, DC and the capital city of the destination country and the log of GDP per capital in the destination country to ensure that measures of the strength of contract enforcement do not pick up the effects of distance or country wealth.

The first column reports coefficient estimates of the effects of the strength of contractual enforcement on the relative choice of cash in advance and post shipment terms. The negative and significant coefficient on the common law dummy in the first column implies that cash in advance terms are less commonly used in countries with a common law legal origin than post shipment terms. The second column reports coefficient estimates for the choice between letter of credit terms and post shipment terms. The negative and significant coefficient in this column implies that letters of credit are also less frequently used in common law countries than post shipment terms. The third column contains coefficient estimates for the choice between cash in advance terms and letter of credit terms. Consistent with the predictions of the model, common law legal origin does not have a significant effect on the relative use of these financing terms. The marginal effects of selling

²⁵The analysis primarily uses data at the invoice level that cover the sale of a specific product to a specific country. Appendix Table 1 illustrates features of the detailed invoice data and how these data relate to orders and annual measures of transactions with a customer. Sales per invoice are highest for invoices associated with letter of credit terms, slightly lower for cash in advance transactions, lower still for documentary collection transactions, and lowest for open account transactions. A customer order can be, and often is, comprised of more than one invoice. Orders occurring on open account terms cover an average of 4.3 invoices, which is more than twice as many invoices as orders occurring on letter of credit or cash in advance terms. Despite this, mean sales per order has the same ordinal ranking across types of terms as mean sales per invoice. This pattern is sensible given that there are fixed costs associated with the creation and use of a letter of credit. Because customers that transact on letter of credit and documentary collection terms place fewer orders per year than customers that transact on cash in advance or open account terms, average annual sales are lower for customers using these terms than the others. Open account terms feature the most orders per year, so that average annual sales are marginally higher for this financing mode relative to cash in advance terms (\$793,397 vs. \$720,341).

to a common law country implied by the results are large. The results predict that moving from a common law country to a country with an alternative legal origin increases the probability that cash in advance terms are used from 4.0% to 31.6%, increases the probability that letter of credit terms are used from 0.5% to 4.2%, and decreases the probability that post shipment terms are used from 95.6% to 64.2%.

Results are largely consistent for other measures of the strength of enforcement of contractual obligations. If contracts are more viable, payment delays are less problematic, contracts are more enforceable, or there is greater confidence in the legal system, transactions are less likely to make use of cash in advance relative to post shipment terms and less likely to make use of letter of credit relative to post shipment terms. Similar choices are associated with outcome based measures of the enforcement of contractual obligations, namely the depth of private credit markets and stock markets, although the private credit variable is not significant in explaining the choice between letter of credit and post shipment terms. When the duration of legal procedures associated with pursuing a claim on a bounced check is longer, cash in advance terms appear to be preferred to post shipment terms and letter of credit terms appear to be preferred to post shipment terms, but this measure is only significant in explaining the second of these relative choices. Only one of the measures of the strength of contractual enforcement has a significant coefficient in explaining the choice between cash in advance terms and letter of credit terms. Private credit is negative and significant, suggesting that cash in advance terms are more frequently used than letter or credit terms when private credit markets are shallow, perhaps reflecting that fees on letters of credit are disproportionately higher in those environments. These findings broadly support the predictions about the effects of the institutional quality of the importer's country that are put forth in propositions 1-3.²⁶

These propositions also have implications for the effects of distance and the interaction of distance and measures of the strength of contractual enforcement. The specifications used to generate the results presented in Table 4 generally produce statistically significant evidence that longer distances are associated with greater use of cash in advance terms relative to post shipment terms and greater use of letter of credit terms relative to post shipment terms, consistent with the predictions. Distance does not have a significant effect on the relative use of cash in advance and letter of credit terms.

One caveat about the results presented in Table 4 is noteworthy. These results emphasize the impact of contractual enforcement in the importer's country, which is denoted by the parameter γ_j in the theory. This parameter measures enforcement of open account financing terms between the exporter and importer as well as the enforcement of loans made by the importer's bank to the

²⁶One sample selection issue is worth noting. The data only include transactions that actually occur. According to the theory, decreases in the institutional quality of the importer's country reduce the profitability of all types of transactions, so transactions in countries with weaker institutions are less likely to occur. If, as suggested by the results, $\mu_B > \mu_X(\tau_{ij})$, unobserved transactions would be more likely to occur on cash-in-advance and letter of credit terms. Therefore, the effect of institutions on the use of these terms relative to post shipment terms would be likely to be larger than indicated in the first two columns of Table 5 if one does not condition on transactions actually occurring.

importer in cash in advance transactions. The model also accounts for the technological efficiency of the banking sector in the importer's country, which is denoted by ρ_j and captures factors that are not related to contractual enforcement and affect funding costs. Unfortunately, there are no clean empirical measures of ρ_j . As a consequence, the estimates in Table 4 might suffer from omitted variable bias. Given that weak contractual enforcement is likely to be associated with weak technological efficiency of banks and that these two conditions are predicted to have opposite effects on the use of cash in advance or letter of credit terms relative to open account terms, any bias that does exist would likely yield underestimates of the magnitude of the effects of contractual enforcement.

Propositions 2 and 3 have implications for analysis of the interaction of distance and contractual enforcement, but this analysis raises the issue that interaction terms can be difficult to interpret in multinomial logit models, as discussed in Ai and Norton (2003). Table 5 presents the results of linear probability specifications in which the dependent variable is a dummy equal to one for transactions that make use of cash in advance or letter of credit terms and zero otherwise. Given that contractual enforcement and distance appear to have similar effects on the use of both cash in advance and letter of credit terms both theoretically and empirically, these are grouped together. These specifications include one of the eight measures of contractual enforcement, a dummy equal to one for sales to destinations that are further away from the US than the mean transaction, the interaction of this dummy with the measure of contractual enforcement, the log of GDP per capita, and year and product fixed effects. Using a dummy to proxy for more remote locations simplifies the exposition and interpretation of the results.

The results indicate that the coefficients on measures of contractual enforcement on their own are typically insignificant, and the coefficients on the distance dummy are typically positive and significant. These results imply that for sales to destinations located close to the US, the extent of contractual enforcement does not impact the financing terms employed and that cash in advance and letter of credit terms are more commonly used for sales to more remote locations. In 6 of the 8 specifications, the coefficient on the interaction of the measures of contractual enforcement and distance is significant. For more remote sales, cash in advance and letter of credit terms are less frequently used when the destination country has a common law legal origin, fewer problems related to payment delays, more enforceable contracts, shorter duration of legal procedures, deeper private credit markets, and larger stock markets. These findings are consistent with the prediction of the theory that proximity mitigates the effects of weak contractual enforcement.

One concern that can be raised about the simple specifications used to produce Tables 4 and 5 is that distance and measures of institutional quality could proxy for the amount of trade that takes place between the exporter and importer. Longer distances and weaker institutions in the importer's country could be associated with lower amounts of trade, and these lower amounts might trigger the use of cash in advance or letter of credit terms. Distance plays this role in Ahn (2010). To check the robustness of the results to this concern, it is possible to include the log of the sales value of the transaction, the log of the sales volume of the transaction, and the log of the sum

of past sales values from the exporter to the importer in the specifications used to generate the results presented in Tables 4 and 5. Doing so does not materially change the results. Another concern is that measures of institutional quality capture the effects of exchange rate volatility. Exporters might prefer cash in advance terms when transacting with customers in countries with more volatile exchange rates. To address this possibility, end of month exchange rates are used to compute the standard deviation in the first difference of exchange rates over a one and five year period. Each of these measures are negatively correlated with measures of institutional quality, as suggested by Acemoglu, Johnson, Robinson, and Thaicharoen (2003). However, including either of these variables in the specifications presented in Tables 4 and 5 does not have a material effect on the results. Finally, in Table 5, distance might capture market centrality. If goods are sold on post shipment terms, it might be more costly to find another buyer for the goods in less central markets. To consider this possibility, the log of the number of importers in each country/year and this value interacted with the measures of contractual enforcement have been included in robustness tests of the results in Table 5. The results are not materially affected.

5.3 Prices

The theory generates several predictions about prices once one controls for sale volumes. Specifically, the prices charged for goods sold on post shipment terms should be higher than the prices charged on cash in advance terms. Furthermore, the differences in these prices should be larger in transactions in which the importer is located in a country with weak contractual enforcement, reflecting the higher probability of default in open account transactions with such importers. In addition, the prices of goods sold on letter of credit terms should be similar to those of goods sold on cash in advance terms. Finally, all prices should appear to be lower in larger transactions.

Table 6 of the paper presents the results of tests of these hypotheses. These tests do not intend to pinpoint any kind of causality; they aim to describe average prices for sales that occur on different terms, conditional on the value of sales, and to exhibit the correlation between prices and the size of a transaction. The dependent variable is the price per pound, and each specification includes a fixed effect for each product/country/Incoterm/year combination. Products that are classified as “Other” products in the data are dropped from the sample for this analysis because they include a wide variety of items. The specification presented in the first column includes a dummy for transactions that occur on letter of credit terms and a dummy for transactions that occur on post shipment terms so that the coefficients on these dummies reflect average prices relative to the prices charged for transactions on cash in advance terms. The coefficient on the post shipment dummy is positive and marginally significant, indicating that prices charged in these transactions are \$0.0326 higher than prices charged in cash in advance transactions. The second column adds a control for the log of the value of sales. The coefficient on this variable is negative and significant, indicating that larger transactions occur at lower prices. In this specification, the coefficient on the post shipment dummy is larger in magnitude and has a higher degree of statistical significance than in the previous specification, reflecting the fact that post shipment transactions typically have a

smaller value than cash in advance transactions.

The third and fourth columns display specifications that are similar to those in the first two columns, but these also include the interaction of the letter of credit and post shipment dummies with a proxy for the strength of contractual enforcement in the importer's country, namely the common law dummy. The positive and significant coefficient on the post shipment dummy in the fourth column implies that prices charged in post shipment term transactions are higher than those charged in cash in advance terms for importers in civil law countries, and the negative and significant coefficient on the interaction of the post shipment dummy and the common law dummy indicates that this price difference is smaller for importers in common law countries. In fact the magnitudes of these coefficients are similar, which suggests that the difference in these prices is negligible in common law countries. This finding is consistent with the idea that prices of transactions that occur on open account terms reflect the higher risk of importer default in weak institutional environments. The coefficients on the letter of credit dummy and interactions including it tend not to be statistically significant throughout the table. Thus, the results are consistent with the theoretical predictions.²⁷

5.4 Creditworthiness, Relationships, and the Crisis

The theory considers the possibility that, within each country, some importers are always patient and honor contracts when they are not enforced while others are stochastically myopic. Exporters learn importers' type by interacting with them. These suppositions generate implications for how financing terms change as a trading relationship develops; these are described in Proposition 5. Specifically, importers that have traded more extensively with the exporter in the past should be more likely to transact on post shipment terms and less likely to transact on cash in advance terms. The strength of contractual enforcement should reduce the impact of the development of an extensive trading relationship.

