On the Hidden Links Between Financing Costs and International Trade Patterns

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Abstract

This paper investigates whether there is a link between financing costs and international trade patterns, and if so, whether this link is determined by the strength of trade and financial ties between trading partners. The potential importance of these considerations stems from the fact that approximately half of world trade is conducted on credit; a supplier gives to its foreign buyer a trade-financing loan financed by commercial banks on both sides of the transaction. For buyers, especially in developing countries, trade-financing loans from foreign suppliers are an essential source of external finance for international trade. We find that, first, with respect to price, the industry-level evidence indicates that financing costs determine international trade patterns, whereby for each industry the pass-through rates of exchange-rate changes into import prices are positively correlated with the industry's dependence on external-finance and trade-credit use. Second, with respect to volume, the country-level evidence suggests that between trading partners, the volume of trade-financing loans depends positively on the stronger trade and financial ties, including the higher value of total imports, the higher degree of product differentiation in imports, and the higher value of banking claims. Interestingly, investigation on trade-financing loans during periods of systematic banking crises suggests that the links between financing costs and international trade patterns also depend on characteristics of the loan arrangements (i.e. maturity), the size of the commercial banks (i.e. money-center, large, or small), and type of creditors (i.e. commercial bank or official).

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Is there a link between financing costs and international trade patterns? For example, considering a firm's purchasing of an imported good: one firm could pre-buy for future delivery, while another spot-buy for immediate delivery. Intuitively, if both use the same mode of transportation, the former would have higher financing costs since the firm has to pay in advance, but it should be better for hedging against the variability of import prices. So, does a firm in an industry which faces high financing costs because it requires extensive external finance have less control over the variability of prices of its imported goods when faced with exogenous shocks such as movements in exchange rates or changes in tariff and non-tariff measures, than a firm in an industry which requires little external finance?

Approximately half of world trade is conducted on credit; a supplier gives to its foreign buyer a trade-financing loan financed by commercial banks on both sides of the transaction. For buyers, especially in developing countries, trade-financing loans from foreign suppliers are an essential source of external finance. How then does a disruption in a country's financial system affect this source of external finance? For example, should a country with stronger trade and financial ties with its trading partners be less affected by disruptions in its financial system because it might be better in securing trade-financing loans?[1]

In short, how important is the link between financing costs and international trade, and what are the implications for the conduct of monetary and international trade policy? Is there a link between financing costs and international trade patterns? And if so, is it determined by the strength of trade and financial ties between trading partners?

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[1] This interest essentially comes after observing that following a turbulent period in financial sector such as debt- and financial crisis, a debtor country tends to have difficulty in continuing normal operation of its international trade. For example, Anne O. Krueger (2002) emphasizes the necessity of a debt restructuring mechanism that would facilitate the provision of trade-financing need of a debtor country in order to limit the degree of economic dislocation. Empirical work seems consistent with the concern that disruption in a country's financial sector adversely affects its international trade. For example, on the basis of data from 217 countries between 1948 and 1997, Andrew K. Rose (2003) concludes that: "international default has negative consequences for trade." Nevertheless, his study simply suggests correlation, but not a channel through which financing costs of a country affect its international trade. As Rose puts it: "It seems clear that there are reasons to believe that sovereign default may lead to a decline in international trade, either as a punishment for and deterrent to further default, or simply because of more costly trade finance and/or insurance." This paper advances his findings by investigating a channel through which a country's financing costs affect its international trade patterns.

This paper seeks to answer these questions by considering two sets of evidence. First, We use the U.S. industry data disaggregated at four-digit level on a firm's external-finance use and import prices to test whether the pass-through rates of exchange-rate changes are determined by an industry's financing costs. With respect to price, the industry-level evidence indicates that financing costs determine international trade patterns, whereby for each industry the pass-through rates of exchange-rate changes into import prices are positively correlated with the industry's dependence on external-finance and trade-credit use. Essentially, this implies that financing costs may also influence the response of international trade patterns to changes in international trade policy (i.e. import tariffs, anti-dumping duties) and monetary policy (i.e. dollarization, interest rate).

Second, We use data on trade-financing loans from the U.S. commercial banks, and from the G7-creditors, to examine whether the strength of trade and financial ties could explain the amount of trade-financing loans between trading partners. We find that the volume of trade-financing loans depends positively on the value of total imports, the degree of product differentiation in imports, and the value of banking claims. Interestingly, our investigation on trade-financing loans during periods of systematic banking crises suggests that the links between financing costs and international trade patterns also depend on characteristics of the loan arrangements (i.e. maturity), size of the commercial banks (i.e. money-center, large, or small), and type of creditors (i.e. commercial bank or official).

This paper follows a literature that emphasizes the association between real and financial linkages (Andrew K. Rose and Mark M. Spiegel (2002), Kristin J. Forbes and Menzie D. Chinn (2003)). The main conclusion of this paper is that there are economically important links between financing costs and international trade patterns, and that these links are determined by trade and financial ties between trading partners.

This paper starts with a theoretical underpinning which is used to organize data for basic tests in section 2. In section 3, I set up the econometric tests and discuss the results. Section 4 concludes.

1. Theoretical underpinnings: trade and financial ties hypothesis

In a simple arrangement of international-trade transactions, after a supplier contracts to supply goods to a foreign buyer, there is a parallel trade-financing loan agreement in which a bank lends on behalf of the supplier to the foreign buyer's bank[2]. Normally, the loan is guaranteed by an export-credit agency of the supplier's country and/or a lead bank, if the loan is syndicated.

We argue that under the buyer's limited commitment to repay, the total amount of trade-financing loans is determined by strength of trade and financial ties between the supplier/creditor country and the buyer/borrower country. Specifically, the amount of trade-financing loans depends on the following:

- positively on the value of total imports by the buyer country,
- positively on the value of banking claims with the buyer country, and
- on the degree of product differentiation in total imports, with the direction of the association determined by characteristics of the loan arrangements (i.e. maturity), size of the commercial banks (i.e. money-center, large, or small), and type of creditors (i.e. commercial bank or official).

We label this the "trade and financial ties hypothesis." The basic intuition behind this hypothesis, and the formal model focusing on international exchange characterized by separation between the *quid* and the *quo* such as trade-financing loan, contracts for future delivery, collateral, and insurance, is found in Appendix B.

2. The basic tests

The trade and financial ties hypothesis in the previous section sets the framework to examine empirically the links between financing costs and international trade patterns. Our next step is to investigate whether there is a link between financing costs and international trade patterns, and if so,

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[2] Stylized facts of trade financing are found in Appendix A. Figure A illustrates details and time-line of standard trade-financing arrangement.

whether this link is determined by trade and financial ties between trading partners. I proceed by setting up basic tests on two sets of data.

2.1 The First Test: Financing Costs and Pass-Through into Import Prices

The objective is to test whether the pass-through rates of exchange-rate changes into import prices are determined by each industry's financing costs. If so, there is a link between financing costs and international trade patterns. More importantly, such a link implies that financing costs could also determine the response of international trade patterns to changes in international trade- and monetary policy.

The most disaggregated and comprehensive data on each industry's use of external-finance that can be linked with import prices is available only for the U.S.'s manufacturing industries[3]. I use the basic econometric specification that is closely related to standard exchange-rate pass-through estimation, with a modification, to address what we are looking for: for each industry, the correlation between the pass-through rates of exchange-rate changes into import prices and the industry's financing costs.

Theoretically, financing costs use should be positively correlated with the pass-through rates. In purchasing an imported good, the firm could pre-buy for future delivery or spot-buy for immediate delivery. The former would imply higher financing costs since the firm has to pay in advance, but would be a better hedge against the variability of import prices[4]. Thus, the disconnection between changes in import prices and exchange rates should be more likely for an industry that faces low financing costs with little need for external-finance use. Hence, if we can measure the industry's

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[3] Using only the U.S. data raises a question on whether the evidence from the U.S. industries is a good representative for industries in other countries. The response to this question is, given that the U.S.'s capital market is more developed than most countries, the U.S. firms are less financially constrained, implying that the findings, if any, of the correlation between industry's external-finance use and the rates of exchange-rate pass-through into import prices can be 'a lead evidence' of the link between international trade and financing costs in other countries. In other words, using the U.S.-industry evidence simply biases against any finding of the link between financing costs and international trade patterns.

