Off the Cliff and Back? Credit Conditions and International Trade during the Global Financial Crisis*

Davin Chor† Kalina Manova ‡

First draft: October 2009
This version: December 2009

Comments are Welcome.

Abstract

We study the collapse of international trade flows during the global financial crisis using detailed data on monthly US imports during this period. We show that adverse credit conditions were an important channel through which the crisis affected trade volumes. We identify the effects of credit tightening by exploiting the variation in the cost of capital across countries and over time, as well as the variation in financial dependence across sectors. We find that countries with higher interbank rates and thus tighter credit markets export less to the US. These effects are especially pronounced in sectors that require extensive external financing, have few collateralizable assets, and can access limited trade credit. Exports of financially vulnerable industries are thus more sensitive to the cost of external capital than exports of less dependent industries, and this sensitivity rose during the financial crisis. Our estimates imply that the crisis would have reduced trade flows by 26% more if governments had not acted to lower lending rates, and by 30% less if policy interventions had had a more immediate effect on the cost of capital. These results provide new evidence on the effect of credit conditions on trade, while highlighting the large real effects of financial crises and the potential gains from policy intervention.

Keywords: international trade, financial crisis, credit constraints, trade credit.

JEL Classification: F10, F14, F42, G01, G20, G28.

*The work in this paper has been partially supported by a Stanford Vice Provost for Undergraduate Education (VPUE) Faculty Grant for Undergraduate Research and SMU Office of Research Grant No. 09-C244-SMU-010. We thank Pol Antràs, Marc Melitz, and Daniel Trefler for insightful conversations, as well as audiences at the Harvard international lunch, University of New South Wales, and Singapore Management University. Carlo Antonio Cabrera, Chan Li, Vera Eidelman, and Zhicheng Song provided excellent research assistance.

†School of Economics, Singapore Management University, 90 Stamford Road, Singapore 178903. E-mail: davinchor@smu.edu.sg

‡(Corresponding author) Department of Economics, Stanford University, 579 Serra Mall, Stanford, CA 94305, USA. Email: manova@stanford.edu

1 Introduction and Motivation

The current global financial crisis has had far-reaching repercussions on economic activity. After a sharp and sudden collapse in international trade in the last quarter of 2008, world trade flows are projected to decline by up to 9% in 2009.[1] This exceeds the anticipated loss of 6% in industrial output and 2.5% in income per capita.[2] The contraction in exports has been particularly acute for small open economies, several of whom have seen their trade volumes in the second half of 2008 fall by up to 30% year-on-year. This decline in cross-border trade has contributed to the spread of recessionary pressures to countries which had little direct exposure to the US subprime mortgage market where the crisis originated. For example, the popular press has provided anecdotal accounts of how manufacturing plants around the world have scaled down production and employment in response to limited export opportunities.[3]

Two aspects of the financial crisis are believed to have triggered this large decline in international trade. On the producer side, the crisis has seen a severe reduction in the availability of external finance, thus curtailing the production and export capacities of firms. On the consumer side, the negative economic outlook has in turn led to a slowdown in global demand. To date, however, there has been relatively limited formal empirical evidence on the importance of these mechanisms in explaining the collapse in trade flows. It would be useful in particular to understand the contribution of these forces to the potentially uneven trade decline across countries and sectors, in order to inform the design of policy interventions to mitigate the real effects of this and future financial crises.

This paper is one of the first to establish and quantify the effect that credit tightening had on international trade during the 2008-2009 global crisis. We examine the evolution of monthly US imports over the November 2006 to April 2009 period, and compare trade patterns before and during the crisis.[4] We identify the effects of credit tightening by exploiting the variation in interbank lending rates (which we use as a measure of the cost of external capital) across countries and over time, as well as the variation in financial dependence across sectors. We find that countries with higher interbank rates and thus tighter credit availability export less to the US. These effects are especially pronounced in sectors that require extensive external financing, have few collateralizable assets, and can access limited trade credit.[5] In other words, exports of financially dependent industries are more sensitive to the cost of external capital

[1] WTO projections from March 2009.

[2] IMF projections.

[3] See for example Schwartz (2009a,b) in *The New York Times*.

[4] Based on the developments in global financial markets described in Section 2, we date the beginning of the crisis to the month when it started to unfold in earnest, September 2008. We discuss the robustness of our results to alternative ways of dating the crisis period later below. Future drafts will aim to extend the data sample to include more recent months of newly-available data.

[5] Throughout this paper, to avoid confusion, we use the term "trade credit" to refer to transactions between a firm and its buyers or suppliers that involve the transfer of goods or services without immediate need for a transfer of payment funds. On the other hand, we use the term "trade finance" to refer to formal borrowing by firms from banks or other financial institutions to facilitate international trade activities, such as export letters of credit or trade insurance.

than exports of less dependent industries, and this sensitivity rises during the financial crisis. These results are robust to controlling for countries' overall level of development (GDP and GDP per capita), as well as the role of factor endowments as determinants of trade patterns.

We also consider whether a country's pre-crisis level of financial development served to mitigate the adverse effects of the crisis. Here, we indeed find suggestive evidence that the exports of countries with stronger financial institutions were more resilient to the crisis, especially in sectors with high external finance dependence, few tangible assets, and limited access to trade credit. We find these results when using an outcome-based proxy for a country's capacity to efficiently supply capital (private credit as a share of GDP), and to a slightly weaker extent, when using a direct institutional measure of the ability to sustain financial contracts (accounting standards). This suggests that both long-term institutional features of the financial system, as well as short term fluctuations in the cost of capital, can be important for understanding patterns of trade during a financial crisis.

Our findings imply that credit conditions contributed significantly to the overall decline in trade flows during this crisis. In particular, our reduced-form estimates indicate that a 1% rise in interbank rates is associated with 20% lower trade volumes on average. We also infer how US imports would have evolved under two alternative scenarios: (1) governments around the world did not actively intervene in financial markets, and interbank rates remained at their peak levels from September 2008; and (2) all countries implemented dramatic policy interventions immediately after September 2008, and interbank rates instantaneously dropped to their low levels of April 2009. We find that the 2008-2009 financial crisis would have reduced US imports by 25.6% more and 30.2% less under these hypothetical scenarios respectively. Moreover, there would have been large and systematic differences in the response of exports across sectors at different levels of financial vulnerability. These results highlight the large impact of financial market disturbances on the real economy, the cost of crisis contagion on export performance, as well as the scope for policy intervention.

Our findings on the role of credit conditions in explaining trade patterns during the recent crisis provide an additional piece of evidence on the importance of credit and financing for exporting activities. Access to external capital clearly matters for both domestic production and exporting because firms often have to incur substantial upfront costs that cannot be funded out of their cash flow or accumulated reserves. Some of these costs are of a fixed nature, such as for product development and investment in capital equipment, while others are variable costs, such as intermediate input purchases, advance payments to salaried workers, and land or equipment rental fees. Exporting is furthermore associated with particular outlays that can exacerbate firms' liquidity constraints. Sunk and fixed costs that are specific to cross-border trade include costs incurred in: learning about the profitability of export opportunities; making market-specific investments in capacity, product customization and regulatory compliance; and

setting up foreign distribution networks. Some variable trade costs, such as for shipping and duties, may also have to be incurred before export revenues are realized. To overcome these liquidity constraints, firms routinely rely on financing from banks or trade credit extended by their business partners. The additional risk that is faced in exporting relative to domestic sales further necessitates insurance for many cross-border transactions. These factors have all led to a very active credit market for international trade activities: Up to 90% of world trade reportedly depends on some form of trade finance, with the market for trade-related credit and insurance said to be worth about $10-$12 trillion in 2008 (Auboin 2009).

While credit availability is important in all industries, our empirical strategy relies on the observation that some sectors are more dependent on the financial system than others for technological reasons. The recent growth literature has identified several measurable dimensions that characterize a sector's financial vulnerability. First, production and exporting in some industries are associated with larger upfront costs that cannot be serviced internally, and such industries require more external finance (Rajan and Zingales 1998).[6] Second, industries which employ more tangible assets such as plant, property and equipment enjoy easier access to outside capital because firms can pledge more collateral (Braun 2003, Claessens and Laeven 2003). Finally, in some sectors, firms routinely receive more trade credit which gives them an alternative to and thus potentially reduces their dependence on bank financing (Fisman and Love 2003). This is incidentally consistent with anecdotal evidence that most of the firms reporting the biggest losses in output and employment since September 2008 have been in computers and electronics (Sprint, Nokia, Texas Instruments, Philips, Microsoft, Sony, Ericsson), chemical manufacturing and pharmaceuticals (Pfizer), and transportation and machinery (Caterpillar, Harley Davidson), respectively sectors with high dependence on external finance, low intensity of tangible assets, and limited access to trade credit (see Appendix Table 2).

Our finding that exports in financially vulnerable sectors were sensitive to a high cost of credit particularly during the height of the global crisis provides further evidence of the importance of credit conditions for international trade. We offer three potential interpretations for this central finding. First, demand for imports in the US plummeted during the crisis as American households reduced consumption spending and American producers scaled down their purchases of intermediate inputs. Faced with reduced export revenues, firms outside the US would naturally find it more difficult to incentivize home country lenders and raise the necessary bank credit for their export transactions. Second, in the face of the global liquidity crunch, banks around the world prioritized the need to shore up their balance sheets instead of engaging in fresh lending activity. This evaporation of liquidity did not spare the market for trade finance. A third possibility recognizes that exporting firms may in practice also access bank financing

[6]Rajan and Zingales (1998) show that countries where private credit is more readily available are able to support faster growth in industries that are more dependent on external finance. In a similar spirit, Raddatz (2006) demonstrates how such deeper financial systems facilitate a dampening in sectoral volatility in sectors that have high liquidity needs.

in their destination markets as well. Credit tightening in the US may thus have directly impacted the ability of foreign firms to finance their exports to the US. Although we are unable to disentangle the relative importance of these three alternative mechanisms, the subsequent rising cost of trade financing would naturally exert a disproportionately large dampening effect on sectors that are more financially vulnerable, namely those that require more external finance, have few tangible assets, or have limited access to trade credit.[7] Looking ahead, our results also raise the open question whether credit conditions and financial development will become more quantitatively important as a determinant of cross-sector patterns of specialization and trade even beyond the aftermath of the crisis.