Table 7 displays the results of tests of these ideas. The specifications presented are linear probability models that explain the use of different financing terms. Each specification includes fixed effects for each customer in each country, so the impact of past interaction is identified off of changes in the financing terms offered to particular customers in particular countries. The specifications also include product fixed effects and year fixed effects, and standard errors are clustered by customer.

To measure the extent to which the exporter and importers have interacted in the past, the specifications in the odd numbered columns include the log of sales to a customer prior to a particular transaction, and the specifications in the even numbered columns include the log of the number of past transactions with a customer. These variables are interacted with a dummy equal to one for common law countries to capture the possibility that an established trading relationship has less of an impact in countries with strong contractual enforcement. The common law dummy

²⁷While it is tempting to use prices to estimate implied interest rates associated with different financing terms, the data do not contain sufficient detail about the timing of payments to perform the required calculations.

is not included on its own because it is subsumed by the fixed effect for each customer in each country. Specifications also include controls for the log of sales value, the log of sales volume, and the log of GDP per capita.

The dependent variable in the first two columns is a dummy variable equal to one for transactions that occur on cash in advance terms. The -0.0223 coefficient on the log of previous sales in column 1 indicates that transactions with a customer are less likely to occur on cash in advance terms as the value of past transactions with that customer increases. The magnitude of this coefficient implies that a one standard deviation increase in the log of previous sales is associated with a 3.7% decrease in the use of cash in advance terms. The 0.0218 coefficient on the log of previous sales interacted with the common law dummy offsets the coefficient on the log of previous sales on its own and indicates that the effect of the development of a trading relationship are not operative in common law countries but only in other countries. The second column presents results using an alternative measure of the development of the relationship between the exporter and the importer, and the results are similar.

Columns 3 and 4 repeat these specifications but the dependent variable is a dummy equal to one for transactions that occur on letter of credit terms. Although the effects of the development of a relationship on letter of credit use is not explicitly considered in the model, it is considered empirically nonetheless. Measures of the development of a trading relationship do not have a significant effect on the use of this type of financing term in common law or other countries. One possible explanation for this finding is that the exporter and banks may not learn as much about importers in letter of credit transactions as they do in cash in advance transactions because of collateral requirements and limited interaction.

The dependent variable in columns 5 and 6 is a dummy equal to one for transactions that occur on post shipment terms, and the results mirror those in columns 1 and 2. As customers develop a relationship with the exporter, they are more likely to trade on post shipment terms, and the effects of past experience are not significant for transactions with countries with stronger enforcement of contracts.²⁸

The tests presented in Table 8 provide further evidence of the impact of relationships by providing insight on the financing terms offered to new customers, and it also informs the question of how financing terms offered to new customers changed during the recent economic crisis, a question considered theoretically in Section 4.2. As in Table 7, the dependent variables are dummies equal to one for transactions using cash in advance terms in columns 1 and 2, letter of credit terms in columns 3 and 4, and post shipment terms in columns 5 and 6. The specifications include a new customer dummy, a crisis dummy, the interaction of the new customer and crisis dummy, country fixed effects, product fixed effects, and year fixed effects.²⁹

²⁸Shocks experienced by individual importers could increase their purchases and their creditworthiness, and the results might merely reflect the impact of these kinds of shocks. To address this issue, it is possible to use a proxy for the nature of the relationship between the exporter and the importer that is computing using the importer's initial level of purchases and the subsequent growth of the importer's country. Results using this technique are similar to those presented in the paper.

²⁹While the tests presented in Table 7 include customer/country fixed effects, product fixed effects, and year fixed

The new customer dummy is a dummy equal to one for observations related to the initial transaction with a customer, and the coefficient reveals if financing terms used for new customers are distinctive when compared to those used for other customers within a particular country. The positive and significant coefficient on this dummy in column 1 indicates that new customers are more likely to transact on cash in advance terms than established customers. The coefficient on the crisis dummy, which is equal to one for transactions that are booked from October 2008-December 2009, is insignificant, but it is difficult to interpret given the use of year fixed effects. The positive and significant coefficient on the new customer dummy interacted with the crisis dummy is perhaps more telling. Consistent with the theoretical prediction, it indicates that the exporter is more likely to transact with new customers on cash in advance terms during the crisis than it was before the crisis. The test presented in column 2 of Table 8 controls for the log of sales value, the log of sales volume, and the log of GDP per capita, and the results are similar to those presented in column 1.

Tests presented in columns 3 and 4 of Table 8 analyze the extent to which transactions occur on letter of credit terms. The results indicate that trade with new customers is more likely to occur on letter of credit terms. This effect does not appear to be more pronounced during the crises.

Columns 5 and 6 present the findings of analysis of the use of post shipment terms. These mirror the results in columns 1 and 2. New customers are less likely to receive post shipment terms, especially during the crisis.

The economic events of late 2008 and 2009 had a large impact on trading generally; demand fell significantly, and importers and exporters questioned whether counterparties that had exhibited creditworthy behavior in the past would continue to do so. In the theoretical framework developed above, a demand and liquidity shock reduce the profitability of transactions that make use of all types of financing terms. However, the decline in activity is predicted to be greatest for customers that transact with the exporter on cash in advance terms prior to the crisis.

Table 9 presents descriptive statistics of growth rates around the time of the crisis that are consistent with this prediction. As indicated in the first row of the table, the exporter's sales fell by 16.28% between the first three quarters of 2008 and the subsequent three quarters. The second row displays the extent to which sales that occurred on different financing terms contributed to this decline, and sales on cash in advance terms accounted for 10.26% of the decline while sales on open account terms accounted for 3.46% of the decline. Because 50.3% of sales in the first three quarters of 2008 occurred on cash in advance terms and 34.6% of sales occurred on open account terms, the decline in sales on cash in advance terms was disproportionately large.

The subsequent rows in the table decompose the overall growth rates into growth in the intensive margin, which accounts for 13.4% of the decline, and changes due to exit and entry which account for -8.75% and 5.91% of the overall growth respectively. Within each component, changes in sales that occur on cash in advance terms are disproportionately large.

These patterns are analyzed in a regression framework in specifications that appear in Table 10.

effects, those in Table 8 include country fixed effects, product fixed effects, and year fixed effects. Identifying effects off of within customer variation is undesirable because the sample period ends before the crisis subsides so it is not possible to observe how the terms offered to customer that were new during the crisis change after the crisis.

The dependent variable in columns 1 and 2 captures intensive margin growth and growth due to exit. It is equal to the change in sales between the first three quarters of 2008 and the subsequent three quarters scaled by the sum of sales in these two periods for customers that remain active, and it is set equal to -1 for customers that only purchase goods in the pre-crisis period.³⁰ The 0.1557 coefficient on the share of pre-crisis sales on post shipment terms variable indicates that customers that were purchasing goods on these terms before the crisis reduce their sales less than other customers during the crisis. The coefficient remains positive and significant in the specification in column 2, which also controls for the log of pre-crisis sales value and volume. The 0.1646 coefficient implies that customers that conducted none of their purchases on post shipment terms before the crisis decreased sales by 16.5% more than customers that conducted all of their sales on these terms.

The next four columns present results for intensive margin growth and growth that is a consequence of exit separately. In columns 3 and 4, the dependent variable is similar to the one used in columns 1 and 2, but observations in which the customer purchases goods before the crisis but not during the crisis are dropped from the sample. The results in column 3 indicate that customers that transact on post shipment terms experience a smaller decline in sales on the intensive margin than other customers, but the effect of financing terms is smaller and insignificant when the specification includes the log of sales value and volume, as in column 4. Columns 5 and 6 present results of linear probability models in which the dependent variable is equal to one for customers that remain active during the crisis, and results of these tests illustrate that customers that purchase a larger share of goods on post shipment terms are more likely to remain active.

Taken together, the results in the paper generate two main insights about the effect of the recent crisis. First, the impact of the crisis on trade is shaped by how trade is financed. Importers that were transacting with the exporter on cash in advance terms before the crisis decrease their purchases by larger amounts. The theory and empirics generate strong results for changes on the extensive margin, but they are more ambiguous concerning changes on the intensive margin. Second, offsetting factors cause the relative use of different financing terms to remain fairly stable. These changes in sales to customers that were active before the crisis do not reflect the appearance of new customers, and the exporter transacted with such customers on primarily cash in advance terms. As a consequence, the share of sales occurring on cash in advance terms decreases slightly, from 50.3% to 47.9% between the first three quarters of 2008 and the next three quarters.

6 Conclusion

Existing research does not explain what kinds of financing terms are used to support trade in different circumstances, and how and why these arrangements affect trade. Few theoretical frameworks characterize how trade is financed, and a dearth of data limits empirical efforts. This paper attempts to push research on this topic forward. It begins by presenting insights that emerge from a descriptive analysis of detailed transaction level data from a U.S. exporter. This analysis yields a

³⁰This approach is used in other work, including Dunne, Roberts, and Samuelson (1989).

few basic facts that motivate a model which in turn generates empirical predictions that are tested more rigorously.

Three main conclusions emerge. First, firms that are likely to have the highest costs of obtaining external capital appear to be the ones that need it in order to finance transactions. Descriptive statistics and regression analyses that consider a variety of proxies for the strength of contractual enforcement reveal that importers are more likely to transact on cash in advance terms in countries where contracts are less likely to be honored. 63.8% of sales to importers in civil law countries occur on cash in advance terms, but only 4.0% of sales to importers in common law countries occur on these terms. This pattern can be rationalized in a model in which banks in the importing country are more effective than the exporter in pursuing claims against importers.

Second, firms in weak institutional environments are able to overcome the constraints of such environments if they can establish a relationship with their trading partners. Examination of descriptive data and analysis of how financing terms offered to specific customers change over time show that as a relationship develops between trading partners, concerns about contractual enforcement seem to subside, and transactions are more likely to occur on post shipment terms. These findings are consistent with the predictions of a dynamic theoretical framework in which importers are either patient and do not default when contracts are not enforced or are stochastically myopic and face liquidity shocks with some probability that cause them to default when contracts are not enforced. The exporter learns about the importer's type by transacting with him and becomes more willing to finance transactions through open account terms as a relationship develops.