[4] See Joshua Aizenman (2003) where it is shown in a formal model that higher financing costs can increase the cost of pre-buying imports, reducing thereby the frequency of pricing to market and the expected deviation from relative purchasing power parity. It should be noted that this study investigates only import pricing behavior. For many developing countries that are highly dependent on exports of one primary commodity, there is also cost associated with export price fluctuations. See, for example, Kenneth M. Kletzer et al. (1992), for a study on the role of conventional instruments for smoothing primary exporters' price risks, including loans and futures contracts, in the presence of sovereign risk and capital shortages.

financing costs, we should expect a positive interaction between the industry's financing costs and exchange rate changes.

In order to focus on the interaction between exchange-rate changes and the industry's financing costs, I modify the standard exchange-rate pass-through estimation by including the interaction effects of exchange rates with a measure of external-finance use, and controlling variables thought to influence pass-through rates across industries. The dependent variable is the industry-disaggregated import price index, pooled across industries and time periods. Let j denotes industry and t denotes time period, the estimating equation, with all variables transformed to natural logs, is given by:

(1) Import Prices $_{j,t}$

$$= \beta_1 \cdot \text{Lagged Import Prices}_{j,t} + \beta_2 \cdot \text{Exchange Rates}_t$$

$$+ \beta_3 \cdot (\text{Exchange Rates}_t \times \text{Volatility of Exchange Rates}_t)$$

$$+ \beta_4 \cdot (\text{Exchange Rates}_t \times \text{Industry } j\text{'s Concentration})$$

$$+ \beta_5 \cdot (\text{Exchange Rates}_t \times \text{Industry } j\text{'s Financing Costs})$$

$$+ \beta_6 \cdot \text{Industry } j\text{'s Inventory to Shipments}_t + \varepsilon_{j,t}$$

It should be noted that this approach of estimating exchange-rate pass-through has one advantage over other specifications of pass-through estimation. By focusing on differences across industries based on interactions between exchange rates and variables thought to influence the pass-through rates, this approach can estimate the correlation between the rates of pass-through and controlling variables without using two-stage estimation. Thus, unlike previous studies, it is less subject to an econometric issue of weighted least squares[5].

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[5] Previous studies on exchange rate pass-through use the two-stage regression technique whereby, (1) pass-through elasticities are estimated for each series of import prices (industries, countries), and (2) weighted least squares method is implemented by using the inverse of the standard error of pass-through elasticity estimates from the first stage as weights to allow for heteroskedasticity for the first stage pass-through elasticities. See, for example, Jaiwen Yang (1997) on a link between and exchange rate pass-through and degree of product differentiation, and Jose Manuel Campa and Linda S. Goldberg (2003), on

Variables and their source of data are reported in Appendix D. Two simple correlations (not reported) are noteworthy. First, the simple correlation shows that an industry that is highly dependent on external-finance use is also highly dependent on trade-credit use: the correlation between the two variables for all U.S. companies in the 1980's is 0.38 and statistically significant at 5-percent level. Second, an industry with high level of industry inventory to shipments tends to be highly dependent on external-finance use.

2.2 The Second Test: Trade and Financial Ties and Volume of Trade-Financing Loans

The objective here is to examine whether between trading partners the amount of trade financing loan depends on trade and financial ties. For buyers, especially in developing countries, trade-financing loans from foreign suppliers are an essential source of external finance for international trade. In particular, it is important to investigate how a disruption in a country's financial system such affects this source of external finance. Results from this test should suggest whether a link between financing costs and international trade patterns depends on trade and financial ties between trading partners.

The simple econometric specification is as follows: The dependent variable is the amount of trade-financing loans a borrower (importer) country receives from a creditor (foreign supplier) country. The key explanatory variables include measures of trade and financial ties between trading partners. In order to investigate the response of trade-financing loans to trade and financial ties during periods of disruption in a borrower country's financial system, I include the interaction effects between the indicator of a financial disruption and measures of trade and financial ties. Let i denotes borrower countries and, as before, t denotes time periods. Let $[\bullet]'$ be a row vector of explanatory variables, and Θ_k be a column vector of coefficients. The estimating equation is given by:

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how exchange rate pass-through across OECD countries are determined by microeconomic factors (e.g. industry composition of a country's import bundle) and macroeconomic factors (e.g. inflation and volatility of exchange rates).

(2)   Trade-Financing Loans$_{i,t}$

$$= \theta_0 \cdot \text{Financial-Disruption Indicator}_{i,t}$$

$$+ \left[\text{ Trade and Financial Ties }\right]'_{i,t} \cdot \Theta_1$$

$$+ \left[\text{ Trade and Financial Ties } \times \text{ Financial-Disruption Indicator }\right]'_{i,t} \cdot \Theta_2$$

$$+ \left[\text{ Controlling Variables }\right]'_{i,t} \cdot \Theta_3$$

To deal with the non-zero nature[6] of the observations on the amount of trade-financing loans,

I estimate the above equation with the pooled Tobit regression[7], with all variables in natural logs,

including controlling variables thought to determine trade-financing loans between trading partners. Of

course, we need appropriate measures of trade and financial ties and the indicator of financial-

disruption periods. This is what we will examine shortly[8].

Variables and their source of data are reported in Appendix D. Tables 4 and 5 report statistics

of the trade-financing loans data. Several points are noteworthy. First, from 1997 to 2002, Korea and

Brazil not only proportionally received large trade credits from the U.S. commercial banks, but they

also received trade credits in excess of total imports from the United States. Second, most of trade

credits from G7 to low-income countries were from the official creditor (i.e., Senegal:85%,

Mongolia:76%). We also find that the correlation (not reported) between the value of banking claims

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[6] When an observation on trade-financing loan is equal to zero, it might not be the issue of data observability as in the general data-censoring problem. Suppose that the volume of trade-financing loans is an observable outcome: a trade-financing loan takes on the value zero with positive probability, but is a continuous random variable over strictly positive values. One can think of a borrower/importer and a creditor/foreign supplier solving an optimization problem, in which for some periods the optimal choice will be zero trade-financing loan (a corner solution).

[7] Computationally, this estimation technique applies standard Tobit regression to a data set as if it was a one long cross section of size equals to number of panels $\times$ periods of time.

[8] Andrew K. Rose and Mark M. Spiegel (2002) investigate causality between a country's bilateral borrowing and bilateral trade with its creditors. They show that a volume of bilateral borrowing is higher between countries with stronger trade ties. However, the skeptic could still offer a number of arguments against causality. First, although Rose and Spiegel solve a possibility that international borrowing and trade could be driven by a common factors by using instrumental variables, in the absence of a well-accepted theory of a link between a country's financing costs and its international trade, the set of their instruments thought to be important to international trade but not international borrowing patterns may not include a large number of potential omitted variables. Second, from their claim, though intuitive and suggestive, it is difficult to draw on an example and policy implication between a country's financing costs and its international trade pattern. Empirical work that links directly a channel through which financing costs of a country influences its international trade is essential in order to advance a discussion on real and financial linkages, and, in particular, the immediate concern on the links between international trade and financial system (e.g. whether a country services its debt obligation because it wants to avoid losing trade financing (Jeremy I. Bulow and Kenneth Rogoff (1989)), or to preserve its good reputation (Jonathan Eaton and Mark Gersovitz (1981), Kenneth M. Kletzer and Brian D. Wright (2000), or to avoid from collusive punishment from international banks (Mark J. Wright (2002))). This paper makes progress on causality between trade and finance by focusing on the mechanics of trade-financing, a channel through which a country's financing costs may potentially influence its international trade patterns.

and imports are high and statistically significant (0.5 and 0.8 in the case of the U.S.'s banks and the G-7 creditors, respectively), consistent with the findings of Andrew K. Rose and Mark M. Spiegel (2002) to the effect that a volume of bilateral borrowing is higher between countries with stronger trade ties.

3. The hidden links

3.1 Pass-Through Rates Are Positively Correlated with Financing Costs

3.1.1 Results from Dependence on External-Finance Use

I start by using *Dependence on External-Finance Use* as a measure of an industry's financing costs. As can be seen from Table 2, the coefficient estimates on the interactions between *Dependence on External-Finance Use* and *Exchange Rates* are all statistically significant. However, their signs vary for different categories of the U.S. companies. This can be the case when old firms in a low pass-through industry have lower external-finance use (face lower financing costs) than old firms in a high pass-through industry, but a pattern of external-finance use of young firms is reversed. If anything, this result suggests interesting linkages between international trade, monetary policy and credit markets. Mitchell A. Petersen and Raghuram G. Rajan (1995) show that creditors in concentrated credit markets have an assurance of obtaining future surplus from the firm, and consequently accept lower returns up front, so that in credit markets young firms who get institutional loans (bank loans) are more indebted in concentrated credit markets than in competitive credit markets, but this pattern reverses for older firms since the older firms, having few investment opportunities and being faced high interest rates, tend to use less external finance[9].