1.1 Related literature

Our results add to a growing literature on the role of financial frictions in international trade. A number of theoretical and empirical papers have shown that, in the presence of credit constraints, countries with more developed financial institutions have a comparative advantage in financially vulnerable sectors.[8] While this literature exploits the same cross-sector variation in industry financial vulnerability as we do, it typically relies on country-level measures of financial development (such as private credit as a share of GDP, accounting standards, and creditor rights protection) that exhibit no or very limited time-series variation. By contrast, we explore the substantial variation in interbank rates across countries and over time using higher frequency data. We also focus on export patterns before and during a financial crisis instead of on cross-country variation in steady state.

The global liquidity squeeze has also sparked a renewed interest in the academic and policy literature on the role played by trade finance in mitigating credit constraints at the level of the individual firm. There is now a complementary body of evidence based on firm-level data showing that more credit-constrained firms indeed display a lower capacity for export activities.[9] While it is difficult to obtain definitive figures, estimates for the worldwide shortfall in trade finance range from $25-500 billion for the second half of 2008 (Auboin 2009, Chauffour and Farole 2009), prompting many economists and policy-makers to press the case for a coordinated push from country governments to shore up such lines of credit (Ellingsen and Vlachos 2009).

Our paper also falls within a broader research agenda seeking to assess the impact of banking and financial crises on economic outcomes, such as sectoral growth (Kroszner et al. 2007, Dell'Ariccia et al.

[7]The World Bank has assessed that about 10-15% of the decline in international trade has been driven by the lack of trade financing, with the remaining decline attributable to the collapse in aggregate demand (reported in Auboin 2009). That said, these figures appear to be relatively loose ballpark estimates.

[8]See Kletzer and Bardhan (1987), Beck (2002), Matsuyama (2005), Becker and Greenberg (2007), Do and Levchenko (2007), Chaney (2005), Manova (2008a), and Ju and Wei (2008) for theoretical models of credit constraints in trade. See Beck (2002, 2003), Svaleryd and Vlachos (2005), Hur et al. (2006), Becker and Greenberg (2007), and Manova (2008a,b) for country-level empirical evidence on the role of financial development as a determinant of trade flows.

[9]See for example Greenaway et al. (2007) based on UK data, Muûls (2008) on Belgium, Manova et al. (2009) on China, Amiti and Weinstein (2009) on Japan, and Minetti and Zhu (2009) on Italy.

2008).[10] More recently, Campello et al. (2009) show that the ongoing financial crisis has had a more severe impact on planned R&D, employment, and capital spending in credit-constrained firms, based on a survey of 1,050 CFOs in the US, Europe and Asia. With regards to the impact of crises on international trade, Amiti and Weinstein (2009) use matched firm-bank data from Japan to show that banks transmitted financial shocks to exporters during the systemic crisis that plagued Japan in the 1990s. In terms of empirical approach, our work is closest to Iacovone and Zavacka (2009), who explore the effect of 23 banking crises on exports during the 1980-2006 period. Their paper also exploits a similar dimension of cross-country, cross-industry variation to show that annual export growth rates were hurt more during a banking crisis in sectors more dependent on external finance and with fewer tangible assets, but that this effect was mitigated in countries with stronger levels of financial development. In contrast, we focus solely on one crisis episode, and examine higher frequency monthly data to track movements in the cost of capital and the accompanying decline in trade flows more closely.

Last but not least, our paper contributes to a fast-growing body of work investigating the trade effects of the 2008-2009 crisis. Freund (2009) and Levchenko et al. (2009) document that the decline in world trade has become more pronounced relative to the decline in GDP in the most recent global economic downturns, especially during this ongoing crisis. One proposed explanation points to the rise of vertical specialization and trade in intermediate inputs (Yi 2003): Any negative shock to final goods demand would thus have a multiplier effect on the decline in total recorded trade (which includes both intermediates and consumer goods). Consistent with this hypothesis, Levchenko et al. (2009) find that trade in goods that are used more intensively as intermediates did contract more severely during this financial crisis.[11] Similarly, Eaton et al. (2009) report that the decrease in world trade appears less severe when normalized by production or domestic sales, both of which are output concepts that include the value of embodied intermediates (unlike GDP). They then proceed to examine how international trade would have fared under counterfactual scenarios in which either trade frictions or the demand for manufactured goods had not declined, using a general equilibrium model of production and trade. Our paper admittedly focuses on a more narrowly-defined task: To test the hypothesis that one specific trade friction – credit conditions – mattered in explaining the observed fall in trade flows.

The remainder of the paper is organized as follows. Section 2 provides a descriptive overview of the collapse in trade flows and the rise in the cost of external finance during the crisis period. Section 3 describes the data, including the country measures of credit conditions and the sector measures of financial

[10] Kroszner et al. (2007) find that banking crises affect external finance dependent sectors relatively more in countries that had better initial financial development, arguing that this is because these sectors would have benefited most and grown faster from the easier access to credit in such countries. Note however that these results are obtained for a sample that is composed heavily of less developed countries.

[11] On the other hand, using a computable dynamic general equilibrium model, McKibbin and Stoeckel (2009) place the focus on the much larger contraction of trade in durables relative to its production to explain this trend.

vulnerability. Section 4 undertakes the regression analysis, while Section 5 interprets the magnitudes of these estimates via two hypothetical scenarios. The last section concludes.

2 Preview: The Crisis-related Decline in US Imports

Our primary goal is to track how trade flows reacted to the unfolding global credit crisis. For this reason, we examine trade data on a monthly basis for the US, obtained from the US Census Bureau website. We focus on the US data, given that the Census Bureau provides one of the most accessible sources of high-quality data, with figures for each month made available in a timely fashion (with a lag of about 3 months). We offer first an overview of the main trends in this data for the 2007-2009 period.

Figure 1 illustrates how aggregate US trade flows unraveled during the financial crisis. Trade volumes were in fact recording modest trend growth all the way until mid-2008, but this was followed by a severe contraction, both in terms of its magnitude and speed. US trade flows witnessed a particularly sharp month-on-month decline between October and November 2008, the timing of which coincided with the height of the global credit crunch. While nervousness over the exposure of financial institutions to the subprime mortgage market had steadily been building up since the end of 2007, two events in September 2008 – the collapse of Lehman Brothers and the government bailout of AIG – brought credit activity to a virtual standstill and raised the prospect of a financial sector meltdown in the US. The Dow Jones Industrial Average Index subsequently plunged almost 20% during a single week in mid-October 2008, dragging down investor and consumer sentiment substantially.

Several observations regarding the collapse in US trade flows are worth noting. First, the fall in US imports was more precipitous than that in US exports. On a month-on-month basis, US imports contracted 21.3% between October and November 2008, while its exports fell 14.3%, reflecting the particularly sharp decline in consumer sentiment and import demand in the US relative to other countries.[12]

Second, trade flows in the manufacturing sector (NAICS code first digit = 3) mirrored closely this aggregate decline. US manufacturing imports were 19.2% lower in November 2008 compared with the previous month, while the corresponding fall for manufacturing exports was 14.7%.[13] Third, this contraction in US manufactures was a very broad-based one (see Table 1). Focusing on the import figures, no 3-digit industry was spared from the contraction, with the only difference across industries being one of severity. The worst-hit industry was by far Petroleum and Coal Products manufacturing (NAICS 324) where import volumes more than halved during this month. On the other end of the spectrum,

[12]This contrast is even more stark when the corresponding figures are calculated in year-on-year terms for November 2008: US imports fell 18.3%, while US exports dropped a more moderate 8.4%.

[13]With regards to trade in services, Borchert and Mattoo (2009) find that this has been more resilient during the global financial crisis than trade in manufactured goods. They suggest that this can be attributed to the demand for services being less cyclical, and to services production and trade being less dependent on external finance.

food manufacturing (311) and furniture manufacturing (337) saw the most moderate declines, but these still registered a more than 5% fall. How much of these declines in trade volumes were due to decreases in prices versus decreases in quantities? While trade-related price indices are not readily available at a monthly frequency for the US, Levchenko et al. (2009) have used quarterly price indices from the National Income and Product Accounts (NIPA) to conclude that decreases in quantities accounted for most of the contraction in measured trade with one key exception: The especially sharp fall in petroleum and coal-related products (324) was due in large measure to the fall in commodity prices witnessed during this period as global demand slid.

This decline in US trade flows coincided with a severe shortfall in trade financing, a part of the overall freeze in lending activity at the height of the crisis. While systematic data on lines of credit and trade insurance are difficult to come by, all available accounts point to a sharply rising cost of trade financing during the last quarter of 2008. For example, an IMF-BAFT (Bankers' Association for Finance and Trade) survey of 44 banks from 23 developed and emerging markets reported a broad-based increase in the price of various trade-related credit instruments between October 2008 and January 2009, specifically a near doubling in the basis points spread over costs required to secure lines of credit or export credit insurance.[14] A similar World Bank survey of firms and banks in 14 developing countries also found that the crisis led to a fall in export pre-payments, forcing many firms to stretch out their cash flow cycles. While the price of credit instruments apparently peaked and started to moderate by the first quarter of 2009, these had not fallen back to their pre-crisis levels yet (Malouche 2009). These difficulties in accessing credit during the crisis prompted a response from policy-makers, including a commitment made at the G20 Summit in April 2009 to raise $250 billion to bolster the supply of trade finance.

In what follows, we shall examine the role of adverse credit conditions in influencing the cross-country and cross-industry pattern of this sudden drop in US imports during the height of the crisis.