The third conclusion is that the manner in which trade is financed shapes the impact of macroeconomic and financial crises like the recent one. Using the theoretical framework developed in the paper, crises can be modelled as a decrease in demand and an increase in the likelihood that liquidity shocks occur. Under these circumstances, importers that were transacting on cash in advance terms before the crisis reduce their purchases the most, a pattern that appears in the data.

Additional research on how trade is financed could make novel contributions. Although survey evidence suggests that the relative use of alternative financing terms and that the impact of contractual enforcement on the choice of financing terms are similar for other firms, analysis of how trade is financed in other settings could reveal new insights about how contracting problems affect international economic activity and the value of alternative types of collateral. For example, product characteristics might shape financing terms and, in turn, levels of trade. Exporters of commodities might be more willing to trade on letter of credit terms because these goods are a more attractive form of collateral, but exporters of differentiated goods might be more likely to require the use of cash in advance terms. Studies of the firm level dynamics of trade rarely account for considerations about how trade is financed, but financing effects could be significant and correlated with more commonly studied effects. Transitions of firms into and out of international trade activity could reflect liquidity shocks and learning about which firms are creditworthy rather than learning about demand. The growth and productivity of traders could reflect the relaxation of a financial constraint rather than some type of spillover. These topics are left for future research.

References

- Acemoglu, Daron, Simon Johnson, James Robinson, and Yuyong Thaicharoen, 2003, "Institutional Causes, Macroeconomic Symptoms: Volatility, Crises, and Growth," *Journal of Monetary Economics* 50, pp. 49-123.
- Ai, Chunrong, and Edward C. Norton, 2003, "Interaction Terms in Logit and Probit Models," *Economic Letters* 80, pp. 123-129.
- Ahn, JaeBin, 2010, "A Theory of Domestic and International Trade Finance," working paper.
- Alessandria, George, Joseph Kaboski, and Virgiliu Midrigan, forthcoming, "The Great Trade Collapse of 2008-2009: An Inventory Adjustment?" *IMF Economic Review*.
- Amiti, Mary, and David Weinstein, 2010, "Exports and Financial Shocks," NBER Working Paper 15556.
- Antràs, Pol, 2003, "Firms, Contracts, and Trade Structure," *Quarterly Journal of Economics* 118 (4), pp. 1375-1418.
- Antràs, Pol, 2005, "Incomplete Contracts and the Product Cycle," *American Economic Review* 95 (4), pp. 1054-1073.
- Antràs, Pol, and Ricardo Caballero, 2009, "Trade Flows and Capital Flows: A Financial Frictions Perspective," *Journal of Political Economy* 117 (4), pp. 701-744.
- Antràs, Pol, Mihir Desai, and C. Fritz Foley, 2009, "Multinational Firms, FDI Flows and Imperfect Capital Markets," *Quarterly Journal of Economics* 124 (3), pp. 1171-1219.
- Antràs, Pol, and Elhanan Helpman, 2004, "Global Sourcing," *Journal of Political Economy* 112 (3), pp. 552-580.
- Antràs, Pol and Elhanan Helpman, 2008, "Contractual Frictions and Global Sourcing," forthcoming in E. Helpman, D. Marin, and T. Verdier (eds.), *The Organization of Firms in a Global Economy*, Harvard University Press.
- Araujo, Luis, and Emanuel Ornelas, 2007, "Trust-Based Trade," working paper.
- Auboin, Marc, 2009, "Restoring Trade Finance: What the G20 Can Do," in *The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20*, ed. Richard Baldwin and Simon Evenett, London: Center for Economic Policy Research.
- Banerjee, Abhijit V., and Esther Duflo, 2000, "Reputation Effects and the Limits of Contracting: A Study of the Indian Software Industry," *Quarterly Journal of Economics* 115(3), pp. 989-1017.
- Baldwin, Richard, and Simon Evenett, eds., 2009, *The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20*, London: Center for Economic Policy Research.
- Beck, Thorsten, 2002, "Financial Development and International Trade: Is There a Link?" *Journal of International Economics* 57(1), pp. 107-131.
- Burkart, Mike and Tore Ellingsen, 2004, "In-Kind Finance: A Theory of Trade Credit," *American Economic Review* 94 (3), pp. 569-590.
- Chaney, Thomas, 2005, "Liquidity Constrained Exporters," working paper.

- Chor, Davin and Kalina Manova, 2009, "Off the Cliff and Back? Credit Conditions and International Trade during the Global Financial Crisis," working paper
- Cuñat, Vicente M., 2007, "Trade Credit: Suppliers as Debt Collectors and Insurance Providers," *The Review of Financial Studies* 20 (2), pp. 491-527.
- Desai, Mihir, and C. Fritz Foley, and James R. Hines Jr., 2010, "Trade Credit and Taxes," working paper.
- Desai, Mihir, and C. Fritz Foley, and James R. Hines Jr., 2004, "A Multinational Perspective on Capital Structure Choice and Internal Capital Markets," *Journal of Finance* 59 (6), pp. 2451-2488.
- Djankov, Simeon, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer, 2003, "Courts," *Quarterly Journal of Economics* 118 (2), pp. 453-517.
- Dunne, Timothy, Mark J. Roberts, and Larry Samuelson, 1989, "The Growth and Failure of U.S. Manufacturing Plants," *Quarterly Journal of Economics* 104(4), pp. 671-698.
- Eaton, Jonathan, Sam Kortum, Brent Neiman, and John Romalis, 2010, "Trade and the Global Recession," working paper.
- Foley, C. Fritz, Matthew Johnson, and David Lane, 2010, "Note on International Trade Finance," Harvard Business School Note 9-211-007.
- Giannetti, Mariassunta, Mike Burkart and Tore Ellingsen, forthcoming, "What You Sell Is What You Lend? Explaining Trade Credit Contracts," *Review of Financial Studies*.
- Greif, Avner, 1993, "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition," *American Economic Review* 83(3), pp. 525-548.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2004, "The Role of Social Capital in Financial Development," *American Economic Review* 94(3), pp. 526-556.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2009, "Cultural Biases in Economic Exchange?," *Quarterly Journal of Economics* 124(3), pp. 1095-1131.
- Hart, Oliver and John H. Moore, 1994, "A Theory of Debt Based on the Inalienability of Human Capital," *Quarterly Journal of Economics* 109, pp. 841-879.
- Hummels, David L. and Georg Schaur, 2010, "Hedging Price Volatility Using Fast Transport," *Journal of International Economics* 82 (2010) 15-25.
- Iacovone, Leonardo, and Veronika Zavacka, 2009, "Banking Crises and Exports: Lessons from the Past," World Bank Policy Research Working Paper 5016.
- Knack, Stephen, and Philip Keefer, 1995, "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," *Economics and Politics* 7(3), pp. 207-227.
- Kletzer, Kenneth, and Pranab Bardhan, 1987, "Credit Markets and Patterns of International Trade," *Journal of Development Economics* 27(1-2), pp. 57-70.
- La Porta, Rafael, Florencio Lopez-De-Silanes, Andrei Shleifer, and Robert W. Vishny, 1998, "Law and Finance," *Journal of Political Economy* 106 (6), pp. 1113-1155.
- Levchenko, Andrei, 2007, "Institutional Quality and International Trade " *Review of Economic Studies*, 74(3), pp. 791-819.

- Levchenko, Andrei A., Logan Lewis, and Linda L. Tesar, 2009, "The Collapse of International Trade during the 2008-2009 Crisis: In Search of the Smoking Gun," NBER Working Paper.
- Macchiavello, Rocco, 2010, "Development Uncorked: Reputation Acquisition in the New Market for Chilean Wines in the UK," mimeo University of Warwick.
- Manova, Kalina, 2008, "Credit Constraints, Equity Market Liberalizations, and International Trade," *Journal of International Economics* 76(1), pp. 33-47.
- Manova, Kalina, 2010, "Credit Constraints, Heterogeneous Firms, and International Trade," working paper.
- McMillan, John, and Christopher Woodruff, 1999, "Interfirm Relationships and Informal Credit in Vietnam," *Quarterly Journal of Economics* 114(4), pp. 1285-1320.
- Melitz, Marc, 2003, "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica* 71(6), pp. 1695-1725.
- Milgrom, Paul R., Douglas C. North, and Barry R. Weingast, "The Role of Institutions in the Revival of Trade: The Law Merchant, Private Judges, and the Champagne Fairs," *Economics and Politics* 2(1), pp. 1-23.
- Nunn, Nathan, 2007, "Relationship-Specificity, Incomplete Contracts and the Pattern of Trade," *Quarterly Journal of Economics* 122 (2), pp. 569-600.
- Ng, Chee K., Janet Kiholm Smith and Richard L. Smith, 1999, "Evidence on the Determinants of Credit Terms Used in Interfirm Trade," *The Journal of Finance* 54 (3), pp. 1109-1129.
- Olsen, Morten, 2010, "Banks in International Trade: Incomplete International Contract Enforcement and Reputational Concerns," working paper.
- Paravisini, Daniel, Veronica Rappoport, Philipp Schnabl, and Daniel Wolfenzon, 2011, "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data," working paper.
- Petersen, Michell A. and Raghuram G. Rajan, 1997, "Trade Credit: Theories and Evidence," *The Review of Financial Studies* 10 (3), pp. 661-691.
- Rauch, James E., 2001, "Business and Social Networks in International Trade," *Journal of Economic Literature* 39(4), pp. 1177-1203.
- Schmidt-Eisenlohr, Tim, 2009, "Towards a Theory of Trade Finance," European University Institute working paper.
- Stephens, Malcolm, 1998, "Export Credit Agencies, Trade Finance, and South East Asia," IMF Working Paper WP/98/175.
- Thomas, Jonathan and Tim Worrall, 1994, "Foreign Direct Investment and the Risk of Expropriation," *Review of Economic Studies*, 61:1, pp. 81-108.
- Wang, Jian-Ye, and Marcio Ronci, eds., 2006, *Access to Trade Finance in Times of Crisis*, Washington DC: International Monetary Fund.

Figure 1

Share of Aggregate 1996-2009 Sales by Destination Region

Notes: This figure displays the share of aggregated 1996-2009 sales directed to different regions of the world.