One way to get a sense of magnitude of the coefficient estimates is as follows: The industry at the 4th quartile (highest dependent) of *Dependence on External-Finance Use* is Special Industry Machinery. The industry at the 1st quartile (lowest dependent) is Instruments for Testing of Electrical

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[9] See also Raghuram G. Rajan and Luigi Zingales (2001) for a survey on how relationship-based (bank-dominated) and arm's length (market-based) financial system can have different effects on industrial structure and growth.

Signals. Using the *Dependence on External-Finance Use* of old firms in the 1980's, the coefficient

estimate then predicts that pass-through of 1 percent exchange rate changes into import prices of the

Special Industrial Machinery should be 0.577 percent higher than the Instruments for Testing of

Electrical Signals industry.

3.1.2 Results from Dependence on Trade-Credit Use

As can be seen from Table 3, the coefficient estimates of the interactions between *Exchange*

Rates and *Dependence on Trade-Credit Use* are all positive and statistically significant at the 1-percent

level[10].

A sense of magnitude of the coefficient estimates is given as follows. The industry at the 4th

quartile (highest dependent) of *Dependence on Trade-Credit Use* is Electrical Machinery, Equipment,

and Supplies. The industry at the 1st quartile (lowest dependent) is Construction Machinery and

Equipment. Using the stock measure of *Dependence on Trade-Credit Use* of firms in the 1980's, the

coefficient estimate then predicts that pass-through of 1 percent exchange rate changes into import

prices of the Electrical Machinery, Equipment, and Supplies industry should be 0.054 percent higher

than the Construction Machinery and Equipment industry.

These results are interesting for both practical and intellectual reasons. The immediate

practical concern is that while the literature on open-economy macroeconomics focuses on how firm

pricing behavior (in particular, pricing to market behavior, market power, and product differentiation)

affects the conduct of monetary policy, the results presented here suggest that dependence on external-

finance use and industry financing costs are also important. The intellectual interest of these results is

that they offer evidence on the role of financing costs in international trade. In recent years, researchers

have been concerned with how firms' dynamics such as pricing and productivity influence patterns of

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[10] Although the estimation does not use measures of *Dependence on Trade-Credit Use* from different categories of firms (i.e.
young firms and old firms), it is unlikely to observe opposite patterns of the correlation between pass-through rates and trade-
credit use across firm age as we did when we use measures of *Dependence on External-Finance Use*. Using firm-level data,
Mitchell A. Petersen and Raghuram G. Rajan (1995) find that although the decision to offer trade credits depends upon the
firm's quality, the decision by trade creditors to offer early payment discount does not vary with firm size or firm age.

international trade. The evidence in this paper suggests a possible channel through which finance and capital markets might have influential impact on international trade patterns.

3.2 Trade and Financial Ties Determine Volume of Trade-Financing Loans

3.2.1 Varying the U.S.-Commercial Bank Size

With the data on trade-financing loans from the U.S. commercial banks, we are able to investigate whether the correlations between trade-financing loans and trade and financial ties vary across bank size. Using the data on trade-financing loans from the U.S. money-center banks, Table 6 reports the coefficient estimates on the measures of *Trade and Financial Ties* with and without interactions with *Financial-Disruption Indicator*.

As can be seen in the first and second column of Table 6, the coefficient estimates on *Value of Total Imports*, *Value of Banking Claims*, and *Degree of Product Differentiation in Imports*, are positive and statistically significant.[11,12] The coefficient on *Financial-Disruption Indicator* is negative, but not significant. The coefficient estimate of the interaction between *Financial-Disruption Indicator* and *Degree of Product Differentiation in Imports* is negative and statistically significant at the 1-percent level.

For panel data, where both cross-section and time-period are large, there could be the problem of cointegration in the panel estimation (see for example M. Hashem Pesaran and Ron Smith (1995) and Peter C. B. Phillips and Hyungsik R. Moon (1999)). In the context of trade-financing loans in this study, the existence of cointegration would probably mean that trade-financing loans across borrower countries are highly correlated over time. In other words, if one has a prior that trade-financing markets are highly integrated, it might be useful to control for cointegration in the estimation.

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[11] Throughout the paper, the reported standard errors are robust to heteroskedasticity.
[12] To get a sense of magnitude of coefficient estimate from the Tobit estimation is not straightforward. This is because partial effects on mean responses, averaged across the distribution of unobservables, cannot be identified. Jeffrey M. Wooldridge (2002) suggests an approach to get around this, but given a large number of explanatory variables under consideration in this paper, his approach is not practically applicable to our estimation.

The robustness of the results with different specifications, and the extent of panel cointegration are considered in Table 7, which show the lower- and upper bound of coefficient estimates of a series of models nested between the specification (8) and (9). The columns with 'no prior' are coefficient estimates without controlling for the possibility of panel cointegration in the estimation,[13] whereas the columns with 'high' are estimates with a prior that trade-financing market is highly integrated. As can be seen from Table 7, the coefficient estimates on the interactions between *Financial-Disruption Indicator* with *Value of Total Imports* and with *Value of Banking Claims* are positive with varying degree of statistical significance for all U.S. banks.[14] Interestingly, the effects of the interaction between *Financial-Disruption Indicator* and *Degree of Product Differentiation in Imports* vary across the bank size: for the trade-financing loans from money-center banks, the effect is negative, whereas it is positive for large and small banks. This suggests that during a period of systematic banking crises, the links between financing costs and international trade patterns depend on the size of the commercial bank of the loan arrangement.[15]

3.2.2 Varying the G7-Creditor Type

Data on trade-financing loans from the G-7 countries allow us to investigate the correlation between trade and financing ties and the provision of trade-financing loans by creditor type (commercial banks, all- and short-term official creditors). Table 8 reports the coefficient estimates of the basic specification using the data on trade-financing loans of all types of the G7 creditors.

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[13] I follow M. Hashem Pesaran and Ron Smith (1995), that by averaging the data over time and estimating cross-section regression on group means, the estimation should provide efficient and consistent estimates of the long-run effects of the explanatory variables if there is panel cointegration in the data.

[14] All coefficients reported in lower- and upper-bound are at least at 5-percent level, otherwise zero value reported.

[15] This might be a result of bargaining position of a borrower country and its creditors. Using data on secondary-market prices of loans to developing countries from U.S. commercial banks, Fernandez and Ozler (1999) find that countries with higher debt concentration (the proportion of a country's debt held by large banks relative to small banks) have higher secondary-market prices of loans. They argue that because the banks' bargaining power increases with the degree of debt concentration, repayment and secondary-market prices will increase with a country's level of debt concentration. In addition, our result shows that disruption in a country's financial system affects international trade, a finding that is closely related to the study on the link between financial development and international trade. Thorsten Beck (2003, (2002)) finds that countries with better-developed financial systems have higher export shares and trade balances in industries that use more external finance, suggesting that financial development may translate into a comparative advantage in industries that use more external finance. Delving deeper into the components (i.e. by industries) of international trade, it is possible that the negative impact of financial disruption on international trade is larger for industries that face higher financing costs and depend more on external finance.

Table 9 reports lower- and upper-bound of coefficient estimates from the data of the G7 creditors. The coefficient estimates on the interactions of *Financial-Disruption Indicator* with *Value of Total Imports* and with *Value of Banking Claims* are positive and statistically significant. Interestingly, the effects of *Financial-Disruption Indicator* and its interaction with *Degree of Product Differentiation in Imports* on the amount of trade-financing loans differ across creditor types. The effect of *Financial-Disruption Indicator* is positive for commercial-bank creditor, whereas it is negative for official creditor. This seems to suggest that during periods of systematic banking crises, there is a substitution away of trade-financing lending from official to commercial-bank creditor[16]. The interaction between *Financial-Disruption Indicator* and *Degree of Product Differentiation in Imports* has a negative effect on trade-financing loans in the case of commercial-bank creditor, but none for official creditors. That *Trade and Financial Ties* are less important to the official creditors with respect to the commercial-bank creditors seems reasonable since, in recent years, official creditors such as export-credit agencies have changed their role from lender to guarantor of trade-financing loans.

4. Conclusion

Approximately half of world trade is conducted on credit; a supplier gives to its foreign buyer a loan financed by commercial banks on both sides of the transaction. For importers, especially in developing countries, trade-financing loans from foreign suppliers are an essential source of external finance. This paper argues that there are links between financing costs and international trade patterns, links that are determined by the strength of trade and financial ties between trading partners. The paper presents two sets of evidence, which, apart from the main findings, may bear on other areas of current research.