3 Description of the Data

Our empirical exercise utilizes trade flow data at a monthly frequency, in order to track the rapid unfolding of the crisis, especially during the second half of 2008. As explained in the previous section, we focus on US trade flows, since the US Census Bureau regularly updates and posts detailed monthly trade data on its public website. Since our interest is in understanding how cross-country differences in the severity of the credit crunch affected trade performance, we focus on US import flows from its top 100 trading partners. We use monthly data starting from November 2006. This pre-dates the start of the crisis, in particular the latter months of 2007 when the critical state of the subprime loan market became ever

[14] See: http://baft.org/content_folders/Issues/IMFBAFTSurveyResults20090331.ppt

more apparent. While our sample currently ends in April 2009, it is our intention to extend this as more data become available.[15]

We require a measure of credit conditions across countries as our key explanatory variable. In principle, a direct measure of the cost of trade financing, such as the rates charged on export credit lines or insurance, would be ideal. Such data is unfortunately not readily available for a large sample of countries; for example, the IMF and World Bank surveys cited above suffer from limitations in country coverage, as well as (potentially) the cross-country comparability of the credit instruments for which the rates are quoted. In the absence of systematic information on trade financing costs, we appeal instead to a broader measure of the cost of external finance in the economy. Specifically, we use the interbank lending rate as a measure of the tightness of prevailing credit conditions in each country over time. These interbank rates are the interest rates that commercial banks charge each other for short-term loans of a pre-set duration (typically: overnight, one month, or three months), which serve to allow banks to adjust their liquidity positions and meet reserve requirements. More generally, the interbank rate has come to be seen as an indicator of the overall cost of credit in the economy, especially since many other lending rates often take their cue from it. It is not uncommon, for example, for interest rates on loans such as housing mortgages to be pegged against the interbank rate (plus a spread).

To expand on this, the interbank rate can be viewed as the sum of the (domestic) central bank discount rate, plus a spread that is specific to interbank loans. The discount rate is conceptually a baseline measure of the cost of borrowing that is set by the central bank, while the interbank spread is a premium that is charged on interbank loans that reflects the risk of default by borrowing banks. During periods of normal economic activity, this default risk is normally considered to be very low, so that interbank rates are typically among the most favorable rates that are openly quoted. That said, our analysis requires a measure of the cost of credit in a period of financial duress, during which both the baseline cost of borrowing and the risk of default would in principle matter for determining the total cost of capital that firms have to incur.[16] We therefore use the interbank rate, rather than just the interbank spread, in our empirical work below.

There are some practical issues involved in obtaining a measure of the interbank rate. At any given time, individual banks may quote slightly different interbank lending rates, as the exact terms of each contract may vary depending on the perceived credit-worthiness of the borrowing institution. That said, these rates have historically exhibited a high correlation across lending banks in a country, particularly in

[15]While the Census Bureau typically posts the trade data for each month within 3 months of the actual date, it appears to periodically revisit and update past data presumably as more precise figures become available. We have found though that any such revisions are minor, typically not exceeding 1% of the trade value initially report, which we view as part of the classical measurement error in our empirical work.

[16]To be even more precise, it would be preferable to have a measure of the cost of borrowing such as commercial paper rates that reflects the default risk of firms, as opposed to that of banks *per se*. That said, there are constraints to obtaining this data similar to those faced in procuring information on the terms of trade financing.

developed economies where the banking industry is competitive.[17] In some countries, banking associations and even the central bank will quote a reference rate that reflects prevailing conditions in the interbank market, which then serves as a benchmark for the cost of borrowing in that economy. A well-known example of this is the London Interbank Offer Rate (LIBOR), which is reported each business day by the British Bankers' Association (BBA).

Reflecting this reality, the Thomson Reuters Datastream database which we use can contain more than one interbank rate series for a country, even for loans of the same duration. When more than one series was reported in Datastream, we opted first to use series quoted by the country's central bank. If this was not available, we turned next to rates reported by banking associations or related regulatory bodies, such as the British Bankers' Association (BBA), European Banking Federation (FBE), or Financial Markets Association (ACI).[18] In the absence of such sources, we then chose finally to use an interbank rate quoted by a major commercial bank in the country.

For our baseline results, we focus on the one-month (or thirty-day) interbank rate, to be consistent with the typical duration needed to complete an international trade shipment. We average the interbank rate quoted across business days to obtain a monthly measure of the cost of credit in each country. As we show below, our results are very similar when using three-month (or ninety-day) rates instead.[19] In all, Datastream provides information on interbank rates for a sample of 29 countries. This is admittedly on the small side in terms of number, but nevertheless covers most of the US' key trading partners with up to 57% of total US imports in 2007 included in our sample. The list of countries also reflects a broad spectrum of levels of economic and financial development, including most of the OECD, as well as several key emerging markets (Romania, Hungary) and small open economies (Singapore, Hong Kong).

Figure 2 and Appendix Table 1 illustrate the evolution of the one-month interbank rate over the November 2006 to April 2009 period. This prime borrowing rate reached a peak in mid-2008 in most major economies, reflecting the rising cost of private credit as banks became extremely averse to lending, being preoccupied instead with shoring up their capital positions. Lending rates spiked in March 2008 (when Bear Stearns required a bailout), and once again in September 2008 (when Lehman Brothers collapsed and AIG failed). Interbank rates only began easing in November 2008, in response to the broad range of extraordinary monetary policy moves being deployed to bolster liquidity. These successfully lowered the interbank cost of borrowing from a median in our sample of 4.66% (September 2008) to 1.01% (April 2009).

[17] By the same token, the interbank lending rate would likely be a much poorer indicator of the cost of credit in countries with under-developed banking sectors, in which interbank lending activity is muted.

[18] For BBA series, we used the daily interest rate series, rather than the "5pm" quotes. There are typically only minuscule differences between the two interbank rates.

[19] The correlation in the monthly average of the one-month and three-month rates is very high for the countries in our sample, in excess of 0.99.

Beneath this broad trend, there are nevertheless important differences in the time paths in the interbank rates across countries, reflecting differences in the severity and timing of the credit crunch and subsequent policy interventions. This dimension of cross-country variation in the cost of credit will be crucial for our empirical strategy, to allow us to estimate the importance of credit conditions for international trade during the crisis. In countries such as Germany and Bulgaria, the interbank rate was on a steady upward trend until this was abruptly reversed in October and November 2008. In contrast, interbank rates were declining from a much earlier date in Canada and Singapore, reflecting the earlier interventions made by central bankers in these countries to cope with the impending downturn. In China, there was a spike in the cost of credit in the latter half of 2007, well before the height of the crisis in the US and Europe. As for Japan, although interbank rates there also crept up during the financial crisis, and fell back again as monetary easing commenced in the last quarter of 2008, interbank rates were always very low, and never climbed above the 1% level.

In addition to the variation in credit conditions across countries, our empirical strategy also exploits differences in the sensitivity to tighter credit availability across sectors. We follow closely the methodology in the prior literature in constructing three such variables of industry financial dependence. For this, we use Compustat data, which covers all publicly-traded firms in North America. External finance dependence ($EXTFIN$) is measured as the fraction of total capital expenditure not financed by internal cash flows, and reflects firms' requirement for outside capital (Rajan and Zingales 1998). Asset tangibility ($TANG$) is constructed as the share of net plant, property and equipment in total book-value assets, and captures firms' ability to pledge collateral in securing credit (Braun 2003). Finally, access to trade credit ($TCREDIT$) is calculated as the ratio of the change in accounts payable over the change in total assets, and indicates how much credit firms received from their buyers and suppliers instead of having to immediately settle all payments on the spot (Fisman and Love 2003). To construct each of these variables, we first compute financial dependence at the firm level as an average measure over the 1996-2005 period. This pre-dates the crisis, so that the impact of the financial crisis on firm behavior does not contaminate these measures. We then use the median value across firms in each NAICS 3-digit category as the industry measure of $EXTFIN$, $TANG$ and $TCREDIT$ respectively. Appendix Table 2 lists these values for the 21 industries in our data.

These three variables are widely viewed as capturing technologically-determined characteristics of a sector which are exogenous from the perspective of an individual firm. This is corroborated by the much greater variation in these measures across industries than among firms within a given sector. Note that the value of these sector characteristics may differ across countries, but we measure them with a proxy based on firm-level data for the US. This choice is motivated by three considerations. First, similar data are not systematically available for a broad range of countries. Second, the United States has one of the

most advanced financial systems, recent developments notwithstanding, and the behavior of US firms thus likely reflects firms' optimal choice of external financing and asset structure. Finally, our empirical strategy requires only that the relative rank ordering of sectors remain stable across countries, even if the precise magnitudes may vary.

The Data Appendix describes in detail the other control variables used in the empirical analysis.

4 Results

We establish the detrimental effect of the deterioration in credit conditions during the 2008-2009 financial crisis on trade flows in two steps. We first document that at the cross-country level, a higher interbank rate was indeed associated with a lower volume of exports to the US. We then show that financially dependent sectors in countries with high interbank rates were particularly severely affected during the crisis.

4.1 Credit tightness across countries

We begin by examining the differential effect of the crisis on trade flows across exporting countries with varying levels of the cost of capital. In particular, we estimate the following specification:

$$\ln Y_{it} = \alpha_1 IBRATE_{it} + \alpha_2 D_{crisis} \times IBRATE_{it} + D_t + \epsilon_{it} \tag{1}$$

where Y_{it} and $IBRATE_{it}$ are respectively the value of aggregate US imports from country i (summed over all manufacturing industries) and the interbank rate in that country during month t. D_{crisis} is a binary variable equal to 1 in September 2008 and later, which we will refer to as the crisis period. This will allow us to identify the effect of credit tightness on trade flows at the height and immediate aftermath of the turmoil in financial markets.

We also include month fixed effects, D_t, which subsume the main average effect of the crisis on US bilateral imports. These fixed effects control for the time-series variation in aggregate import demand and trade credit supply in the United States, as well as any monthly seasonality in this data. The coefficients of interest, α_1 and α_2, are thus identified purely from the variation in the cost of credit across exporting countries in a given month. We report standard errors clustered by country, to allow for correlated idiosyncratic shocks at the exporter country level.