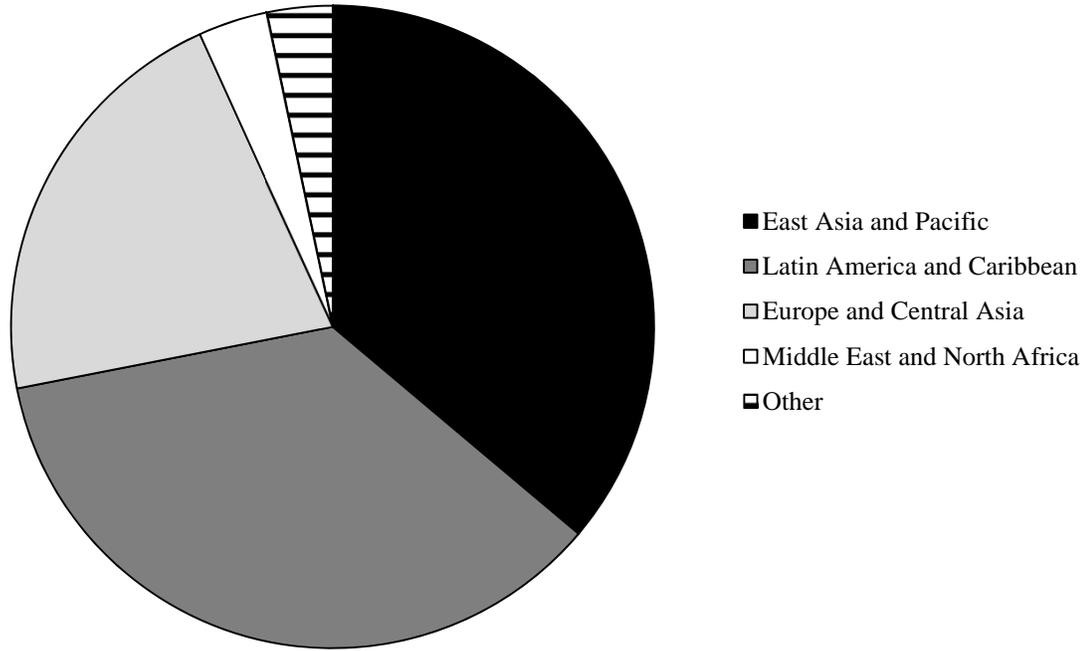


Figure 2

Share of Aggregate 1996-2009 Sales by Product

Notes: This figure displays the share of aggregated 1996-2009 sales by product category.

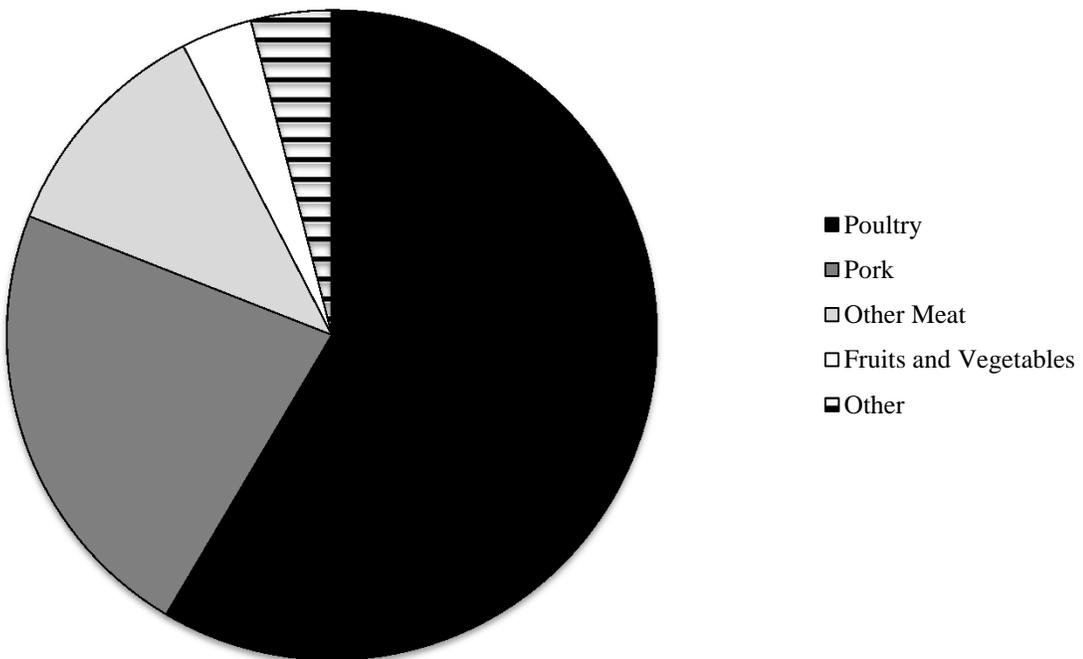
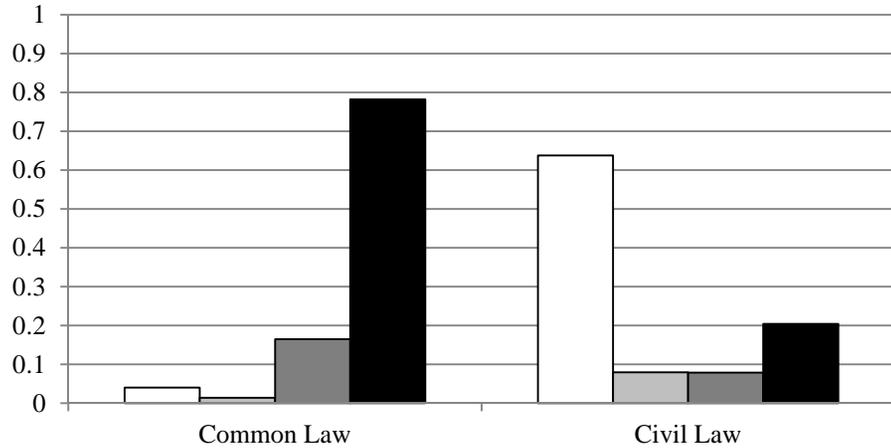


Figure 3

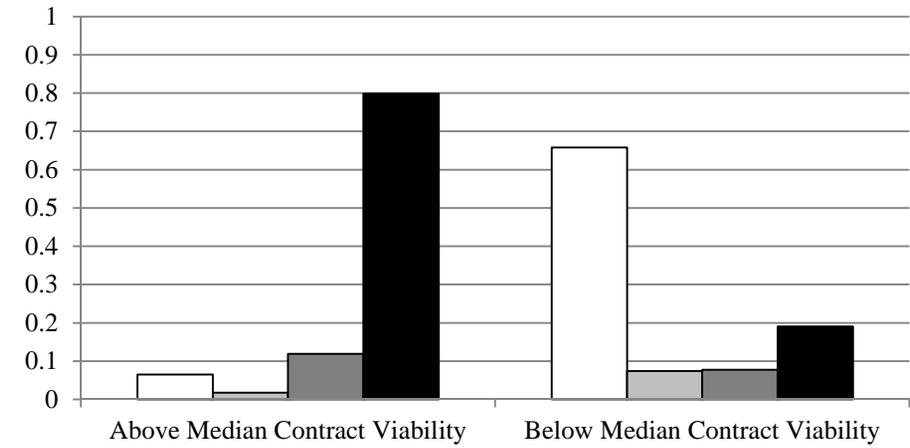
Financing Terms and the Enforcement of Contracts

Notes: This figure displays the share of sales that occur on different terms to jurisdictions classified using measures of the strength of the enforcement of contracts. The clear bar within each set illustrates the share of sales on cash in advance terms, the next bar illustrates the share of sales on letter of credit terms, the next bar illustrates the share of sales on documentary collection terms, and the final bar illustrates the share of sales on open account terms. Contract viability is drawn from the International Country Risk Guide, and it measures the risk of contract modification or cancellation with higher values indicating lower risks. Payment Delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and exporting payments from a country with higher values indicating lower risks. Enforcement of Contracts comes from Knack and Keefer (1995) and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement.

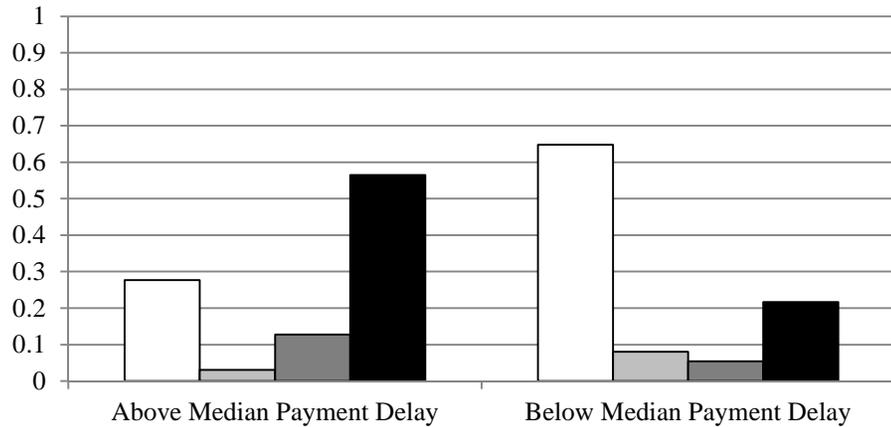
Panel A: Legal Origin



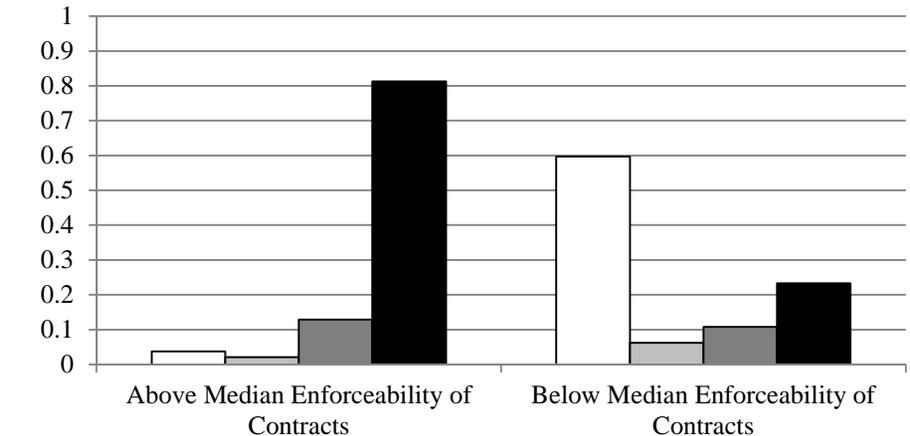
Panel B: Contract Viability



Panel C: Payment Delay



Panel D: Enforceability of Contracts



□ Cash in Advance □ Letter of Credit ■ Documentary Collections ■ Post shipment

Figure 4

Cash in Advance Share and Cumulative Customer Sales

Notes: This figure displays the share of transactions that occur on cash in advance terms as function of the value of past transactions with a customer. Each bar represents the share when cumulative transactions with a customer in a particular location lie between the values displayed on the x axis.