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[16] Dalia Marin and Monika Schnitzer (2002) show that since the international debt crisis in the 1980's, international barter has also emerged as an international trade technique, and increases substantially after recent financial crises in Russia and South East Asia.

First, with respect to price, the industry-level evidence indicates that financing costs influences international trade patterns, whereby for each industry the pass-through rates of exchange-rate changes into import prices are positively correlated with the industry's dependence on external-finance and trade-credit use. Essentially, this means financing costs determines international pricing behavior. In the context of the exchange-rate pass-through literature, the findings in this paper provides fresh evidence that an industry's external-finance use and its financing costs have an influence on pass-through rates. This knowledge is useful in the implementation of optimal monetary policy in open-economy framework. In the context of international trade literature, this paper suggests that there are links between a country's financing costs and source of external finance, and trade patterns with its trading partners. Essentially, these imply that financing costs can potentially be an important factor in determining the effect of a shift in international trade policy (such as anti-dumping- and import tariffs policy) as well as a change in monetary policy (i.e. exchange rate and interest rate policy)[17]. For example, together with a recent finding of Carmen M. Reinhart et al. (2003a) that dollarization does appear to increase exchange rate pass-through, the findings in this paper suggest that variation across industries of pass-through rates and linkages between inflation and exchange rate changes, might depend on level of an industry's external-finance use, dollar debts, and financing costs. Further, the results are relevant in explaining how industries with differing levels of dependence on external finance and trade credit respond to financial disruption in their country's financial sector. As an example, the recent credit crunch in Argentina had only limited negative effects on firms in the agricultural industry (producer of grains), which generally do not have access to bank financing, but instead, have suppliers' credits on barter basis.

Second, with respect to volume, the country-level evidence suggests that between trading partners the higher volume of trade-financing loans depends positively on the strength of trade and financial ties,

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[17] For closely related research on these, see for example, Robert C. Feenstra (1989) on how import tariffs and exchange rate symmetrically affect import prices; Bruce A. Blonigen and Stephen E. Haynes (2002) on how imposition of an anti-dumping duty may influence firm's pricing decisions which lead to structural breaks in exchange rate pass-through; Won Chang and L. Alan Winters (2002) on how the setup of regional trade agreement may influence import-and export-prices; Paul R. Bergin and Robert C. Feenstra (2001) on how a firm's price-setting behavior plays an important role in an open-economy macroeconomic model; Michael W. Klein et al. (2002) on how financial difficulties at banks were economically important in reducing the number of foreign direct investment projects by Japanese firms into the United States.

including the higher value of total imports, the higher degree of product differentiation in imports, and

the higher value of banking claims. Interestingly, a study of trade-financing loans during periods of

systematic banking crises suggests that the links between financing costs and international trade

patterns also depend on characteristics of the loan arrangements (i.e. maturity), size of the commercial

banks (i.e. money-center, large, or small), and type of creditors (i.e. commercial bank or official).

Besides the implications regarding the bargaining positions between a borrower country and its

creditors, the analyses also emphasize the notion that in order to resolve international debt problem,

financial policy cannot be separated from a country's international trade. During a debt crisis and other

financial disruption in a country's financial system, external finance for investment in highly trade-

dependent sectors may be warranted. As Joshua Aizenman (1991) suggests, this would reduce

economic dislocation of the debtor country and increase future repayments to its creditors. As Jeremy

I. Bulow (2002) puts it, the ultimate goal of any debt policy should be to foster trade and enhance

efficient investment, but not to maximize capital flows. To achieve these goals, this paper affirms that

we must not only recognize that financing costs and level of debt intolerance differ among countries

(Carmen M. Reinhart et al. (2003b)), but we must also try to understand linkages between trade and

finance in different parts of the economy.

Appendix A: Stylized Facts of Financing Costs and Trade Financing

There is a large literature indicating that development of a country's financial sector
positively influences the level and the rate of growth of per capita income. Interestingly, the positive
influence of financial sector development is found to vary with financial dependence across industries
and across countries, suggesting a link between financing costs and international trade pattern[18].

Historically, trade-financing loans were subsidized by governments of industrial countries,
usually through the so-called 'export credit agency'[19], and were widely used for imports of capital
goods as a part of large industrial projects in developing countries. Pressured by criticisms of its cost

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[18] Raghuram G. Rajan and Luigi Zingales (1998) find that during 1980's the industrial sectors in a large number of countries that
are relatively more dependent on external finance develop disproportionately faster in countries with more developed financial
sectors. Raymond Fisman and Inessa Love (2003) find that industries with higher dependence on trade credit financing have
disproportionately higher growth rates in countries with weaker financial sectors. If international trade patterns are determined
by comparative advantage of a country, these findings of the link between financial dependence and industry growth across
countries would imply that a disruption in the financial sector that affects a country's source of external finance could also
negatively influence an industry comparative advantage.
[19] Major export credit agencies are the US Export-Import Bank, the Kreditanstalt fur Wiederaufbau (KfW) of Germany the
Export Credits Guarantee Department (ECGD) of the United Kingdom, the Japan Bank for International Cooperation (JBIC),
and the Canadian Export Development Corporation (EDC).

ineffective and subsidized trade-financing activities, export credit agencies of the OECD countries agreed in 1992 to maintain some floor level of trade-financing interest rates, and to focus their role as guarantors of trade-financing loans. As a result, trade financing has gradually been done less by government agencies, and more by capital markets.

In order to get a better picture of trade financing for international trade, let us look at basic features of trade financing loans. For a simple arrangement of trade-financing loans, after a foreign supplier contracts to supply goods to an importer, there is a parallel loan agreement in which a "negotiating" bank in the supplier country lends to an "issuing" bank in the importer country.[20]

An example of trade-financing loans[21]

Loan: Citigroup puts together a trade-financing loan to fund the purchase of 1,072 Volvo buses by Mexico's IAMSA group. The overall finance amounts to US$223 million consisting of commercial facility of US$125.7 million and the Swedish Export Guarantee Board or Export Kredit Namnden (EKN) supported term loan facilities of US$97.2 million.

Lender, Borrower, Guarantor: Lender of record is the Swedish Export Credit Corporation (SEK). Borrower of record is Promotora de Proyectos Terrestres. The commercial contract is between IAMSA and its subsidiaries and Volvo Buses de Mexico. The IAMSA group, consisting of IAMSA and subsidiaries and the entities forming part of OMnibus de Mexico, Grupo Flecha Amarilla and Grupo Toluca, represents the leading group of bus operators in Mexico encompasses 22% of the Mexican industry fleet and transports 20% of the 2.1 billion passengers transported annually in the country. The deal has 100% political and 90% commercial risk cover from the Swedish agencies.

Repayment: The financing of the acquisition of these 1,702 buses represents the majority of the IAMSA group's fleet renewal program for the years 2002-2005. There is an eight-year tenor overall -- with final maturity mid-2010. Deliveries of the buses is over three years, and this is accommodated by tranching both facilities into four tranches with five years repayment per tranche.

Because a foreign supplier and/or its export credit agency has to accept delayed payment and, thus, bears all risks of non-repaying (i.e., commercial- and political-risks), it will normally try to transfer most of the risk to capital markets through a specialized financing technique called forfaiting[22]. Another feature of trade financing is that since trade-financing loans are tied with the purchase of imported goods, and are a source of inexpensive financing, it has often been argued in the business community that servicing of trade-financing obligations commands a priority over other types of international debts[23].

Appendix B: A formal model of trade and financial ties.

Trade and Financing: Basic Setup

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[20] In recent years there has been an increasing volume of trade financing through syndicated loans of large international banks. Typically, a lead bank (also called mandated arranger) acts as a negotiating bank to syndicate loans from other banks. A lead bank may also be a guarantor. Normally, an export credit agency of the supplier country will be a guarantor of trade-financing loans.

[21] This example is drawn from Trade Finance Magazine (December, 2002).

[22] According to a recent estimate, activities in the market that is devoted to international trade financing are worth around US$700 billion a year (the *Economist* (January 4th, 2002)). A mechanic of forfaiting is non-recourse sale by the foreign supplier of bank-guaranteed promissory notes, bills of exchange, or similar documents received from an importer. The foreign supplier receives cash at the time of the transaction by selling the notes or bills at a discount from their face value to a specialized finance firm called a forfaiter. Although the foreign supplier is responsible for the quality of her goods, she receives a clear and unconditional cash payment at the time of the transaction.