Panel A of Table 2 shows that countries with higher interbank rates export systematically less to the US (Column 1). This effect is highly statistically and economically significant, with the point estimate implying that a one percentage point rise in the cost of bank financing is associated with approximately a 20% decrease in that country's trade volume to the US market. This result is consistent with the

broader body of evidence in the prior literature demonstrating that tighter credit conditions constrain firms' export levels, or even prevent firms from exporting altogether.

Note that in principle, private credit may be more expensive either because of an elevated demand for loans or because of low credit supply. The above results strongly suggest that during the 2007-2009 period, the variation in interbank rates across countries reflects limited credit availability, so that a higher cost of credit was associated with lowered trade volumes. (Conversely, if we had found that countries that export more to the US were also those with higher interbank rates, this would have supported the demand-based interpretation that firms in countries with more promising export opportunities were seeking access to more external finance, and thus bidding up the market-clearing lending rate.) In view of these results and our findings below, we will thus interpret high interbank rates as an indicator of tighter credit conditions.[20]

Column 2 includes the interaction between the crisis period dummy and the country interbank rate to our baseline regression. We find here weak signs that the financial crisis magnified the impact of tight credit conditions, as the point estimate for α_2 is negative, but not significant at the standard 10% level. Nevertheless, in later specifications that control for country differences in factor endowments and overall development, this effect will be more precisely estimated. The next few columns address the possibility that the interbank rate may be proxying for a country's level of economic development, or may be correlated with endowment attributes of the economy. Column 3 controls for initial physical and human capital ($\log(K/L)_i$ and $\log(H/L)_i$), as well as their interactions with D_{crisis}. Column 4 includes a control for initial GDP and GDP per capita, as well as their respective interactions with the crisis period dummy. (All factor endowment and income control variables used in this paper are 1996-2005 averages.) The main coefficient on the interbank rate remains negative and significant, although this weakens when we include both factor endowment and income controls jointly in Column 5. Interestingly, the effect of the interbank rate during the crisis period becomes statistically significant if we use a three-month lag of the interbank rate to allow for the possibility that firms have to secure external financing in advance of product delivery (Column 7), or if we date the start of the crisis at March 2008 (the Bear Stearns saga) instead (Column 8).

The bottom panel in Table 2 confirms that our findings also hold when we examine countries' exports *by sector*. We exploit the detailed nature of the available data, and study US imports by 3-digit NAICS industry. This allows us to include industry-month fixed effects in the estimating equation:

$$\ln Y_{ikt} = \alpha_1 IBRATE_{it} + \alpha_2 D_{crisis} \times IBRATE_{it} + D_{kt} + \epsilon_{ikt} \tag{2}$$

The effects of credit tightness on trade flows in general and during the crisis, α_1 and α_2, are now identified

[20] This interpretation is consistent with the evidence in Campello et al. (2009) that the 2008-2009 financial crisis prevented credit-constrained firms from pursuing attractive investment projects.

from the variation across countries within a given sector k and month t. This provides a stricter test of the credit constraints mechanism as it controls for differences in the level of US demand for imported goods across industries and over time.

We find that countries with lower interbank rates export more to the US not only in the aggregate, but also at the industry level (Column 1). There are some indications that this advantage increased during the crisis period (Column 2). These results once again hold when we control in a similar fashion to Panel A for cross-country differences in per worker factor endowments (Column 3), as well as for GDP and GDP per capita (Column 4). When controlling for both initial endowments and income, we find now that the negative effect of the interbank rate on trade flows becomes significant for the crisis period, suggesting a differential impact of credit tightening at the height of the crisis (Column 5). Note that we obtain similar results when using the three-month interbank rate (Column 6), lagging the one-month interbank rate (Column 7), or extending the crisis period to March 2008 and later (Column 8).

Column 9 in both panels A and B presents the results when excluding Turkey, which stands out with its particularly high interbank rates (often in excess of 15%). We find coefficients of the same order of magnitude, but lower statistical significance. We ascribe this to the limited sample of countries in our data (29), and more specifically to the low proportion of developing countries where the external capital is presumably costlier. Were our sample more representative, it would cover more countries with intermediate and high interest rates, Turkey would no longer stand out as an outlier, and the effects of credit conditions could be potentially larger because they would be identified from a less skewed distribution of lending rates across countries. Separately, it is worth mentioning that the results in Table 1 remain broadly similar if we include the monthly-averaged nominal bilateral exchange rate with respect to the US, to control for the scope for currency movements to affect the demand for exports from particular countries (results available on request). This is evidently because the movements in exchange rates during this period are relatively small compared to the observed movements in the interbank rate and trade volumes.[21]

How do we interpret these results? Recall that the time path of interbank rates varies substantially across countries, and is thus not collinear with the crisis dummy included in these regressions (Figure 2). Our results therefore cannot be attributed to a non-linear effect of the cost of capital on export performance. We offer several potential explanations why countries with higher interbank rates may have experienced larger falls in their exports during the financial crisis.

First, as the crisis unfolded, demand for imported final goods plummeted as households took a significant hit in their real estate and financial asset values. The prospect of job insecurity or even unemployment also dampened consumer sentiment. Producers in turn scaled down their output plans,

[21] Levchenko et al. (2009) reach a similar conclusion.

prompting a reduction in the demand for imported intermediate inputs. While non-durable goods and services may have been more resilient, demand for imported manufactures as a whole collapsed. Note that in our regressions, we have implicitly controlled for either the aggregate or sector-specific decline in US demand through the use of monthly or industry-month fixed effects (Panels A and B respectively). What can explain our results, however, is that the sudden drop in US demand presented a bigger challenge to exporters that face tighter credit conditions. When firms need external finance to cover their fixed upfront costs, they require sufficiently high export revenues to guarantee lenders a high enough expected return. A decline in anticipated export revenues would thus make it more difficult for firms to obtain private credit. When the fall in demand and the cost of external capital are both high enough, some firms would not be able to finance their exports and would withdraw from the American market altogether. Other firms might still continue exporting, but would reduce their export quantities instead. In other words, under credit constraints, both the number of firms from country i exporting to the US, as well as the value of individual firm exports would contract in response to a sharp decline in US demand, and this contraction would be amplified in countries with high interbank rates. This logic can be formalized for example using a model with credit constraints and firm heterogeneity, as in Manova (2008a).

An alternative explanation recognizes that exporting firms may be able to access bank financing and trade credit not only in their home country, but also in their destination market. It is thus possible that US imports fell not only because demand plunged, but also because potential exporters found it more difficult to obtain financing in the US, where the availability of bank loans declined sharply during the crisis period. Once again, these developments in the US cannot by themselves explain the differential effect of the financial crisis on the exports of countries with varying costs of external capital, since our estimation includes monthly fixed effects. Nevertheless, if exporting firms use US credit markets as a substitute for borrowing at home, then credit tightening in the US would be particularly burdensome on exporting firms based in countries where external credit is limited and interbank rates high. This interpretation raises the possibility that financial frictions in one country can amplify the effect of credit constraints in its trade partners.[22]

While we cannot distinguish between these two alternative explanations, we emphasize that they both underscore the importance of credit constraints and financial intermediation in international trade. In other words, both interpretations support the idea that credit constraints matter for international trade and amplified the effect of the global crisis on trade flows.

[22]This is consistent with the theory and evidence in Manova (2008a) and Antràs et al. (2009) that foreign portfolio flows and foreign direct investment can compensate for underdeveloped domestic financial markets.

4.2 Financial dependence across sectors

One potential concern with the results above is that the interbank rate may capture the effect of some other unobserved country characteristic which was the actual driving force behind the impact of the crisis on trade flows. To address this concern and establish the role of credit conditions more convincingly, we next exploit the variation in financial dependence across sectors. We show that the financial crisis not only had a greater impact on countries with tighter credit conditions, but also exerted a disproportionately large effect on financially vulnerable industries in such countries.

We focus on three sector characteristics that reflect firms' sensitivity to the availability of bank credit and the cost of external capital: dependence on external finance ($EXTFIN$), endowment of tangible assets ($TANG$), and access to trade credit ($TCREDIT$). As argued in Section 3, the literature has argued that these variables capture systematic differences across sectors that are at heart technologically-determined, and are exogenous from the perspective of an individual firm. Focusing on one sector measure for financial dependence at a time, for example $EXTFIN$, we are interested in the following estimating equation:

$$\begin{aligned} \ln Y_{ikt} &= \beta_0 + \beta_1 D_{crisis} + \beta_2 IBRATE_{it} + \beta_3 EXTFIN_k \\ &\quad + \beta_4 IBRATE_{it} \times EXTFIN_k + \beta_5 D_{crisis} \times IBRATE_{it} + \beta_6 D_{crisis} \times EXTFIN_k \\ &\quad + \beta_7 D_{crisis} \times IBRATE_{it} \times EXTFIN_k + \epsilon_{ikt} \end{aligned} \tag{3}$$

Written in this general form, this empirical model captures the possibility that the financial crisis has had a negative effect on the exports of all countries i and sectors k ($\beta_1 < 0$, the main effect of the crisis dummy), that countries with higher interbank rates may export less in all sectors and time periods t ($\beta_2 < 0$, the main effect of $IBRATE_{it}$), and that there may be systematic differences in export demand or supply across sectors (β_3, the main effect of $EXTFIN$).

Of greater interest to us are the double and triple interaction terms. The specification in (3) would allow the financial crisis to have a differential effect on exports across countries with varying degrees of credit tightness ($D_{crisis} \times IBRATE_{it}$), as well as across sectors at different levels of financial dependence ($D_{crisis} \times EXTFIN_k$). It also accommodates the possibility that credit conditions can affect patterns of specialization and hence constitute a source of comparative advantage, such that countries with higher interbank rates may generally export more in financially dependent sectors ($IBRATE_{it} \times EXTFIN_k$). Finally, the triple interaction term ($D_{crisis} \times IBRATE_{it} \times EXTFIN_k$) tests whether the negative effect of the crisis on exports is not only stronger in countries with worse credit conditions, but also concentrated on the most financially vulnerable sectors in those economies.