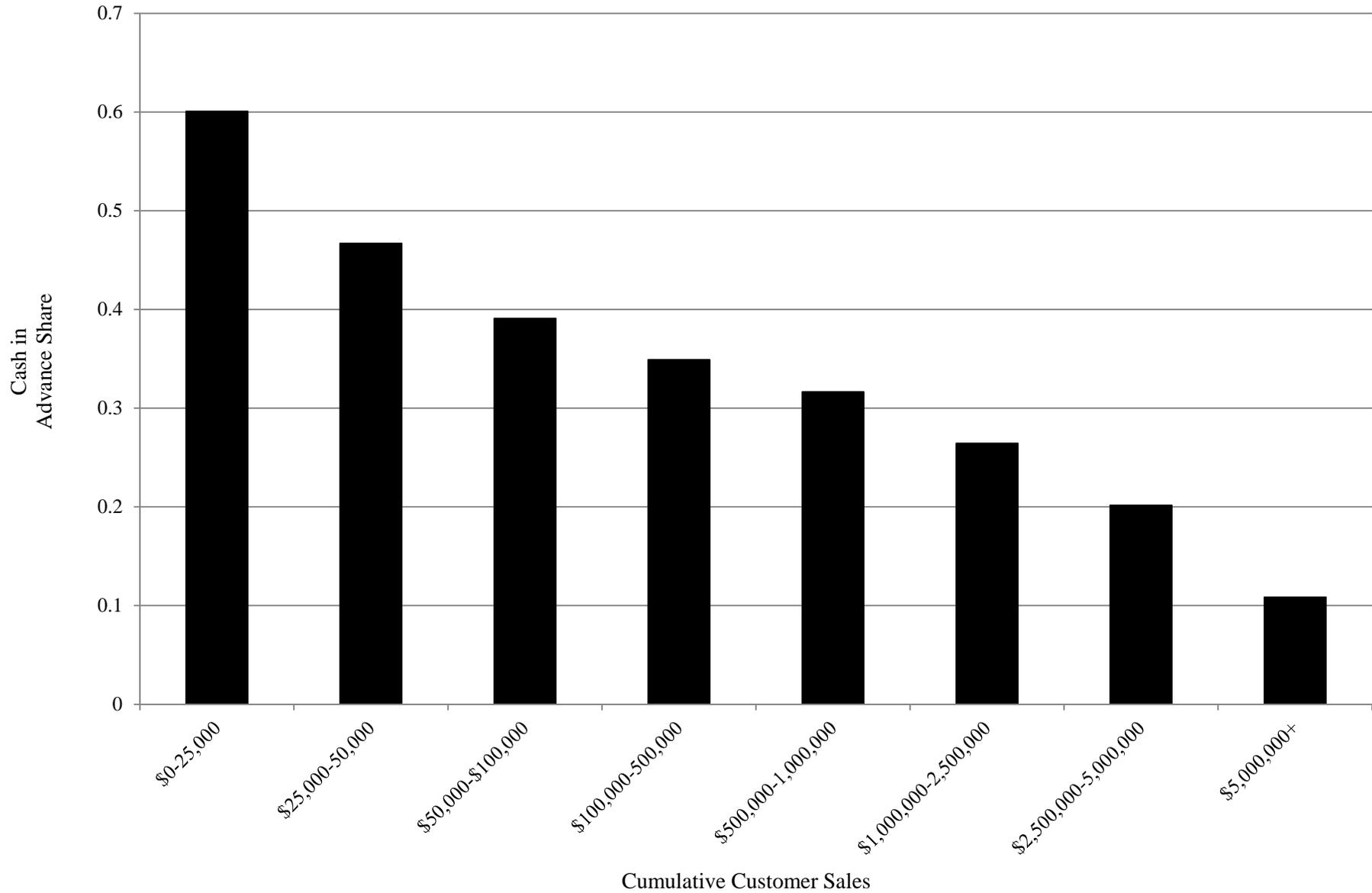
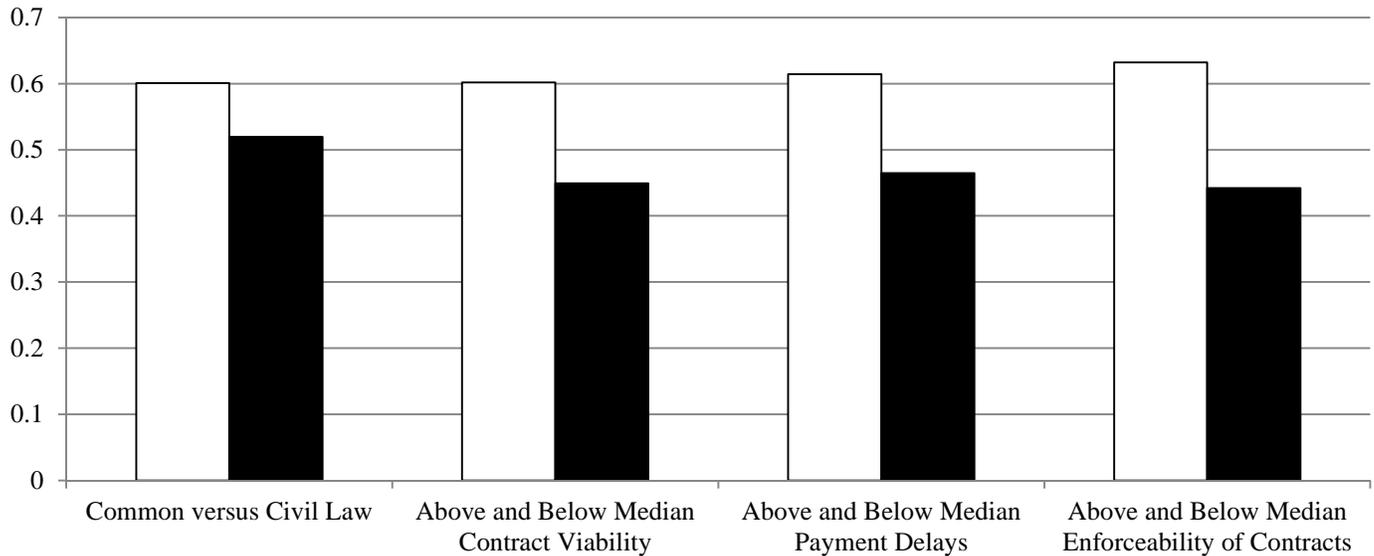


Figure 5

Comparison with Survey Data

Notes: This figure displays data from two sources on the use of open account terms for sales in 2009. The top panel shows the average extent to which open account terms are the top payment method used for sales to jurisdictions classified using measures of the strength of the enforcement of contracts. It is constructed using data from FCIB, a trade association of export credit and trade finance specialists. The lower panel shows similar measures computed using the data analyzed throughout the paper. The first two bars respectively illustrate common law and civil law countries, the next two are for countries with above and below median measures of contract viability, the next two are for countries with above and below median measures of payment delays, and the last two are for countries with above and below median measures of the enforceability of contracts. Contract viability is drawn from the International Country Risk Guide, and it measures the risk of contract modification or cancellation with higher values indicating lower risks. Payment Delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and exporting payments from a country with higher values indicating lower risks. Enforcement of Contracts comes from Knack and Keefer (1995) and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement.

Panel A: FCIB Survey Data



Panel B: Exporter Data

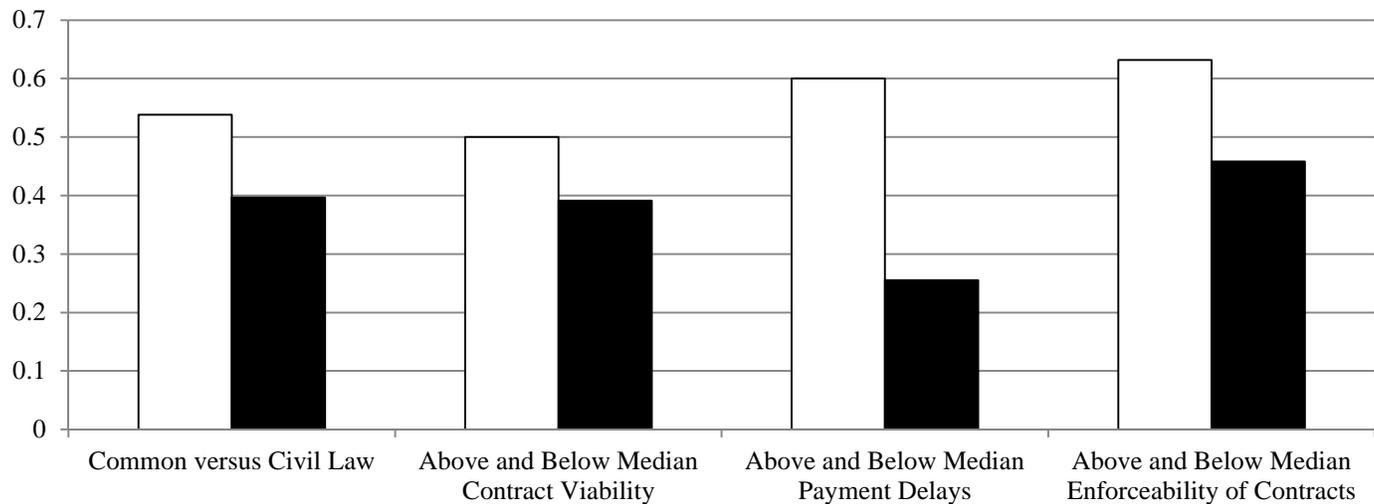


Figure 6

Financing Terms and Prices per Pound

Notes: This figure displays the value weighted price per pound charged for sales that occur on different financing terms.