[23] For example, from the Global Investing Section of the *Financial Times*: "Government can reschedule their bonds and it affects their sovereign rating but if you don't pay your trade obligations your imports dry up." (Alison Beard (August 30th, 2001)). In addition, the moral hazard problem seems to be less likely as compared to other types of international borrowing such as bonds and other types of loans. The foreign supplier can threaten to cut off future supplies in the event of the importer's actions that reduce the chances of repayment. Of course, the importer has a recourse option to import from alternative foreign suppliers. This is a part of what we examine shortly in the theoretical model.

This appendix presents a conceptual framework modeling international exchange characterized by separation between the *quid* and the *quo*, such as trade-financing loan, contracts for future delivery, collateral, and insurance[24]. Consider trade and financial ties in an international economy populated by entrepreneurs (buyers) and potential foreign suppliers. Let us refer to each of the former and of the latter by he and she, respectively. Each entrepreneur has a project, which requires an imported good from foreign suppliers. The economy and the project lasts for two periods and three-date: date-0 to date-2.

The value of the imported good is $1, and is made in two deliveries: an amount α on date-0 and another $1-\alpha$ on date-1, where $0 \leq \alpha \leq 1$. The imported good requires one period for installation, after which it can be used in the project until date-2.

Let $1+y$, where $0 \leq y \leq 1$, be a riskless cash flow from using each $1 worth of the imported good. On each date, if the entrepreneur works on his project, he can earn this cash flow proportional to amount of the imported good available on that date. That is, his project will generate a cash flow of 0 on date-0, $\alpha(1+y)$ on date-1, and $1+y$ on date-2. Note that the investment of the entrepreneur in his project is observable and contractible to the foreign supplier: the trade-financing loan is tied with delivery of the imported good, and the entrepreneur cannot divert trade-financing loan to other uses.

The entrepreneurs need a trade-financing loan from foreign suppliers. A trade contract between an entrepreneur and a foreign supplier not only specifies a schedule of deliveries of the good, but also includes terms of a required trade-financing loan repayment. The required repayment is denoted by $1+p$, where $0 \leq p \leq 1$, and it is to be made after date-0 delivery (α) is arrived, but before date-1 delivery ($1-\alpha$).

Suppose that the foreign supplier's cost of producing $1 worth of imported good equals 1, and the entrepreneur's willingness to pay for this imported good is $1+v$, where $0 \leq v \leq 1$. Then, the required trade-financing loan repayment, $1+p$, can be found such that (i) $1+p \geq 1$: cost of production is covered by repayment, (ii) $1+p \leq 1+v$: entrepreneurs are willing to repay, and (iii) $1+p \leq \alpha(1+y)$: date-1 cash flow from the project is sufficient to repay the trade-financing loan.

Limited Commitment with Trade and Financial Ties

A date-0 foreign supplier to the project has been in trade and financial relationship with the entrepreneur since a beginning of the project, and thus develops specific skills in supplying the entrepreneur. Let us call this date-0 foreign supplier the relationship supplier.

There is a limitation on willingness of any potential relationship supplier to provide trade-financing loans. After date-0 imported good (α) is delivered, the entrepreneur cannot commit to make his required repayment ($1+p$) to the relationship supplier. By not repaying, the entrepreneur can still generate a date-1 cash flow of $\alpha(1+y)$, by using date-0 delivery in his project, and then use the date-1 cash flow to finance recourse to import the good equals to date-1 delivery from other foreign suppliers.

Other potential foreign suppliers who come after date-0 to replace the relationship supplier, know less than the relationship supplier on how to supply to the ongoing project of the entrepreneur.

Let us call any of these potential foreign suppliers the unskilled supplier. Suppose that for each \$1 worth of date-2 cash flow to be earned by the entrepreneur, if the date-1 delivery was supplied by the relationship supplier, he can earn only $1 - s_E$, where $0 \le s_E \le 1$, if he imports the date-1 delivery from the unskilled supplier.

For the entrepreneur, a difference in date-2 cash flow generated by using the imported good in the project, between (a) repaying trade-financing loan and getting the date-1 delivery from the relationship supplier, and (b) not repaying the loan and getting the date-1 delivery from the unskilled supplier is:

(3)   Date-2 cash flow = $\begin{cases} 1 + y & ; \text{relationship supplier} \\ & ; \text{unskilled supplier} \\ (1+y)(1-s_E) \end{cases}$

As for the relationship supplier, in the event of non-repayment she can cancel date-1 delivery $(1 - \alpha)$, and sell to other entrepreneurs in the world market. Since her good is specifically made for the entrepreneur's ongoing project, it would not be as productive if it were used in other projects. As a result, the most that she can expect to get in return from supplying the date-1 delivery to the world market instead will be $(1 - s_S)(1 + p)(1 - \alpha)$, where $0 \le s_S \le 1$, which is less than the amount that she can get, $(1 + p)(1 - \alpha)$, if the entrepreneur services his repayment obligation.

Recall from the stylized facts on trade financing that a trade-financing loan is an obligation that an issuing bank of the entrepreneur has to repay to a negotiating bank of the relationship supplier. In the event of non-repayment, the negotiating bank can seize as collateral the banking assets of the issuing bank accessible to the negotiating bank. Essentially, this means that the larger the financial ties (i.e. cross-border banking claims) between the negotiating bank and the issuing bank, the more banking assets that can be seized to repay the relationship supplier if the entrepreneur fails to service his repayment obligation[25].

Let β be the value of such assets that can be seized in the event of non-repayment, where $0 \le \beta \le 1$. Under limited commitment to repay, the relationship supplier is willing to provide a trade-financing loan only if in the event that the entrepreneur fails to repay, a total value that she can get from selling date-1 delivery to the world market and seizing the banking assets of the issuing bank, is sufficient to cover her total cost of production:

(4) $(1 - s_S)(1 + p)(1 - \alpha) + \beta \ge 1$

From the above condition, three implications follow. First, in the event of non-repayment by the entrepreneur, the relationship supplier's loss in the value of her good (a fraction, $1 - s_S$) cannot be too large. This means that the more differentiated the imported good (because of its specificity to the project), the larger the loss to the relationship supplier.

Second, it is risky for the relationship supplier to engage in a one-time sale $(\alpha = 1)$ and provide a trade-financing loan to the entrepreneur. This implies that the larger the volume of continuing trade, which can be measured by the value of total imports, the less risky for the relationship supplier to provide the loan. Third, if a value of the banking assets that can be seized as collateral is sufficiently large relative to the total cost of production (i.e. $\beta = 1$), an incentive condition of the relationship supplier to provide the loan is easily satisfied.

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[25] Such assets could also represent insurance covered by the government's export credit agency. Malcolm Stephens (1998) notes that, unfortunately, exporters, banks, and investors seem not to have been sufficiently concerned about risks in South East Asia as to seek export credit agency cover before a recent East-Asian financial crisis.

Time line of events thus far is:

Date-0	Date-1	Date-2
1. Supplier agrees to sell to entrepreneur an imported good. The good is to be delivered at Date-0 and Date-1. 2. Banks on both sides agree on trade-financing loan contract. 3. Supplier delivers Date-0 fraction of the imported good and acquires specific skills in making and supplying the good to entrepreneur through relationship.	1. Relationship supplier delivers Date-1 fraction of the imported good if entrepreneur repays trade-financing loan; otherwise she sells the good to world market with loss due to specificity of the good. 2. Entrepreneur makes a repayment and receives the Date-1 delivery, or he defaults and uses cash-flow generated by Date-0 delivery of imported good to recourse to other suppliers.	1. Entrepreneur generates Date-2 cash-flow by either (1) (if he repaid) using all imported good from the relationship supplier or (2) (if he defaulted) using a mixed of imported good from two suppliers (relationship supplier and unskilled supplier) and suffering a loss due to specificity of the imported good. 2. If entrepreneur defaulted on Date-1, negotiating bank of relationship supplier seizes as collateral banking assets of issuing bank of entrepreneur.