In what follows, we focus on estimating the two key terms of interest that reflect the role of credit conditions in explaining the cross-sectoral pattern of trade, namely $IBRATE_{it} \times EXTFIN_k$ and $D_{crisis} \times$

$IBRATE_{it} \times EXTFIN_k$. Specifically, we consider an estimating equation of the following form:

$$\begin{aligned} \ln Y_{ikt} &= \beta_4 IBRATE_{it} \times EXTFIN_k + \beta_7 D_{crisis} \times IBRATE_{it} \times EXTFIN_k \\ &\quad + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \end{aligned} \tag{4}$$

which subsumes the role of all terms in (3) that vary only along two of the three dimensions (country, industry, month) through the use of an extensive battery of fixed effects. Note that the D_{kt}'s are a full set of industry-month fixed effects, which help to capture sector-specific import demand conditions in the US from month to month, as well as the time variation in the availability of trade financing in the US. Separately, the country-month fixed effects, D_{it}, capture the effect of possible shocks to aggregate production and credit conditions in each exporting country over time, as well as bilateral exchange rate fluctuations. Finally, the country-industry fixed effects, D_{ik}, control for other non time-varying sources of comparative advantage that help to explain the average pattern of country exports across sectors. It should be emphasized that this exhaustive set of controls should significantly allay concerns regarding omitted variables. The coefficient of $IBRATE_{it} \times EXTFIN_k$ in (4) can nevertheless be identified from the variation across industries within a given country-month, as well as the variation across countries in a given industry-month. The triple interaction term in turn takes the difference in exports of a country with tight credit markets in a financially dependent sector against exports of a country with low interbank rates in a less financially dependent sector, and compares this difference before and during the crisis period.

We present our results from estimating equation (4) in Table 3, which uses the industry measure of external finance dependence $(EXTFIN)$ based on Rajan and Zingales (1998). For completeness, the top panel in this table shows estimates from regressions that contain only industry-month and country-month fixed effects, as the country-industry fixed effects do not need to be included to fully absorb the main and double interaction effects contained in the triple-interaction term. The bottom panel shows results from the fully saturated model that also controls for country-industry fixed effects. As anticipated, we find that countries with higher interbank rates tend to export relatively less in sectors with a greater requirement for external finance ($\beta_1 < 0$), although this is not always precisely estimated. Importantly, this effect intensified during the crisis period ($\beta_2 < 0$, Column 2).

We obtain similar results in Table 4 when we explore the variation in sectors' endowment of tangible assets, using the $(TANG)$ based on Braun (2003). Since industries with high levels of asset tangibility can in principle post more collateral to secure a loan, such sectors should be less sensitive to worsening credit conditions. We would thus expect the signs of the coefficients in this table to now be reversed compared to the results obtained with $EXTFIN$. Indeed, we find that countries with higher interbank rates posted a better export performance in sectors intensive in tangible assets, with this comparative

advantage being significantly more pronounced during the financial crisis (Columns 1 and 2).

Finally, in Table 5 we explore the role of access to trade credit (Fisman and Love 2003). On the one hand, trade credit that is extended by upstream suppliers or downstream buyers in lieu of an immediate payment can serve as a substitute for firms to relying on formal bank loans. If one's business partners are willing and able to continue extending trade credit despite developments in the financial sector, this would suggest that industries with greater routine access to trade credit would be more resilient in the face of a high cost of trade financing. On the other hand, it is possible that the willingness to extend trade credit may also have dried up as a result of the general liquidity crunch at the height of the crisis. It is therefore possible that trade credit may have diminished during this period, with a more severe contraction witnessed in countries with higher interbank rates where the banking sector was presumably hit harder.

The results in Table 5 point strongly to the former interpretation, that trade credit can to a certain extent serve as a substitute for formal bank financing. Columns 1 and 2 reveal that countries with high interbank rates did export relatively more in sectors with greater access to trade credit ($TCRED$), and this effect was in fact more pronounced during the crisis period.[23] Note that this result is not inconsistent with the anecdotal evidence of a collapse in trade financing during the crisis. Our measure of the access to trade credit is based on firms' use of such credit in 1996-2005, so that the $TCRED$ measure is unaffected by developments during the crisis period. We can still identify the role of trade credit, so long as the ranking across sectors in access to trade credit does not change drastically when the total level of trade credit available in the economy falls, for example because of exogenous technological or institutional reasons.

It is useful emphasizing once again that the extensive set of fixed effects which we use in Tables 3, 4 and 5 go a long way towards mitigating concerns related to omitted variables bias. Nevertheless, we explore some further robustness tests in the remaining columns to ensure that this is indeed not a major possibility. In Column 3, we control for the role of initial factor endowments in determining the pattern of specialization. Specifically, we interact country factor endowments ($\log(K/L)_i$ and $\log(H/L)_i$) against a corresponding measure of industry factor intensities ($\log(k/l)_k$ and $\log(h/l)_k$), as well as triple interactions with the crisis dummy ($D_{crisis} \times \log(K/L)_i \times \log(k/l)_k$ and $D_{crisis} \times \log(H/L)_i \times \log(h/l)_k$).[24] Column 4 controls for the possibility that export patterns may be correlated with country size or overall

[23] Levchenko et al. (2009) find no evidence for a role for trade credit in explaining trade patterns during the crisis. Their finding however rests solely on the cross-industry variation in access to trade credit, whereas we exploit both this cross-industry variation as well as cross-country variation in the cost of formal bank financing during the crisis to uncover a role for $TCRED$.

[24] In the bottom panel of Tables 3, 4 and 5, the double interaction terms between factor endowments and factor intensities cannot be identified, as these are collinear with the country-industry fixed effects. These controls are therefore dropped. We however still control for the triple interaction terms $D_{crisis} \times \log(K/L)_i \times \log(k/l)_k$ and $D_{crisis} \times \log(H/L)_i \times \log(h/l)_k$ in these specifications.

level of development, and that it is these effects which our key dependent variables involving the cost of credit are picking up. To address this, we include an initial measure of country GDP and GDP per capita, each interacted against a full set of industry fixed effects, as well as a further triple interaction with D_{crisis}.[25] Columns 5 jointly includes both the factor endowment and income controls from Columns 3 and 4. We further consider using the three-month interbank rate (Column 6), a three-month lag of the cost of credit (Column 7), and an alternative March 2008 start date for the crisis period (Column 8). The last two columns in each table examine the stability of the estimates to dropping outliers in terms of country interbank rates (Turkey) and sector financial dependence (NAICS code=325; chemical manufacturing, which includes pharmaceuticals).

While statistical significance varies somewhat across alternative specifications, the magnitude of the estimated effects, namely their economic significance, remains fairly stable. Note in particular that our results are robust to the inclusion of the factor endowment and income controls (Columns 3-5), particular when considering sectoral financial vulnerability as measured by asset tangibility or access to trade credit.[26]

To summarize, countries with higher interbank rates and hence worse credit conditions displayed a lower volume of exports in financially dependent sectors. This effect was more pronounced during the recent crisis period. This central finding is consistent with the view that import demand and credit conditions worsened significantly in the US during the financial crisis, thereby magnifying the detrimental effect of tight credit markets on countries' export flows. Moreover, the simultaneous contraction in export revenues, the supply of financing at home, and the supply of financing in the destination market (the US) would naturally be most consequential for firms in sectors that require more external finance, but have limited tangible assets and access to trade credit. Overall, these findings underscore the importance of credit conditions and financial intermediation in international trade.

Our triple-interaction analysis points to a further potential consequence of the financial crisis. Credit conditions clearly became more influential in determining the patterns of specialization and exports during the height of the crisis, raising the question whether the unusual severity and rapid deepening of this crisis will have long-term implications for trade patterns beyond the aftermath of the financial turmoil. Specifically, will the global economy transition permanently to a new steady state in which the availability of secure sources of finance will become more important as sources of comparative advantage? Or will the importance of credit conditions for trade ease off instead once the 2008-2009 crisis is decisively

[25] Once again, only the triple interaction can be identified in the bottom panel specifications that already include country-industry fixed effects.

[26] See Appendix Table 3 for results when all three sector measures ($EXTFIN$, $TANG$, and $TCRED$) are included simultaneously. While the sign and magnitudes of the estimated coefficients are similar to those in Tables 3, 4 and 5, they are less precisely estimated presumably because they are identified from the variation in these three sector characteristics across 21 industries only.

behind us?

We conclude this subsection with a simple exercise to illustrate how the importance of credit conditions for the pattern of trade has intensified as the financial crisis unfolded. To do this, we employ a more flexible empirical specification that relaxes the assumption of a stepwise change in the determinants of trade patterns after 2008 that is built into (4). Consider the following:

$$\ln Y_{ikt} = \sum_{t=1}^{M} \beta_{1m} D_{t=m} \times IBRATE_{it} \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \quad (5)$$

Comparing this against (4), this new regression allows the effect of credit conditions on the composition of exports to vary non-linearly over time: We use a full series of monthly dummies, $D_{m=t}$ (equal to 1 in month t), instead of the crisis binary indicator, and interact each of the $D_{m=t}$ against the product of the interbank rate in country i in month t and the external finance dependence characteristic of industry k. The D_{it}, D_{kt} and D_{ik} are country-month, industry-month, and country-industry fixed effects as before. (We drop the triple interaction corresponding to the dummy variable for the first month, $t = 1$, to avoid a collinearity problem with the country-industry fixed effects.)

We plot the evolution of the β_{1m} coefficients from (5) in Figure 3A, to illustrate how the importance of the credit channel of comparative advantage varies over time. Figures 3B and 3C present similar graphs from running (5), but using instead $TANG$ and $TCREDIT$ respectively as the industry measure of financial dependence. In each figure, the dotted lines indicate the bounds of the 90% confidence intervals of each β_{1m} coefficient. Two linear regression trend lines for the β_{1m}'s are also plotted, for the pre-September 2008 and post-September 2008 periods. (The point estimates from the regressions with $EXTFIN$, $TANG$ and $TCREDIT$ are listed in full in Appendix Table 4.)