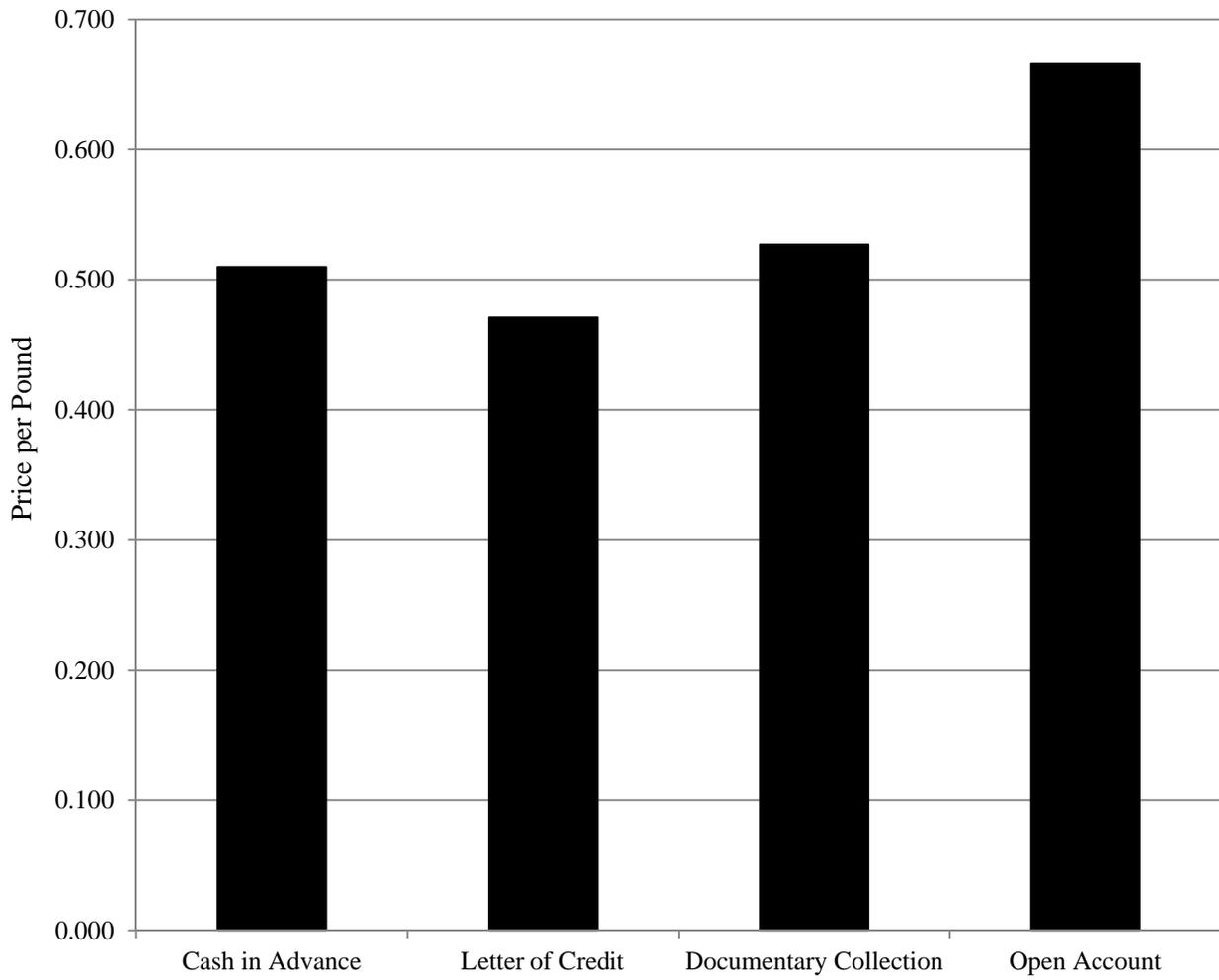


Figure 7

Financing Terms, Repeated Interactions, and a Fall in Demand

This figure illustrates the relationship between the expected profitability of transactions under post shipment terms and cash in advance terms as a function of the number of past transactions. The dashed curves indicate the impact of a fall in demand.

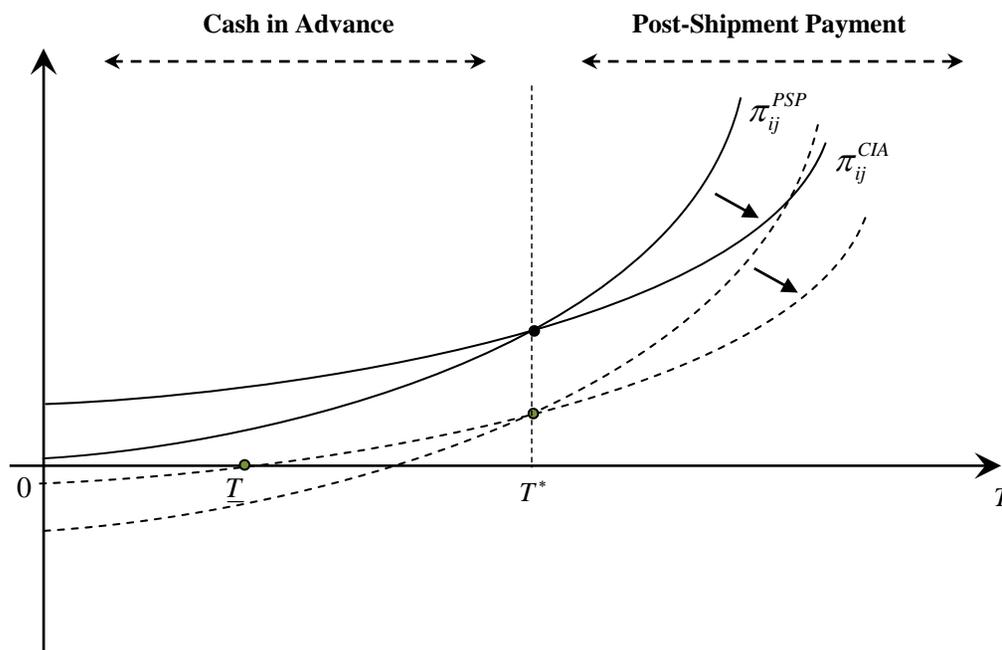


Figure 8

Financing Terms, Repeated Interactions, and a Fall in the Share of Trustworthy Importers

This figure illustrates the relationship between the expected profitability of transactions under post shipment terms and cash in advance terms as a function of the number of past transactions. The dashed curves indicate the impact of a fall in the share of trustworthy importers.

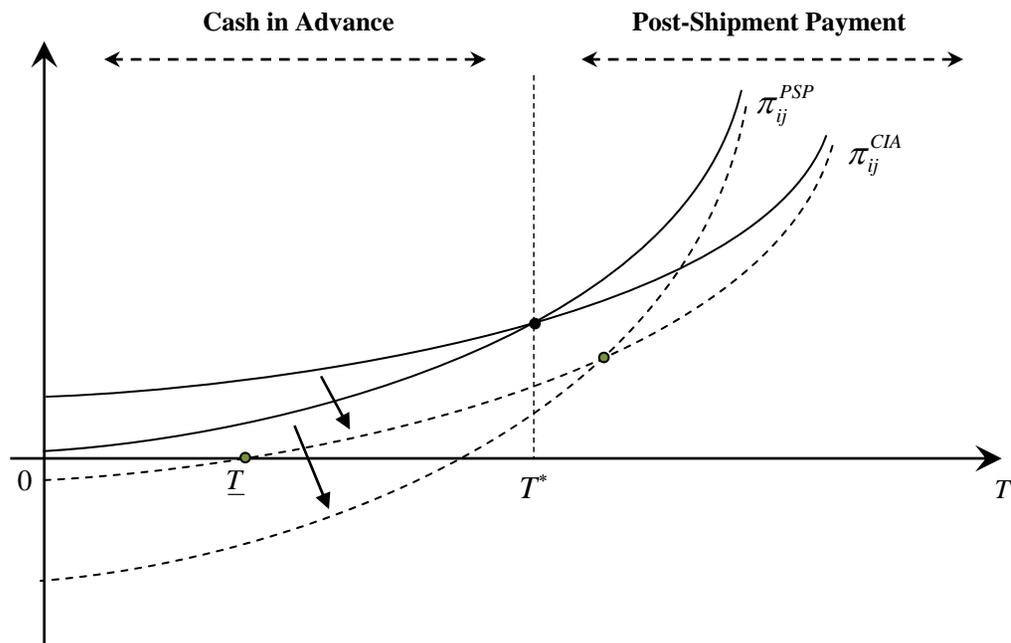


Table 1
Categories of Financing Terms

Notes: This table displays the twenty most commonly used financing terms and how these terms are assigned to the four categories of terms that appear in the first row.

| Cash In Advance | Letter of Credit | Documentary Collection | Open Account |
|---|------------------|------------------------|--------------------------------------|
| Wire transfer in advance | Letter of credit | Sight Draft | Net 7 days after arrival |
| Wire transfer upon receiving fax | | | Net 7 allow 21 |
| 20% deposit, 80% wire transfer in advance | | | Net 7 allow 30 |
| 10% wire transfer in advance, 90% prior to arrival | | | Net 14 days after arrival |
| 10% wire transfer in advance, 90% 3 days prior to arrival | | | Net 15 days after arrival |
| 30% deposit, 70% 7 days prior to arrival | | | Net 21 days after arrival |
| 30% deposit, 70% estimated time of arrival | | | Net 21 days after delivery |
| 15% deposit, 85% prior to arrival | | | Net 30 days after arrival |
| | | | Net 30 days after delivery |
| | | | Net 45 days from bill of lading date |

Table 2**Relative Use of Financing Terms**

Notes: This table displays the value weighted share of sales that occur under different financing terms for the full sample and several subsamples.

| Sample | Cash in Advance Share | Letter of Credit Share | Documentary Collection Share | Open Account Share |
|---------------|-----------------------|------------------------|------------------------------|--------------------|
| All Customers | 44.0% | 5.8% | 11.0% | 39.2% |
| New Customers | 51.2% | 15.2% | 13.8% | 19.8% |