Proposition 1: Under limited commitment to repay, the amount of trade-financing loans that the relationship supplier is willing to provide to the entrepreneur is:
- Positively correlated with value of total imports by the entrepreneur
- Positively correlated with value of banking claims that the entrepreneur's issuing bank owes to the supplier's negotiating bank (increasing with β)
- Negatively correlated with degree of product differentiation in imports (increasing with s_S)

The present value of cash flows of the entrepreneur if the entrepreneur fails to service repayment obligation is:

(5) $$\underbrace{\alpha(1+v)}_{date-0} \qquad \underbrace{-\beta+\alpha(1+y)+(1-\alpha)(1+v)}_{date-1} \qquad \underbrace{-(1-\alpha)(1+p)+(1-s_E)(1+y)}_{date-2}$$

If the entrepreneur repays his trade-financing loan, a present value of cash flows that will be generated is:

(6) $$\underbrace{\alpha(1+v)}_{date-0} \qquad \underbrace{-(1+p)+\alpha(1+y)+(1-\alpha)(1+v)}_{date-1} \qquad \underbrace{+(1+y)}_{date-2}$$

From the two conditions above, the entrepreneur has incentive to repay to the relationship supplier when:

(7) $$\frac{s_E(1+y)+\beta}{\alpha(1+p)} \geq 1$$

Two implications follow. First, similar to the incentive condition to provide trade-financing, the above condition suggests that repayment incentive is easier to satisfy when value of total imports

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by the entrepreneur and value of the entrepreneur's issuing bank assets in reach of the supplier's negotiating bank (as represented by β) are large.

Second, the degree of product differentiation in imports (as represented by s_E) influences the repayment incentive. Interestingly, the more differentiated the good, the greater the repayment incentive; it is more difficult for the entrepreneur to find other foreign suppliers to replace the relationship supplier, and thus his present value of cash flows suffers more when s_E is large.

Proposition 2: Under limited commitment to repay, the entrepreneur's incentive to repay is:
- Positively correlated with value of total imports
- Positively correlated with value of banking claims that the entrepreneur's issuing bank owes to the supplier's negotiating bank (increasing with β)
- Positively correlated with degree of product differentiation in imports (increasing with s_E)

To summarize:

Observable quantities of interest	Parameters	Effects on trade-financing loans	Ties
Value of total imports	$1 - \alpha$	+	Trade
Value of banking claims	β	+	Financial
Degree of product differentiation in imports	$s_i; i = \{S, E\}$	±	Trade/Financial

Appendix C: List of countries in the sample
Emerging markets:

Afghanistan, Albania, Algeria*, Angola, Argentina*, Armenia, Aruba, Azerbaijan, Bahrain*, Bangladesh, Barbados, Belarus, Belize, Benin, Bermuda*, Bhutan, Bolivia*, Bosnia and Herzegovina, Botswana, Brazil*, Brunei, Bulgaria*, Burkina Faso, Burundi, Cambodia, Cameroon*, Cape Verde, Central African Republic, Chad, Chile*, China*, Colombia*, Comoros, Congo Democratic Republic, Congo Republic, Costa Rica*, Croatia, Cuba, Cyprus, Czech Republic*, Djibouti, Dominica, Dominican Republic*, Ecuador*, Egypt*, El Salvador*, Equatorial Guinea, Estonia, Ethiopia*, Falkland Islands, Fiji, Gabon*, Gambia, Georgia, Ghana*, Gibraltar, Grenada, Guatemala*, Guinea, Guinea Bissau, Guyana, Haiti, Honduras, Hong Kong*, Hungary*, India*, Indonesia*, Iran*, Iraq*, Israel*, Jamaica*, Jordan*, Kazakhstan, Kenya*, Korea*, Kuwait*, Kyrgyz Republic, Laos, Latvia, Lebanon*, Lesotho, Liberia*, Libya, Lithuania, Macao*, Macedonia*, Madagascar, Malawi*, Malaysia*, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico*, Moldova, Mongolia, Morocco*, Mozambique, Myanmar, Namibia, Nepal, Netherlands Antilles, New Caledonia, Nicaragua*, Niger, Nigeria*, Oman*, Pakistan*, Panama*, Papua New Guinea, Paraguay*, Peru*, Philippines, Poland*, Qatar*, Romania*, Russia*, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia*, Senegal*, Seychelles, Sierra Leone, Singapore*, Slovakia*, Slovenia, Solomon Islands, Somalia, South Africa*, Sri Lanka*, St. Lucia, St. Vincent and Grens, Sudan*, Suriname, Swaziland, Syria*, Tajikistan, Tanzania, Thailand*, Togo, Tonga, Trinidad and Tobago*, Tunisia*, Turkey*, Uganda, Ukraine, United Arab Emirates, Uruguay*, Vanuatu, Venezuela*, Vietnam, Yemen, Zambia*, Zimbabwe

Industrial countries:

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

Note: Data for the U.S. banks' trade financing are available only for countries with * and industrial countries.

Appendix D: Variables and Data Source

Variables	Description
	Industry-Level Data
Financing-Cost Measures	
Dependence on Trade-Credit Use	[(capital expenditures - cash flow from operations) / capital expenditures] for four firms in the 1980's, old firms in the 1980's, young firms in the 1980's, and all firm constructed from the data of the U.S. companies over the 1980's in Standard and Source: Raghuram G. Rajan and Luigi Zingales (1998)
Dependence on External-Finance Use	(i) a stock measure of dependence on trade credits: [accounts payable / total assets dependence on trade credits: [change in accounts payable / change in total assets], of dependence on external finance: [(total assets - retained earnings) - total assets] data of the U.S. companies over the 1980's in Standard and Poor's *COMPUSTAT* Source: Raymond Fisman and Inessa Love (2003)
Import Prices	Quarterly indexes disaggregated into the four-digit SIC. Source: U.S. Bureau of Labor Statistics (BLS) on-line databases. http://www.bls.g accessed on August 30, 2003
Exchange Rates	Inverse of the U.S. nominal effective exchange rates (i.e. an increase is dollar depr nominal effective exchange rates are averages of the monthly exchange rate series Source: *International Financial Statistics (IFS)* series [neu] by the International M
Volatility of Exchange Rates	Three-month rolling standard deviations of the monthly nominal effective exchang Source: *International Financial Statistics (IFS)* series [neu] by the International M
Industry Concentration	Two-digit SIC industries' Herfindahl-Herschmann Index (HHI) from the 1992 sur SIC industry, the HHI index is calculated by summing the squares of the individua for the 50 largest companies or the universe, whichever is lower, in the industry. Source: U.S. Bureau of Census. On-line databases: http://www.census.gov/epcd/w accessed on August 30, 2003.
Industry Inventory to Shipments	Quarterly inventory to shipments for each two-digit SIC industry, averaged from t Source: U.S. Bureau of Census. On-line databases: http://www.census.gov/indicator/www/m3/hist/m3bendoc.htm, accessed on Augu
	Country-Level Data
Trade-Financing Loans	
U.S. Commercial Banks	Quarterly stock of commercial-bank trade credits from the U.S. to industrial and d available for all commercial banks (money-center, large, and small) from Septemb 2002. Money-center banks include Bank of America Corp., Bank One Corp., Taur Chase & Co., and Citigroup. Large banks include Bank of New York Co., Wachov Financial Corp., HSBC Holdings PLC, and State Street Corp.. Source: Federal Financial Institutions Examination Council (FFIEC)-*Country Exp and Country Exposure Information Report (E.16)*
G7 Creditors	Bi-annual stock of trade credits from G7 to developing countries, available for con official creditors from 1991 to 2002. The data is the aggregate of trade credits from that since most of trade-financing loans are provided by large industrial countries, credit agencies or by international banks and their subsidiaries, it is reasonable, gi data, to match trade-financing loans with international trade data of G7 countries. Source: Bank of International Settlements (BIS)
Trade and Financial Ties	
Value of Imports	Value of total imports from the creditor/exporter country (US, G7) by the borrowe Source: Organisation for Economic Cooperation and Development (OECD)-*Mont Statistics*. http://sourceoecd.org
Value of Banking Claims	Value of cross-border banking claims the borrower/importer country owes to the c Source: *FFIEC-E16* for the U.S. commercial banks and from BIS for the G7-credi
Degree of Product Differentiation in Imports	[total value of the imports of differentiated products / (total value of imports of or + total value of imports of reference-priced goods)] averaged over the sample peri U.S. commercial-bank case, and 1991-2002 for the G7-creditors case), using good