Two patterns stand out in these figures. First, the coefficients on the interactions with $EXTFIN$ are almost always negative, while those with $TANG$ and $TCREDIT$ are almost always positive. This reinforces our earlier conclusion that countries with higher interbank rates export systematically less in financially vulnerable sectors that require more external finance, have few collateralizable assets and enjoy less trade credit availability respectively. Note that there is a fair bit of movement month-to-month in the estimated β_{1m} coefficients, reflecting the volatility of trade data at the monthly frequency.

Secondly, all three figures clearly indicate that the importance of credit conditions for the composition of country exports increased dramatically as the crisis deepened. There is a fairly pronounced break right around September 2008, the month we use to date the start of the height of the crisis in our earlier analysis, with all three graphs exhibiting a clear jump in the magnitude of β_{1m} after September 2008. Figure 3A suggests that $EXTFIN$ became progressively more important for the sectoral composition of trade after September 2008, specifically in facilitating exports in more external finance-dependent industries in countries with a low cost of credit. On the other hand, Figures 3B and 3C indicate that

exports in industries with high asset tangibility and better access to trade credit respectively were higher in countries with more adverse credit conditions, particularly after September 2008. There are signs that the increased magnitude of the β_{1m} coefficients may be tapering off in these latter two cases (for $TANG$ and $TCREDIT$), although a final verdict will have to await the collection of more data.

4.3 Strength of financial institutions across countries

We view the interbank rate as an indicator of short-term conditions in credit markets, which for our purposes captures the availability of bank financing during the crisis. The cost of lending in an economy, however, depends not only on the amount of available external financing, but also on the strength of financial contractibility, namely the probability that financial contracts will be honored and creditors repaid. The ability of financial markets to efficiently allocate resources and the degree of financial contract enforceability in turn depend on the strength of financial institutions. To provide further complementary evidence of the effect of credit conditions on trade flows during the financial crisis, this subsection explores whether the export performance of countries with more advanced initial financial institutions was more resilient to the global downturn.

We use two different proxies for the strength of financial contractibility which capture long-term characteristics of the institutional setup of countries' financial systems. The first of these variables is private credit (PC), the amount of credit extended by banks and other financial institutions to the private sector as a share of GDP. We use the 1996-2005 average level of private credit over GDP for each country from Beck et al. (2009). While this is an outcome-based measure, it has been widely used in the finance-growth and finance-trade literatures as a reflection of the ability of an economy to sustain formal financial contracts. We also consider the quality of accounting standards in a country ($ACCOUNT$), taken from Rajan and Zingales (1998), which is an index reflecting the detail and nature of the accounting information that companies are required to provide to authorities in a country. Both of these measures provide substantial cross-country variation, but unfortunately do not vary within a country over time.

To explore the differential effect of the crisis across countries at different levels of financial development, we estimate the following two specifications:

$$\ln Y_{ikt} = \gamma_1 PC_i \times EXTFIN_k + \gamma_2 D_{crisis} \times PC_i \times EXTFIN_k + D_{it} + D_{kt} + \epsilon_{ikt} \quad (6)$$

$$\ln Y_{ikt} = \gamma_2 D_{crisis} \times PC_i \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \quad (7)$$

The first of these empirical models includes country-month and industry-month fixed effects, which makes it possible to estimate the magnitude of the comparative advantage that financially developed countries have in financially dependent sectors (γ_1), as well as how much more pronounced this advantage became during the crisis (γ_2). We can evaluate only the latter of these effects when we also incorporate country-industry fixed effects in the second specification.

We present our results for private credit in Table 6, and those for accounting standards in Table 7. Consistent with the evidence in the prior literature, we find that financially developed countries appear to export more in sectors characterized by high external finance dependence (Columns 1-3), few tangible assets (Columns 4-6), and limited access to trade credit (Columns 7-9), although the results are admittedly weaker for the role of trade credit ($TCRED$). (The sign of the effects when considering $TCRED$ is not stable when we switch to using accounting standards in Table 7 rather than private credit over GDP, although the coefficients are not statistically significant.) Moreover, as indicated by the coefficients on the triple interaction terms, the financial crisis appears to have intensified the magnitude of these effects, such that the exports of financially advanced economies were relatively more resilient to the crisis in financially vulnerable sectors. These latter results were particularly strong when considering asset tangibility ($TANG$) as the measure of sectoral dependence, being robust to the inclusion of controls for factor endowments and income as potential determinants of comparative advantage (Column 6).[27]

5 Interpreting the Magnitudes

Section 4 provides strong evidence that credit conditions are an important determinant of aggregate trade flows and the sectoral composition of countries' exports, and that the cost of credit was particularly consequential during the height of the global financial crisis. These results reflect the importance of the cost of securing short-term financing, as proxied by the interbank rate, as well as the significance of long-term financial institutions and the strength of financial contractibility.

In this section, we interpret the magnitude of the contribution of credit conditions to the overall decline in trade flows during the financial crisis. To do so, we use estimates from our empirical analysis to infer how US imports would have evolved under two alternative scenarios. First, we evaluate the hypothetical impact of the crisis if governments around the world had not actively intervened in the banking sector, and interbank rates had remained at their peak levels of September 2008. This exercise provides an upper bound for the damage that the crisis could have inflicted on trade flows specifically through the credit supply channel. We then consider the opposite extreme, and assume that all countries implemented dramatic policy interventions immediately after September 2008, such that interbank interest rates instantaneously dropped to their low levels seen at the end of our sample period in April 2009. This provides a lower bound for the effects of the financial crisis on trade flows. Taken together, we view these figures as providing a sense of the magnitude of the gains from the timely policy interventions that country central banks and governments engaged in to ease the liquidity crunch.

[27] See Appendix Table 3 for regression results using PC and $ACCOUNT$ that control for all three sector characteristics of financial dependence simultaneously.

5.1 Case 1: no policy intervention

We examine first the counterfactual evolution of trade flows under the scenario of no government intervention in credit markets. In particular, we assume that the interbank rate in each country remained fixed at its peak September 2008 level through the end of our sample period.

To infer the additional decline in trade flows that would have resulted from such tight credit conditions, we use our estimates from equation (2). This is the regression of exports to the US by sector on the exporting country's interbank rate and its interaction with the crisis dummy, controlling for industry-month fixed effects. We proceed in two steps. We first use our point estimates and the actual interbank rates to obtain the predicted US imports from each country and sector. We then construct the predicted trade flows under the counterfactual path of interest rates. We find that the US would have imported 25.6% less from the average country and sector between October 2008 and April 2009, were interbank rates to remain at their elevated September 2008 levels.[28] This represents a substantial reduction in the volume of trade, as it would have more than doubled the actual drop in trade flows of 24.9% between October 2008 and April 2009 observed for our sample of countries. As another benchmark for comparison, bear in mind that the overall decline in world trade is projected to reach 9% for the whole of 2009.

Our results further suggest that trade flows would be affected systematically more in financially vulnerable sectors, were interbank rates to remain at their peak levels. To quantify the size of these cross-sector distributional effects, we use our estimates from specification (4), which examines how the effect of the financial crisis varies both across countries with different credit conditions and across sectors at different levels of financial dependence. Based on the estimates from Table 3, if all countries' interbank rates were kept at their September 2008 levels through the end of April 2009, US imports would have been 9% lower in the most external finance-dependent sector (chemical manufacturing) relative to the least dependent sector (leather and allied manufactured products). Similarly, trade would have been 17% weaker in the industry with the lowest share of tangible assets (leather and allied manufacturing) relative to the industry with the hardest assets (petroleum and coal products). Finally, countries would have exported 24% less on average in the sector with the least availability of trade credit (textiles) relative to the sector with the greatest access to buyer and supplier credit (petroleum and coal product).[29]

These estimates provide a sense of the real costs of adverse credit conditions during the financial crisis. At the same time, they also offer encouraging evidence that policy interventions in credit markets were quite effective in averting a substantially more severe collapse in trade flows.

[28] These figures are based on the Column 2 specification in the bottom panel of Table 2. Note that the predicted effects of continued credit tightness would be about twice as large if we used the results in Column 5, which controls for cross-country differences in factor endowments and overall development.

[29] These are computed based on the Column 2 specification in the bottom panels of Tables 3, 4 and 5 respectively.

5.2 Case 2: immediate response to policy interventions

We next consider the alternative scenario, under which the policy response was even more aggressive and the interbank rate in each country dropped to its low April 2009 level immediately after September 2008. An equivalent interpretation of this hypothetical case is that government interventions were the same, but financial markets and interbank rates responded with no lag. To gauge how much higher trade flows would have been under this scenario, we once again use our point estimates from the regressions with double and triple interactions as described in the previous subsection, to compare predicted trade flows under the actual interbank rates to those under the assumption of permanently low interest rates after September 2008.

We find that US imports from the average exporting country would have been 30.2% higher between October 2008 and April 2009, had policy interventions had an instantaneous effect on credit conditions. Trade flows in financially vulnerable sectors would have benefited disproportionately more from the increased availability of cheap external credit. The difference in export performance between the most and least external capital-dependent industries would have been 8%. The difference between industries with the lowest and highest endowment of tangible assets would have been 12%. The corresponding difference when considering industries' access to trade credit would have been a 16% gap.

These results clearly indicate that the effect of the financial crisis on trade flows would have been substantially milder in the absence of credit constraints or under more timely improvements in credit conditions. The large estimated gains from lower interbank rates also emphasize the scope for welfare-enhancing interventions, providing some vindication for the actual policy efforts to ease the extremely tight credit situation triggered by the crisis.