Table 3
Descriptive Statistics

Notes: The cash in advance dummy, letter of credit dummy, and post delivery dummy are dummies equal to one for transactions that occur on cash in advance, letter of credit, or post delivery terms, respectively. Common Law Dummy is a dummy equal to one for countries with a common law legal origin. Contract viability is drawn from the International Country Risk Guide, and it measures the risk of contract modification or cancellation with higher values indicating lower risks. Payment Delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and exporting payments from a country with higher values indicating lower risks. Enforcement of Contracts comes from Knack and Keefer (1995) and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement. Confidence in Legal System is drawn from a World Bank Survey of manager on the degree to which they believe the system will uphold contracts and property rights in a business dispute, and higher values imply greater confidence. Duration of Legal Procedure is taken from Djankov et al. (2003), and it measures the total estimated duration in calendar days to pursue a claim on a bounced check. Private Credit is the ratio of private credit by deposit money banks and other financial institutions to GDP, and Stock Market Capitalization is the value of listed shares to GDP. Distance measures the distance from Washington DC to the capital city of a country. Price per pound is the ratio of the value of sales to the weight of sales in a particular transaction. Sales value is measured in dollars and sales volume is measured in pounds. The log of previous sales is the log of aggregate sales to a customer location prior to a transaction, and the log of the number of previous transactions is the log of the count of transactions to a customer location prior to a transaction. The log of previous year sales to country is the lagged value of the log of the aggregate level of sales to a country. Customer remains active dummy is a dummy equal to one for customers that purchase goods in the pre-crisis and post-crisis periods and zero for customers that only purchase goods in the pre-crisis period. The pre-crisis period covers January-September 2008, and the post-crisis period covers January-September 2009. Customer sales growth is the growth in sales to customers measured as the difference between sales in the post-crisis period and sales in the pre-crisis period, scaled by the sum of sales in the pre- and post-crisis periods. Share of pre-crisis sales on cash in advance terms, letter of credit terms, and post shipment terms measure the share of purchases by a customer during the pre-crisis period that occurred on cash in advance terms, letter of credit terms, and post shipment terms respectively. Log of pre-crisis sales value is the log of pre-crisis sales measured in millions of dollars, and the log of pre-crisis sales volume is the log of pre-crisis sales measured in pounds.

| | <u>Mean</u> | <u>Standard Deviation</u> |
|---|-------------|---------------------------|
| Cash in Advance Dummy | 0.1768 | 0.3815 |
| Letter of Credit Dummy | 0.0177 | 0.1320 |
| Post Shipment Dummy | 0.8055 | 0.3958 |
| Common Law Dummy | 0.7000 | 0.4582 |
| Contract Viability | 3.6549 | 0.5079 |
| Payment Delay | 3.6421 | 0.6292 |
| Enforceability of Contracts | 7.8146 | 1.5151 |
| Confidence in Legal System | 4.1302 | 0.4046 |
| Duration of Legal Procedure | 102.41 | 98.12 |
| Private Credit | 1.3874 | 0.6881 |
| Stock Market Capitalization | 1.0996 | 0.5356 |
| Log of distance | 7.8477 | 0.6999 |
| Log of GDP per capita | 2.2873 | 0.9432 |
| Price per Pound | 1.3201 | 1.3639 |
| Log of Sales Value | 7.5839 | 2.2348 |
| Log of Sales Volume | 7.3905 | 2.9390 |
| Log of Previous Sales | 15.5154 | 1.6494 |
| Log of Previous Number of Transactions | 7.2120 | 2.4946 |
| Customer Remains Active Dummy | 0.6438 | 0.4792 |
| Customer Sales Growth | -0.0933 | 0.4298 |
| Share of Pre-crisis Sales on Cash in Advance Terms | 0.4593 | 0.4941 |
| Share of Pre-crisis Sales on Letter of Credit Terms | 0.0573 | 0.2283 |
| Share of Pre-crisis Sales on Post Shipment Terms | 0.4835 | 0.4958 |
| Log of Pre-crisis Sales Value | 12.4560 | 1.5967 |
| Log of Pre-crisis Sales Volume | 12.6069 | 1.9923 |

Table 4**Financing Terms and Enforcement of Contracts**

Notes: This table displays estimates of coefficients from multinomial logit specifications that explain the choice to use cash in advance, letter of credit, or post shipment financing terms. The specifications include one of the country variables listed in the first column, the log of distance, the log of GDP per capita, product fixed effects, and year fixed effects. Common Law Dummy is a dummy equal to one for countries with a common law legal origin. Contract viability is drawn from the International Country Risk Guide, and it measures the risk of contract modification or cancellation with higher values indicating lower risks. Payment Delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and exporting payments from a country with higher values indicating lower risks. Enforcement of Contracts comes from Knack and Keefer (1995) and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement. Confidence in Legal System is drawn from a World Bank Survey of manager on the degree to which they believe the system will uphold contracts and property rights in a business dispute, and higher values imply greater confidence. Duration of Legal Procedure is taken from Djankov et al. (2003), and it measures the total estimated duration in calendar days to pursue a claim on a bounced check. Private Credit is the ratio of private credit by deposit money banks and other financial institutions to GDP, and Stock Market Capitalization is the value of listed shares to GDP. Distance measures the distance from Washington DC to the capital city of a country. Standard errors that correct for clustering by country appear in parentheses below coefficients. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Type of Financing Terms: | Cash in Advance vs. Post Shipment | Letter of Credit vs. Post Shipment | Cash in Advance vs. Letter of Credit |
|-----------------------------|-----------------------------------|------------------------------------|--------------------------------------|
| Common Law Dummy | -3.4771 (0.4588)*** | -3.0738 (0.8025)*** | -0.4034 (0.9841) |
| Contract Viability | -2.5363 (0.4779)*** | -2.5524 (1.2302)** | 0.0161 (1.1160) |
| Payment Delay | -1.3170 (0.5972)** | -2.2725 (0.7969)*** | 0.9554 (0.7352) |
| Enforceability of Contracts | -0.4833 (0.2870)* | -0.8200 (0.3564)** | 0.3366 (0.4929) |
| Confidence in Legal System | -1.2799 (0.3546)*** | -0.9118 (0.1952)*** | -0.3681 (0.3642) |
| Duration of Legal Procedure | 0.0004 (0.0023) | 0.0027 (0.0016)* | -0.0024 (0.0024) |
| Private Credit | -2.1980 (0.6774)*** | -0.3006 (0.4290) | -1.8974 (0.7322)** |
| Stock Market Capitalization | -1.6405 (0.5884)*** | -1.5847 (0.7735)** | -0.0558 (0.9612) |

Table 5

Financing Terms, Enforcement of Contracts, and Distance

Notes: This table displays linear probability specifications in which the dependent variable is a dummy equal to one for transactions that are conducted on prepayment or letter of credit terms. Common Law Dummy is a dummy equal to one for countries with a common law legal origin. Contract viability is drawn from the International Country Risk Guide, and it measures the risk of contract modification or cancellation with higher values indicating lower risks. Payment Delay is also drawn from the International Country Risk Guide, and it measures the risk of receiving and exporting payments from a country with higher values indicating lower risks. Enforcement of Contracts comes from Knack and Keefer (1995) and it captures the degree to which contractual agreements are honored with higher values indicating higher enforcement. Confidence in Legal System is drawn from a World Bank Survey of manager on the degree to which they believe the system will uphold contracts and property rights in a business dispute, and higher values imply greater confidence. Duration of Legal Procedure is taken from Djankov et al. (2003), and it measures the total estimated duration in calendar days to pursue a claim on a bounced check. Private Credit is the ratio of private credit by deposit money banks and other financial institutions to GDP, and Stock Market Capitalization is the value of listed shares to GDP. Long Distance is a dummy equal to one for transactions in which the capital city of the sales destination is further from Washington, DC than the mean transaction. Each specification includes product fixed effects, and heteroskedasticity-consistent standard errors that correct for clustering at the country level appear in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Dependent Variable: | Dummy if Cash in Advance or Letter of Credit Terms | | | | | | | |
|-------------------------------------|--|----------------------|-----------------------|-----------------------------|----------------------------|-----------------------------|------------------------|-----------------------------|
| Measure of Contractual Enforcement: | Common Law Dummy | Contract Viability | Payment Delay | Enforceability of Contracts | Confidence in Legal System | Duration of Legal Procedure | Private Credit | Stock Market Capitalization |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Contractual Enforcement | -0.1249 (0.0695)* | -0.1504 (0.1509) | -0.0925 (0.0871) | 0.0008 (0.0102) | 0.1609 (0.2253) | -0.0004 (0.0001)*** | -0.0456 -0.0278 | 0.0298 (0.0440) |
| Long Distance | 0.5616 (0.0901)*** | 1.1490 (0.5732)** | 1.0797 (0.3372)*** | 1.6190 (0.2819)*** | 1.5779 (0.9315)* | 0.2529 (0.1127)** | 0.6094 (0.1449)*** | 0.7288 (0.0674)*** |
| Contractual Enforcement * | -0.4630 (0.0949)*** | -0.2396 (0.1492) | -0.2039 (0.0997)** | -0.1881 (0.0366)*** | -0.2827 (0.2256) | 0.0012 (0.0005)** | -0.4161 (0.1196)*** | -0.3375 (0.0695)*** |
| Long Distance | -0.0835 (0.0239)*** | -0.0625 -0.0381 | -0.0648 (0.0516) | -0.0385 (0.0413) | -0.213 (0.0389)*** | -0.1792 (0.0362)*** | -0.001 (0.0347) | -0.1178 (0.0380)*** |
| Product Fixed Effects? | Y | Y | Y | Y | Y | Y | Y | Y |
| No. of Obs. | 579,607 | 481,047 | 481,047 | 509,620 | 512,355 | 549,255 | 309,580 | 342,024 |
| R-Squared | 0.6571 | 0.6500 | 0.6319 | 0.6136 | 0.6793 | 0.5909 | 0.3840 | 0.6099 |

Table 6
Financing Terms and Prices

Notes: The dependent variable is the price charged per pound of goods sold. Letter of Credit is a dummy equal to one for transactions that occur on letter of credit terms, and Post Shipment is a dummy for transactions that occur on post shipment terms. Common Law Dummy is a dummy equal to one for common law countries. The log of sales value measures the value of sales in dollars. Each specification is an OLS specification that includes a fixed effect for each product/country/incoterm/year combination. Heteroskedasticity-consistent standard errors that correct for clustering at the product/country/incoterm/year level appear in parentheses. The "other" category of products is omitted from the data. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Dependent Variable: | Price per Pound | | | |
|---|---------------------|------------------------|-----------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| Letter of Credit Dummy | 0.0013 (0.0215) | 0.0437 (0.0246)* | -0.0007 (0.0238) | 0.0408 (0.0274) |
| Letter of Credit Dummy * Common Law Dummy | | | -0.0318 (0.0552) | -0.0284 (0.0495) |
| Post Shipment Dummy | 0.0326 (0.0180)* | 0.0632 (0.0195)*** | 0.0468 (0.0212)** | 0.0782 (0.0228)*** |
| Post Shipment Dummy * Common Law Dummy | | | -0.0754 (0.0367)** | -0.0789 (0.0349)** |
| Log of Sales Value | | -0.1608 (0.0385)*** | | -0.1612 (0.0385)*** |
| Product/Country/Incoterms/Year Fixed Effects? | Y | Y | Y | Y |
| No. of Obs. | 429,128 | 429,128 | 427,553 | 427,553 |
| R-Squared | 0.5245 | 0.5405 | 0.5241 | 0.5402 |