	E. Rauch (1999).
Financial Disruption	Dummy variable equal to one for periods of a systematic banking crisis, construct... episodes of systematic banking crises since 1975. Source: Gerard Caprio and Daniela Klingebiel (2003)
Public Debts in Banking Claims	Percentage of public debts in banking claims by each bank size (U.S. data) and cr... Source: Same as data for Trade-Financing Loans
Short-Term Debts in Banking Claims	Percentage of short-term debts in banking claims by each bank size (U.S. data) an... Source: Same as data for Trade-Financing Loans
Number of Previous Participation in Paris Club Negotiation	Number of previous participation in Paris Club negotiation, constructed from date... Negotiation Source: http://www.clubdeparis.org
Regional Free Trade Agreement Participation	Dummy variable equal to one if a debtor country participates in a regional free tra... trade agreement dummies include EEC/EC/EU, US-Israel FTA, NAFTA, CARIC... ANZCERTA, MERCOSUR. Source: http://faculty.haas.berkeley.edu/arose/, accessed on May 28, 2003.
Distance from Trading Partners	distance between the borrower/importer country and the creditor/exporter country... Source: Same as data for Regional Free Trade Agreement Participation

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Table 1: Pattern of dependence on external-finance use and variations in import prices, industry inventory to shipments, and market concentration across industries in the United States during 1980-1990

| SIC | Description | Dependence on : | | Coefficient of variation of : | | HHI index |
		External-finance use	Trade-credit use	Import price	Inventory to shipments ratio	
3651	Household Audio and Video Equipment	-1.33	0.05	0.04	0.07	585
3661	Telephone and Telegraph Apparatus	-1.33	0.05	0.04	0.07	1110
3679	Electronic Components	-1.33	0.05	0.05	0.07	414
3531	Construction Machinery and Equipment	-0.18	0.10	0.08	0.10	777
3621	Motors and Generators	-0.05	0.11	0.13	0.07	447
3699	Electrical Machinery, Equipment, and Supplies	-0.02	0.12	0.09	0.07	180
3724	Aircraft Engines and Engine Parts	-0.02	0.12	0.17	0.10	2378
3728	Aircraft Parts and Auxiliary Equipment	-0.02	0.12	0.19	0.10	772
3714	Motor Vehicle Parts and Accessories	0.10	0.08	0.10	0.10	943
3537	Industrial Trucks, Tractors, Trailers, and Stackers	0.14	0.08	0.05	0.12	597
3711	Motor Vehicles and Passenger Car Bodies	0.14	0.08	0.12	0.10	2676
3674	Semiconductors and Related Devices	0.14	0.10	0.05	0.07	541
2899	Chemicals and Chemical Preparations	0.15	0.06	0.09	0.07	190
3569	General Industrial Machinery and Equipment	0.25	0.09	0.12	0.12	102
3823	Industrial Instruments for Control of Process Variables	0.25	0.09	0.21	0.04	256
3825	Instruments for Testing of Electrical Signals	0.25	0.09	0.14	0.04	401
3841	Surgical and Medical Instruments	0.25	0.09	0.14	0.04	243
3559	Special Industry Machinery	0.33	0.09	0.13	0.12	80
3829	Measuring and Controlling Devices	0.33	0.09	0.06	0.04	148

Note: Import price is the quarterly import price index for each SIC industry in the U.S.. HHI index is the Herfindahl-Herschmann Index for each SIC industry. External-finance use is the fraction of capital expenditures not financed with internal funds for old U.S. firms in the same industry between 1980-1990. Trade-credit use measures the fraction of purchases on credits for U.S. firms in the same industry between 1980-1990. Inventory to shipments ratio is the quarterly inventory to shipments for each SIC industry in the U.S..

Table 2: Import prices response to exchange rate changes
Dependence on external-finance use

	(1)	(2)	(3)	(4)
Lagged import prices	0.946	0.940	0.956	0.927
	(0.013)**	(0.014)**	(0.017)**	(0.014)**
Exchange rates	-0.009	-0.012	-0.029	0.013
	(0.020)	(0.020)	(0.024)	(0.022)
interactions of exchange rates with:				
× Volatility	0.002	0.001	-0.010	-0.002
	(0.001)	(0.001)	(0.003)**	(0.002)
× HHI index	-0.000	0.001	0.004	0.003
	(0.001)	(0.001)	(0.001)**	(0.001)**
× External-finance use:				
all firms in 1980	-0.003			
	(0.001)**			
young firms in 1980		-0.004		
		(0.002)*		
old firms in 1980			0.017	
			(0.004)**	
all firms in 1970				0.004
				(0.001)*
Observations	611	583	422	417
Differential in pass-through rates	-0.132	-0.620	0.577	0.067

Note: The dependent variable is the quarterly import price index for each SIC industry in the U.S.. Exchange rate is an inverse of the quarterly U.S.'s nominal effective exchange rates. Volatility is the 3-month rolling standard deviation of the U.S. exchange rates. HHI index is the Herfindahl-Herschmann Index for each SIC industry. External-finance use is the fraction of capital expenditures not financed with internal funds for U.S. firms in the same industry between 1980-1990. Differential in pass-through rates measure (in percentage terms) how much of changes in exchange rate pass-through into import prices of an industry at the 4th quartile level of financial dependence with respect to an industry at the 1th quartile level of financial dependence. Robust standard errors in parentheses. **(*) signifies statistically significant at 1%(5%). Controlling variables not reported here are year dummies and values of industry inventory to shipments.

Table 3: Import prices response to exchange rate changes
Dependence on trade-credit use

	(5)	(6)	(7)
Lagged import prices	0.947	0.954	0.955
	(0.010)**	(0.011)**	(0.011)**
Exchange rates	0.007	0.006	0.007
	(0.018)	(0.018)	(0.018)
	interactions of exchange rates with:		
× Volatility	-0.028	-0.005	-0.002
	(0.005)**	(0.002)**	(0.001)
× HHI index	0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)
× Trade-credit use:			
1-(retained earnings/total assets)	0.056		
	(0.010)**		
accounts payable/total assets (stock measure)		0.010	
		(0.002)**	
account payable/total assets (flow measure)			0.004
			(0.001)**
Observations	724	724	724
Differential in pass-through rates	0.435	0.054	0.073

Note: The dependent variable is the monthly import price index for each SIC industry in the U.S.. Exchange rate is an inverse of the monthly U.S.'s nominal effective exchange rates. Volatility is the 3-month rolling standard deviation of the U.S. exchange rates. HHI index is the Herfindahl-Herschmann Index for each SIC industry. Trade-credit use measures the fraction of purchases on credits for U.S. firms in the same industry between 1980-1990. Differential in pass-through rates measure (in percentage terms) how much of changes in exchange rate pass-through into import prices of an industry at the 4th quartile level of financial dependence with respect to an industry at the 1th quartile level of financial dependence. Robust standard errors in parentheses. **(*) signifies statistically significant at 1%(5%). Controlling variables not reported here are year dummies and values of industry inventory to shipments.

Table 4: Trade-financing loans from the U.S. commercial banks, September 1997 to June 2002

Quartile	Country	Trade-financing loans	Imports	Product Diff.	Banking Claims
		(million US$)	(million US$)	(%)	(million US$)
	Korea	76,244	41,186	19	175,796
4th	Brazil	58,056	26,883	3	338,299
	Mexico	41,541	171,578	10	401,210
	Venezuela	5,827	10,396	11	69,662
3rd	Dominican Republic	5,741	7,744	15	14,349
	Guatemala	5,699	3,483	19	19,368
	Sweden	1,729	6,995	3	110,469
2nd	Belgium	1,616	24,599	4	183,301
	Jordan	1,473	636	42	1,947
	Nicaragua	366	704	26	1,369
1st	Denmark	191	3,013	9	109,712
	Ghana	173	395	31	1,213

Note: Only top three countries for each quartile are reported. Trade-financing loans is the quarterly amount of trade-financing loans from the U.S. Money-center banks to each debtor country from September 1997 to June 2002. Imports is a value of total imports from the U.S. to each debtor country. Product diff. is a degree of product differentiation in imports, measured as the averages over September 1997 to June 2002 of the ratio of imports of differentiated products to imports of reference priced- and organized exchange- products as classified by James Rauch (1999). Banking Claims is a value of banking assets measured as unadjusted cross-border claims by each debtor country.

Table 5: Trade-financing loans from the G7-creditors, January 1991 to December 2001

Quartile	Country	Distribution of trade-financing loans:			
		Total amounts	Commercial banks	Official creditors (short-term)	Official creditors (all maturities)
		(million US$)	(%)	(%)	(%)
	China	237,461	54	16	46
4th	Russia	223,426	42	1	58
	Indonesia	181,644	49	13	51
	Congo Republic	14,382	36	4	64
3rd	Kenya	13,163	46	16	54
	Czech Republic	12,247	45	25	55
	Belarus	2,751	74	7	26
2nd	Bahrain	2,707	78	13	22
	Senegal	2,671	14	33	86
	Brunei	511	0	57	100
1st	Libya	503	0	37	100
	Mongolia	500	24	24	76

Note: Only top three countries for each quartile are reported. Trade-financing loans is the bi-annual amount of trade-financing loans from G7-creditors to each debtor country from January 1991 to December 2001.