6 Conclusion

This paper is one of the first to establish and quantify the effect that credit tightening had on international trade during the 2008-2009 global financial crisis using data on monthly US imports over this period. We find that countries with higher interbank lending rates and thus tighter credit availability generally export less to the US, and there is some evidence that such countries suffered a more severe contraction in their exports during the crisis. These effects are especially pronounced in sectors that require extensive external financing, have few collateralizable assets, and can access limited trade credit. In other words, exports of financially dependent industries are more sensitive to the cost of external capital than exports of less dependent industries, and this sensitivity intensified during the financial crisis. We also show that the exports of countries with stronger initial financial development were more resilient to the crisis, especially in sectors with high external finance dependence, few tangible assets and limited access to

trade credit.

Our findings imply that adverse credit conditions played an important role in the transmission of the effects of the financial crisis to international trade flows. They also indicate that policy interventions contributed substantially towards relaxing credit conditions, thereby dampening the detrimental impact on international trade. Our reduced-form estimates suggest that US imports would have fallen by 25.6% more if interbank rates had remained at their peak September 2008 level through April 2009, essentially doubling the actual percentage decline in trade volumes observed after September 2008. Conversely, were the effects of government policies to lower the cost of lending more immediate, trade flows would have been 30.2% higher than they actually were.

In sum, our paper provides further evidence of the effect of credit conditions on trade, particularly during a severe shock to the banking and financial sector. It also highlights the potential gains from policy interventions targeting access to private credit, and sheds light on the role of such policies in mitigating the uneven impact of the crisis on trade flows across countries and sectors.

7 References

Amiti, Mary, and David Weinstein, (2009), "Exports and Financial Shocks," Columbia University mimeo.

Antràs, Pol, Mihir Desai, and C. Fritz Foley, (2009), "Multinational Firms, FDI Flows and Imperfect Capital Markets," *Quarterly Journal of Economics* 124(3): 1171-1219.

Auboin, Marc, (2009), "Boosting the Availability of Trade Finance in the Current Crisis: Background Analysis for a Substantial G20 Package," *Centre for Economic Policy Research Policy Research* No. 35.

Bartelsman, Eric J., Randy A. Becker, and Wayne B. Gray, (2000), NBER-CES Manufacturing Industry Database, http://www.nber.org/nberces/

Beck, Thorsten, (2002), "Financial Development and International Trade: Is There a Link?" *Journal of International Economics* 57(1): 107-131.

Beck, Thorsten, (2003), "Financial Dependence and International Trade," *Review of International Economics* 11(2): 296-316.

Beck, Thorsten, Asli Demirgüc-Kunt, and Ross Levine, (2009), "A New Database on Financial Development and Structure," World Bank dataset, May 2009 update.

Becker, Bo, and David Greenberg, (2007), "Financial Development, Fixed Costs and International Trade," Harvard Business School mimeo.

Borchert, Ingo, and Aaditya Mattoo, (2009), "The Crisis-Resilience of Services Trade," *World Bank Policy Research Working Paper* No. 4917.

Braun, Matias, (2003), "Financial Contractibility and Asset Hardness," University of California-Los Angeles mimeo.

Braun, Matias, and Borja Larrain, (2005), "Finance and the Business Cycle: International, Inter-Industry Evidence," *Journal of Finance* 40(3): 1097-1128.

Campello, Murillo, John Graham, and Campbell Harvey, (2009), "The Real Effects of Financial Constraints: Evidence from a Financial Crisis," University of Illinois at Urbana-Champaign mimeo.

Caselli, Francesco (2005), "Accounting for Cross-Country Income Differences," in Philippe Aghion and Steven Durlauf, eds. *Handbook of Economic Growth*, Amsterdam: North-Holland.

Chaney, Thomas, (2005), "Liquidity Constrained Exporters," University of Chicago mimeo.

Chauffour, Jean-Pierre, and Thomas Farole, (2009), "Trade Finance in Crisis: Market Adjustment or Market Failure?" *World Bank Policy Research Working Paper* No. 5003.

Claessens, Stijn and Luc Laeven, (2003), "Financial Development, Property Rights, and Growth," *Journal of Finance* 58(6): 2401-2436.

Dell'Ariccia, Giovanni, Enrica Detragiache, and Raghuram Rajan, (2008), "The Real Effect of Banking Crises," *Journal of Financial Intermediation*, 17: 89-112.

Do, Quy-Toan, and Andrei A. Levchenko, (2007), "Comparative Advantage, Demand for External Finance, and Financial Development," *Journal of Financial Economics* 86: 796-834.

Eaton, Jonathan, Samuel Kortum, Brent Neiman, and John Romalis, (2009), "Trade and the Global Recession," mimeo.

Ellingsen, Tore, and Jonas Vlachos, (2009), "Trade Finance in a Liquidity Crisis," *World Bank Policy Research Working Paper* No. 5136.

Feenstra, Robert C., John Romalis, and Peter K. Schott, (2002), "US Imports, Exports and Tariff Data," http://www.internationaldata.org/

Fisman, Raymond, and Inessa Love, (2003), "Trade Credit, Financial Intermediary Development, and Industry Growth," *Journal of Finance* 58(1): 353-374.

Freund, Caroline, (2009), "The Trade Response to Global Downturns," *World Bank Policy Research Working Paper* No. 5015.

Freund, Caroline, and Leora Klapper (2009), "Has the Decline in the Supply of Financing Affected Trade during the Crisis?" mimeo.

Greenaway, David, Alessandra Guariglia, and Richard Kneller, (2007), "Financial Factors and Exporting Decisions," *Journal of International Economics* 73(2): 377-95.

Hall, Robert, and Charles Jones, (1999), "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics* 114: 83-116.

Heston, Alan, Robert Summers, and Bettina Aten, (2006), "Penn World Table Version 6.2", Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.

Hur, Jung, Manoj Raj, and Yohanes Riyanto, (2006), "The Impact of Financial Development and Asset Tangibility on Export," *World Development* 34(10): 1728-1741.

Iacovone, Leonardo, and Veronika Zavacka, (2009), "Banking Crises and Exports: Lessons from the Past," *World Bank Policy Research Working Paper* No. 5016.

Ju, Jiandong, and Shang-Jin Wei, (2008), "When Is Quality of Financial System a Source of Comparative Advantage?" *NBER Working Paper* No. 13984.

Kletzer, Kenneth, and Pranab Bardhan, (1987), "Credit Markets and Patterns of International Trade," *Journal of Development Economics* 27(1-2): 57-70.

Kroszner, Randall S., Luc Laeven, Daniela Klingebiel, (2007), "Banking Crises, Financial Dependence, and Growth," *Journal of Financial Economics* 84(1): 187-228.

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," University of Michigan mimeo.

Manova, Kalina, (2008a), "Credit Constraints, Equity Market Liberalizations and International Trade," *Journal of International Economics* 76(1): 33-47.

Manova, Kalina, (2008b), "Credit Constraints, Heterogenous Firms, and International Trade," *NBER Working Paper* No. 14531.

Manova, Kalina, Shang-Jin Wei, and Zhiwei Zhang, (2009), "Credit Constraints and International Trade: A Firm-Level Analysis," Stanford University (in progress).

Malouche, Mariem, (2009), "Trade and Trade Finance Developments in 14 Developing Countries Post September 2008: A World Bank Survey," *World Bank Policy Research Working Paper* No. 5138.

Matsuyama, Kiminori, (2005), "Credit Market Imperfections and Patterns of International Trade and Capital Flows," *Journal of the European Economic Association* 3: 714-723.

McKibbin, Warwick J., and Andrew Stoeckel, (2009), "The Potential Impact of the Global Financial Crisis on World Trade," *World Bank Policy Research Working Paper* No. 5134.

Minetti, Raoul, and Susan Chun Zhu, (2009), "Credit Constraints and Firm Export: Microeconomic Evidence from Italy," Michigan State University mimeo.

Muûls, Mirabelle (2008), "Exporters and Credit Constraints. A Firm Level Approach," London School of Economics mimeo.

Raddatz, Claudio, (2006), "Liquidity Needs and Vulnerability to Financial Underdevelopment," *Journal of Financial Economics* 80: 677-722.

Rajan, Raghuram, and Luigi Zingales, (1998), "Financial Dependence and Growth," *American Economic Review* 88(3): 559-586.

Romalis, John, (2004), "Factor Proportions and the Structure of Commodity Trade," *American Economic Review* 94: 67-97.

Schwartz, Nelson, (2009a), "Job Losses Pose a Threat to Stability Worldwide," *The New York Times* February 15, 2009.

Schwartz, Nelson, (2009b), "Rapid Declines in Manufacturing Spread Global Anxiety," *The New York Times* March 20, 2009.

Svaleryd, Helena, and Jonas Vlachos, (2005), "Financial Markets, the Pattern of Industrial Specialization and Comparative Advantage," *European Economic Review* 49(1): 113-144.

WTO, (2008), WTO Meeting of Experts on Trade Finance, 12 November 2008, http://www.wto.org/english/news_e/news08_e/trade_finance_12nov08_e.htm

Yi, Kei-Mu, (2003), "Vertical Specialization Explain the Growth of World Trade?," *Journal of Political Economy* 111: 52-102.

8 Data Appendix

A. Trade flows

US trade flows: From the US Census Bureau Foreign Trade Statistics, which reports monthly US trade flows at the 3-digit or 6-digit NAICS level. For US imports, we use the "imports" series rather than the "Cimports" series. The two series differ in their treatment of imports destined for US foreign trade zones (FTZs) or bonded warehouses. The "Cimports" series records the value of these goods as they are imported from or withdrawn from the FTZs or bonded warehouses, whereas the "imports" series record this value at their time of arrival in the FTZs or bonded warehouses (see Feenstra et al. 2002). The correlation between the two import concepts is in any case very high: 0.9917.

B. Industry characteristics

External capital dependence ($EXTFIN$): Constructed following the methodology in Rajan and Zingales (1998). Data from Compustat is used, which covers all publicly-traded firms in North America. A firm's dependence on external capital is the fraction of total capital expenditures over the period 1996-2005 not financed by internal cash flow. The median value across firms in each NAICS 3-digit category is used as the industry measure of $EXTFIN$.