Table 7**Effects of Relationships on Financing Terms**

Notes: The dependent variable in columns 1 and 2 is a dummy equal to one for transactions that occur on cash in advance terms, in columns 3 and 4 it is a dummy for transactions that occur on letter of credit terms, and in columns 5 and 6 it is a dummy for transactions that occur on post shipment terms. The log of previous sales is the log of aggregate sales to a customer location prior to a transaction, and the log of the number of previous transactions is the log of the count of transactions to a customer location prior to a transaction. The log of sales value and the log of sales volume measure the value of sales in dollars and the volume of sales in pounds. Each specification is a linear probability specifications that includes a fixed effect for each customer/country pair, each product, and each year. Heteroskedasticity-consistent standard errors that correct for clustering at the customer level appear in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Dependent Variable: | Dummy if Cash in Advance Terms | | Dummy if Letter of Credit Terms | | Dummy if Post Shipment Terms | |
|---|--------------------------------|------------------------|---------------------------------|---------------------|------------------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log of Previous Sales | -0.0223 (0.0080)*** | | 0.0042 (0.0036) | | 0.0180 (0.0086)** | |
| Log of Previous Sales * Common Law Dummy | 0.0218 (0.0091)** | | -0.0032 (0.0029) | | -0.0186 (0.0094)** | |
| Log of Number of Previous Transactions | | -0.0184 (0.0061)*** | | 0.0037 (0.0035) | | 0.0147 (0.0068)** |
| Log of Number of Previous Transactions * Common Law Dummy | | 0.0190 (0.0074)** | | -0.0033 (0.0032) | | -0.0156 (0.0078)** |
| Log of Sales Value | -0.0001 (0.0005) | -0.0003 (0.0005) | 0.0011 (0.0007) | 0.0011 (0.0007) | -0.0010 (0.0007) | -0.0008 (0.0007) |
| Log of Sales Volume | -0.0003 (0.0007) | -0.0002 (0.0007) | -0.0005 (0.0004) | -0.0006 (0.0005) | 0.0008 (0.0008) | 0.0007 (0.0008) |
| Log of GDP per Capita | 0.0011 (0.0619) | -0.0087 (0.0608) | -0.0166 (0.0155) | -0.0157 (0.0152) | 0.0155 (0.0617) | 0.0244 (0.0602) |
| Customer/Country Fixed Effects? | Y | Y | Y | Y | Y | Y |
| Product Fixed Effects? | Y | Y | Y | Y | Y | Y |
| Year Fixed Effects? | Y | Y | Y | Y | Y | Y |
| No. of Obs. | 555,078 | 555,124 | 555,078 | 555,124 | 555,078 | 555,124 |
| R-Squared | 0.9511 | 0.9509 | 0.8398 | 0.8397 | 0.9435 | 0.9434 |

Table 8
Financing Terms for New Customers

Notes: The dependent variable in columns 1 and 2 is a dummy equal to one for transactions that occur on cash in advance terms, in columns 3 and 4 it is a dummy for transactions that occur on letter of credit terms, and in columns 5 and 6 it is a dummy for transactions that occur on post shipment terms. The new customer dummy is equal to one for the first transaction of a customer. The crisis dummy is equal to one during the October 2008-December 2009 period. Each specification is a linear probability specifications that includes a fixed effect for each country, for each product, and for each year. Heteroskedasticity-consistent standard errors that correct for clustering at the customer level appear in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Dependent Variable: | Dummy if Cash in Advance Terms | | Dummy if Letter of Credit Terms | | Dummy if Post Shipment Terms | |
|-----------------------------------|--------------------------------|-----------------------|---------------------------------|-----------------------|------------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| New Customer Dummy | 0.0874 (0.0125)*** | 0.0862 (0.0130)*** | 0.0239 (0.0078)*** | 0.0253 (0.0080)*** | -0.1113 (0.0127)*** | -0.1115 (0.0131)*** |
| Crisis Dummy | 0.0025 (0.0028) | 0.0028 (0.0019) | 0.0006 (0.0007) | 0.0006 (0.0007) | -0.0031 (0.0029) | -0.0034 (0.0019)* |
| New Customer Dummy * Crisis Dummy | 0.1141 (0.0284)*** | 0.1090 (0.0301)*** | -0.0034 (0.0123) | -0.0048 (0.0125) | -0.1107 (0.0284)*** | -0.1042 (0.0299)*** |
| Log of Sales Value | | -0.0074 (0.0034)** | | 0.0004 (0.0011) | | 0.0071 (0.0034)** |
| Log of Sales Volume | | 0.0041 (0.0018)** | | 0.0002 (0.0011) | | -0.0043 (0.0019)** |
| Log of GDP per Capita | | 0.0533 (0.0445) | | -0.0008 (0.0113) | | -0.0525 (0.0441) |
| Country Fixed Effects? | Y | Y | Y | Y | Y | Y |
| Product Fixed Effects? | Y | Y | Y | Y | Y | Y |
| Year Fixed Effects? | Y | Y | Y | Y | Y | Y |
| No. of Obs. | 566,397 | 559,448 | 566,397 | 559,448 | 566,397 | 559,448 |
| R-Squared | 0.7826 | 0.8040 | 0.4996 | 0.5006 | 0.7775 | 0.7972 |

Table 9**Growth and its Components During the Crisis**

Notes: This table displays aggregate measures of sales growth and components of sales growth during the recent financial crisis. Growth is measured as the change in sales between the first three quarters of 2008, or the pre-crisis period, and the subsequent three quarters, or the crisis period, scaled by the level of sales in the pre-crisis period. The first column displays growth for sales occurring on all terms, and the next four columns display the extent to which sales on different financing terms contribute to the total. Overall growth is also decomposed into intensive margin growth, or the growth due to changes in sales to customers that are active in the pre-crisis and crisis periods, as well as growth due to exit and entry. Growth due to exit is measured by scaling the sales of customers that were active in the pre-crisis period but not the crisis period by the level of sales in the pre-crisis period. Growth due to entry is measured by scaling the sales of customers that were active in the crisis period but not the pre-crisis period by the level of sales in the pre-crisis period.

| | All Terms | Cash in Advance | Letter of Credit | Documentary Collection | Open Account |
|--------------------------------------|-----------|-----------------|------------------|------------------------|--------------|
| Overall Growth Contribution | -16.28% | -10.26% | 0.39% | -2.95% | -3.46% |
| Intensive Margin Growth Contribution | -13.44% | -9.73% | 0.56% | -1.98% | -2.30% |
| Growth Due to Exit Contribution | -8.75% | -4.24% | -0.55% | -2.03% | -1.93% |
| Growth Due to Entry Contribution | 5.91% | 3.70% | 0.38% | 1.06% | 0.77% |

Table 10**Effects of Crisis on Growth by Financing Terms**

Notes: The dependent variable in the specifications that appear in columns 1-2 is the growth in sales to customers measured as the difference between sales in the post-crisis period and sales in the pre-crisis period, scaled by the sum of sales in the pre-crisis and crisis periods. In these columns, the growth rate is equal to -1 for customers that purchase goods in the pre-crisis period but not the crisis period, but such customers are excluded from the sample in columns 3 and 4 which analyze growth at the intensive margin. The dependent variable in the specifications that appear in columns 5-6 is a dummy equal to one for customers that purchase goods in the pre-crisis and crisis periods and zero for customers that only purchase goods in the pre-crisis period. The pre-crisis period covers the first three quarters of 2008, and the crisis period covers the subsequent three quarters. Share of pre-crisis sales on post shipment terms measures the share of purchases by a customer during the pre-crisis period that occurred on post shipment terms. Log of pre-crisis sales value is the log of pre-crisis sales measured in millions of dollars, and the log of pre-crisis sales volume is the log of pre-crisis sales measured in pounds. The specifications are OLS specifications, and heteroskedasticity consistent standard errors appear in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

| Dependent Variable: | Growth: All Customers | | Growth: Customers that Remain Active | | Customer Remains Active Dummy | |
|--|------------------------|------------------------|--------------------------------------|------------------------|-------------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Share of Pre-crisis Sales on Post Shipment Terms | 0.1557 (0.0387)*** | 0.1646 (0.0383)*** | 0.0823 (0.0362)** | 0.0493 -0.0346 | 0.1124 (0.0337)*** | 0.1317 (0.0306)*** |
| Log of Pre-crisis Sales Value | | 0.0426 (0.0309) | | -0.1034 (0.0246)*** | | 0.1152 (0.0264)*** |
| Log of Pre-crisis Sales Volume | | 0.0069 (0.0279) | | 0.0129 (0.0205) | | 0.0010 (0.0250) |
| Constant | -0.4710 (0.0268)*** | -1.0972 (0.1479)*** | -0.1566 (0.0266)*** | 1.0347 (0.1575)*** | 0.6273 (0.0249)*** | -0.8391 (0.1193)*** |
| No. of Obs. | 765 | 765 | 523 | 523 | 765 | 765 |
| R-Squared | 0.0209 | 0.0443 | 0.0098 | 0.1231 | 0.0144 | 0.1845 |

Appendix Table 1

Invoice and Order Characteristics by Financing Terms

Notes: This table characterizes the level and frequency of interactions between the exporter and importers for each type of financing term. It provides means of the sales per invoice, the number of invoices per order, sales per order, and orders per year. Each invoice corresponds to the shipment of a particular product to a specific customer location. A customer order can be associated with more than one invoice. The number of orders per year measures the number of orders placed by a specific customer that are shipped to a specific country on one of the four specific types of financing terms. Mean sales per year is a similar measure for sales.

| | Mean Sales per Invoice | Mean Number of Invoices per Order | Mean Sales per Order | Mean Orders per Year | Mean Sales per Year |
|------------------------|------------------------|-----------------------------------|----------------------|----------------------|---------------------|
| Cash in Advance | 28,852 | 1.41 | 40,797 | 17.66 | 720,341 |
| Letter of Credit | 37,779 | 1.55 | 58,579 | 7.85 | 459,797 |
| Documentary Collection | 14,695 | 2.33 | 34,219 | 12.67 | 433,572 |
| Open Account | 6,313 | 4.30 | 27,128 | 29.25 | 793,397 |