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Table 6: Determinants of Trade-Financing Loans

Trade-financing loans from U.S. Money-center banks

</div>

	(8)	(9)
Financial Disruption	-0.35 (0.38)	
Imports:	0.58 (0.15)**	0.54 (0.14)**
Financial Disruption × Imports	0.13 (0.08)	
Product diff.:	0.39 (0.04)**	0.34 (0.04)**
Financial Disruption × Product diff.	-0.38 (0.07)**	
Banking Claims:	0.64 (0.22)**	0.38 (0.15)*
Financial Disruption × Banking Claims	0.04 (0.08)	
Public debt in Banking Claims	-0.28 (0.07)**	-0.19 (0.05)**
Short-Term debt in Banking Claims	-0.35 (0.11)**	-0.23 (0.11)*
Observations	1865	1865

Note: Dependent variable is quarterly amount of trade-financing loans from the U.S. Money-center banks to each debtor country from September 1997 to June 2002. Financial Disruption is a dummy variable equals to one if a country was in a period of systematic banking crisis. Imports is a value of total imports from the U.S. to each debtor country. Product diff. is a degree of product differentiation in imports, measured as the averages over September 1997 to June 2002 of the ratio of imports of differentiated products to imports of reference priced- and organized exchange- products as classified by James Rauch (1999). Banking Claims is a value of banking claims measured as unadjusted cross-border claims by each debtor country. Public debt (Short-Term debt) in Banking Claims is a value of portion of the cross-border claims by public sector (with maturity less than one year). All variables are in natural logs. Controlling variables not reported are history of Paris-Club negotiation, distance from the U.S., regional free trade agreement and year dummies. Pooled-Tobit estimation with IV applies to Imports and Banking Claims. Robust standard errors in parentheses. **(*) signifies 1%(5%).

Table 7: Lower and Upper bounds of coefficient estimates: Determinants of Trade-financing loans from U.S. commercial banks

Note: Specification search of models nested between the model (8) and (9) of Table 6. All of the estimates reported below are statistically significant at the 5% level.

Explanatory variables [bank size]		Prior on integration of trade financing market				
		no prior			high	
Key :		lower	upper		lower	upper
Imports		0.31	0.40		0.00	0.00
	money-center	0.54	0.68		0.00	1.16
	large	0.00	0.00		0.00	0.00
	small	0.40	0.62		0.00	0.00
Product diff.		0.26	0.30		0.00	0.27
	money-center	0.32	0.41		0.00	0.33
	large	0.00	0.18		0.00	0.00
	small	0.00	0.00		0.00	0.00
Banking Claims		0.53	0.72		0.00	1.60
	money-center	0.41	0.81		1.60	2.76
	large	0.00	0.90		0.00	0.00
	small	0.83	0.99		0.00	0.00
Doubtful :		lower	upper		lower	upper
Financial Disruption		-1.44	0.00		-3.02	-2.00
	money-center	-1.08	0.00		-2.45	-1.63
	large	-1.91	-0.88		-1.96	0.00
	small	-1.04	-0.27		0.00	0.00
Financial Disruption × Imports		0.00	0.16		0.00	0.32
	money-center	0.00	0.17		0.00	0.00
	large	-0.25	0.19		0.00	0.00
	small	0.00	0.00		0.00	0.28
Financial Disruption × Product diff.		0.00	0.00		0.00	0.00
	money-center	-0.41	-0.21		-0.40	0.00
	large	0.00	0.51		0.00	0.44
	small	0.29	0.41		0.00	0.00
Financial Disruption × Banking Claims		0.00	0.20		0.00	0.28
	money-center	0.00	0.15		0.00	0.00
	large	0.00	0.23		0.00	0.30
	small	0.00	0.16		0.00	0.29

Table 8: Determinants of Trade-financing Loans
Trade-financing loans from all G7-creditors

	(10)	(11)
Financial Disruption	-0.98	
	(0.41)*	
Imports:	-0.35	-0.22
	(0.48)	(0.20)
Financial Disruption × Imports	0.09	
	(0.10)	
Product diff.:	0.10	0.15
	(0.06)	(0.05)**
Financial Disruption × Product diff.	0.22	
	(0.11)*	
Banking Claims:	0.88	0.79
	(0.32)**	(0.15)**
Financial Disruption × Banking Claims	0.01	
	(0.07)	
Public debt in Banking Claims	0.44	0.37
	(0.28)	(0.13)**
Short-Term debt in Banking Claims	0.03	0.03
	(0.08)	(0.07)
Observations	1525	1525

Note: Dependent variable is bi-annual amount of trade-financing loans from G7-countries to borrower country from January 1991 to December 2001. Financial Disruption is a dummy variable equals to one if a country was in a period of systematic banking crisis. Imports is a value of total imports from the G7-countries to each debtor country. Product diff. is a degree of product differentiation in imports, measured as the averages over January 1991 to December 2001 of the ratio of imports of differentiated products to imports of reference priced- and organized exchange- products as classified by James Rauch (1999). Banking Claims is a value of banking claims measured as unadjusted cross-border claims by each debtor country. Public debt (Short-Term debt) in Banking Claims is a value the cross-border claims by public sector (with maturity less than one year). All variables are in natural logs. Controlling variables not reported are history of Paris-Club negotiation, distance, regional free trade agreement and year dummies. Pooled-Tobit estimation with IV applies to Imports and Banking Claims. Robust standard errors in parentheses.**(*) signifies 1%(5%).

Table 9: Lower and Upper bounds of coefficient estimates: Determinants of Trade-financing loans from <u>G7-creditors</u>

Note: Specification search of models nested between the model (10) and (11) of Table 8. All of the estimates reported below are statistically significant at the 5% level.

Explanatory variables [creditor type]		Prior on integration of trade financing market				
		no prior			high	
<u>Key</u> :		<u>lower</u>	<u>upper</u>		<u>lower</u>	<u>upper</u>
Imports		0.00	0.00		0.00	0.00
	Bank	-1.29	0.00		0.00	0.00
	non-bank	-1.61	0.00		0.00	0.00
	< 1 year	0.00	1.44		1.09	1.17
Product diff.		0.00	0.15		0.00	0.00
	Bank	0.00	0.00		0.00	0.00
	non-bank	0.36	0.41		0.00	0.00
	< 1 year	0.00	0.00		0.00	0.00
Banking Claims		0.00	0.91		0.00	0.60
	Bank	0.00	1.55		0.91	1.01
	non-bank	0.83	1.79		0.00	0.00
	< 1 year	0.00	0.25		0.00	0.00
<u>Doubtful</u> :		<u>lower</u>	<u>upper</u>		<u>lower</u>	<u>upper</u>
Financial Disruption		-0.98	-0.43		0.00	0.00
	Bank	0.00	1.30		0.00	0.00
	non-bank	-1.15	0.00		0.00	0.00
	< 1 year	0.00	0.00		0.00	0.00
Financial Disruption × Imports		0.00	0.09		0.00	0.00
	Bank	0.00	0.27		0.00	0.00
	non-bank	0.00	0.12		0.00	0.00
	< 1 year	0.05	0.18		0.00	0.00
Financial Disruption × Product diff.		0.00	0.23		0.00	0.00
	Bank	-0.22	-0.12		0.00	0.00
	non-bank	0.00	0.00		0.00	0.00
	< 1 year	0.00	0.00		0.00	0.00
Financial Disruption × Banking Claims		0.00	0.07		0.00	0.00
	Bank	0.00	0.24		0.00	0.00
	non-bank	0.00	0.09		0.00	0.00
	< 1 year	0.00	0.00		0.00	0.00

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Figure A: Time line of standard arrangement of trade-financing loan

(1) Importer and Exporter agree on commercial contract

Exporter

(4) Exporter delivers goods

Importer

(5) Exporter presents draft and documents

(8) Negotiating bank pays exporter

(9) Exporter pays issuing bank

(2) Exporter arrangers Letter of Credits (L/C)

Negotiating bank

Issuing bank

(6) Negotiating bank presents draft and documents. Issuing bank promises to pay in t days and returns the accepted draft

(3) Issuing bank sends L/C to negotiating bank

(7) Negotiating bank sells the accepted draft to forfeiter/public investor

Forfaiter/Public investor

(10) Forfaiter presents the accepted draft and is paid by issuing bank