Asset tangibility ($TANG$): Constructed following Braun (2003), using the same Compustat data as for $EXTFIN$. For each firm, asset tangibility is computed as the total value of a firm's net plant, property and equipment divided by the total value of its assets for the period 1996-2005. The median value across firms in each NAICS 3-digit category is used as the industry measure of $TANG$.

Trade credit ($TCRED$): Constructed following Fisman and Love (2003), using the same Compustat data as for $EXTFIN$. For each firm, access to trade credit in a given year is computed as the change in accounts payable divided by the change in the firm's total assets. This flow measure of access to trade credit is summed over the period 1996-2005 to get a firm measure for this decade. The median value across firms in each NAICS 3-digit category is used as the industry measure of $TCRED$.

Factor intensities ($\log(k/l), \log(h/l)$): From the NBER-CES database. These are constructed first for SIC 4-digit industries: (i) Physical capital intensity as the log of the ratio of real capital stock to total employment; and (ii) Skill intensity as the log of the ratio of non-production workers to total employment. These are calculated using 1996 data, the most recent year available in the NBER-CES dataset. We map SIC 4-digit to NAICS 3-digit industries using the Feenstra et al. (2002) US import database (1989-2006). In that database, import flows at a detailed HS-10 digit level are reported, with accompanying SIC and NAICS industry codes, from which concordance weights were constructed. The factor intensity of each NAICS 3-digit industry is calculated as the concordance-weighted average of the factor intensities of its constituent SIC 4-digit industries.

C. Country variables

Interbank rates ($IBRATE$): See Section 3 of the paper.

Factor abundance ($\log(K/L), \log(H/L)$): Based on Caselli (2005) and the Penn World Tables, Version 6.2 (Heston et al. 2006). Physical capital stock is calculated using the perpetual inventory method, namely: $K_t = I_t + \delta K_{t-1}$, where I_t is investment and $\delta = 0.06$ is the assumed depreciation rate.

The investment flow and labor force data are from the latest version of the Penn World Tables. Human capital per worker is taken from Caselli (2005). Following Hall and Jones (1999), H/L is calculated as a Mincerian return-weighted average years of schooling, namely $H/L = \exp(\phi(s))$, where s is the average years of schooling in the population over 25 years of age, and $\phi(\cdot)$ is a piece-wise linear function with a slope of 0.13 for $s < 4$, 0.10 for $4 < s < 8$, and 0.07 for $s > 8$.

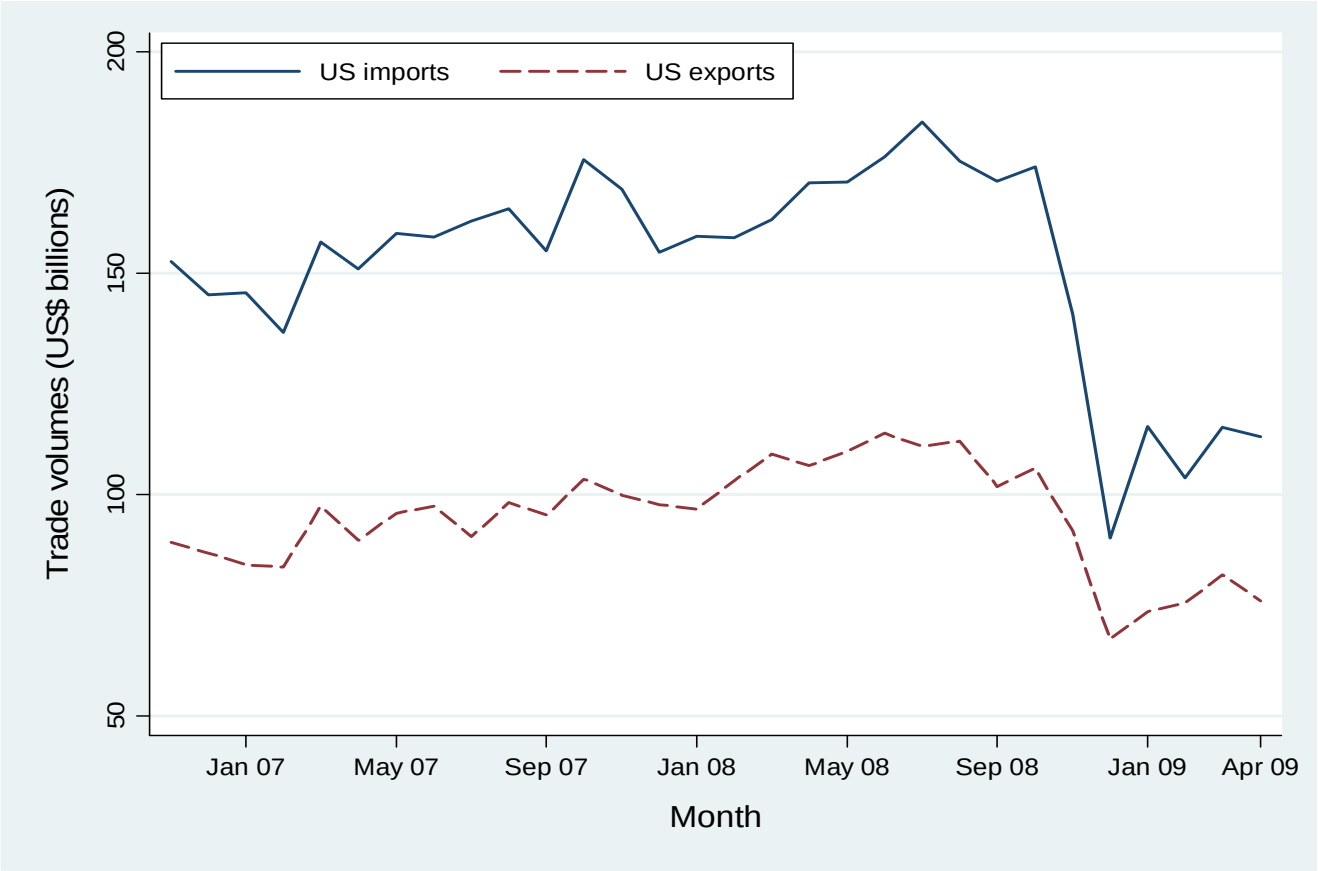
Exchange rates: From Thomson Datastream.

Private credit: From Beck et al. (2009). Equal to the amount of credit extended by banks and other non-bank financial intermediaries to the private sector divided by GDP, averaged over 1996-2005.

Accounting standards: From Rajan and Zingales (1998). Index measure reflecting the amount of disclosure in annual company reports in each country.

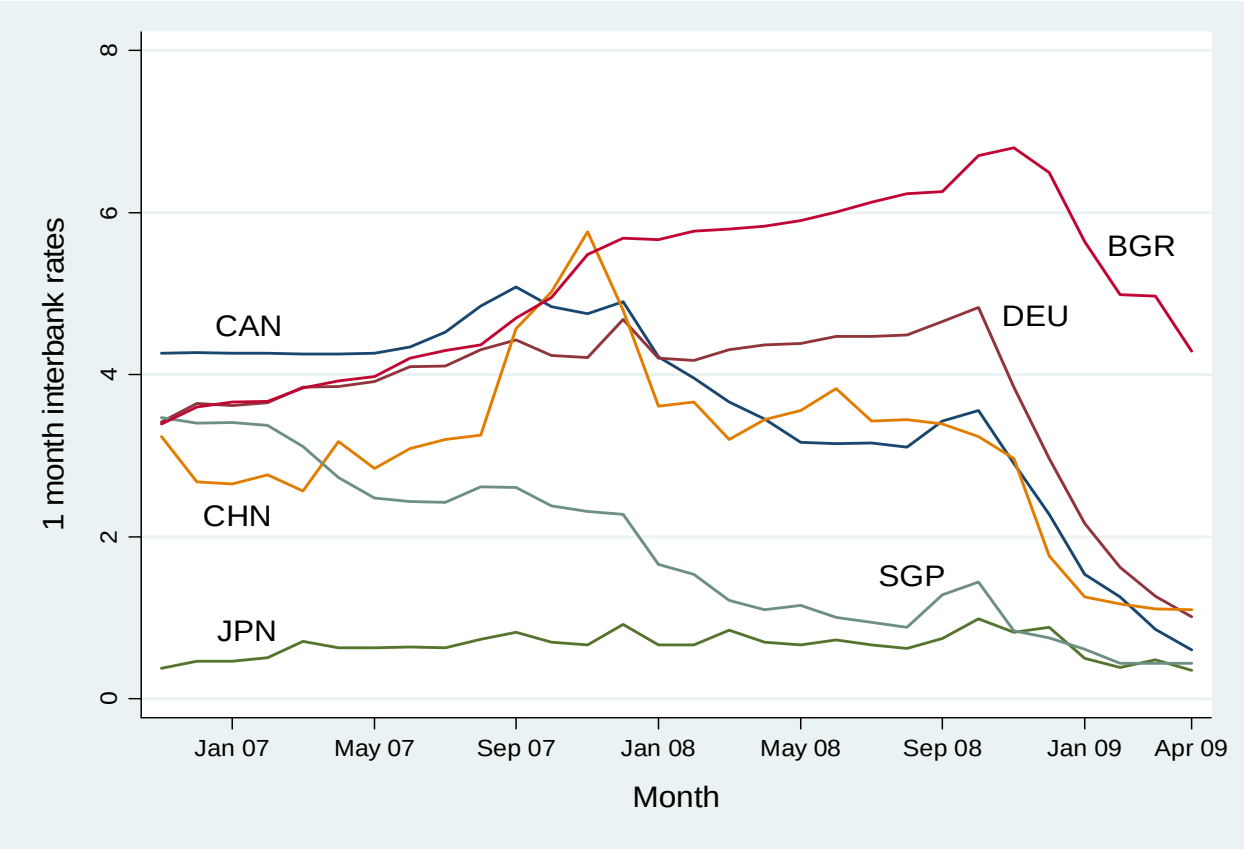
GDP and GDP per capita: From the World Development Indicators (WDI), in PPP units.

Figure 1
The Decline in US Trade Volumes during the Global Financial Crisis



Source: US Census Bureau.

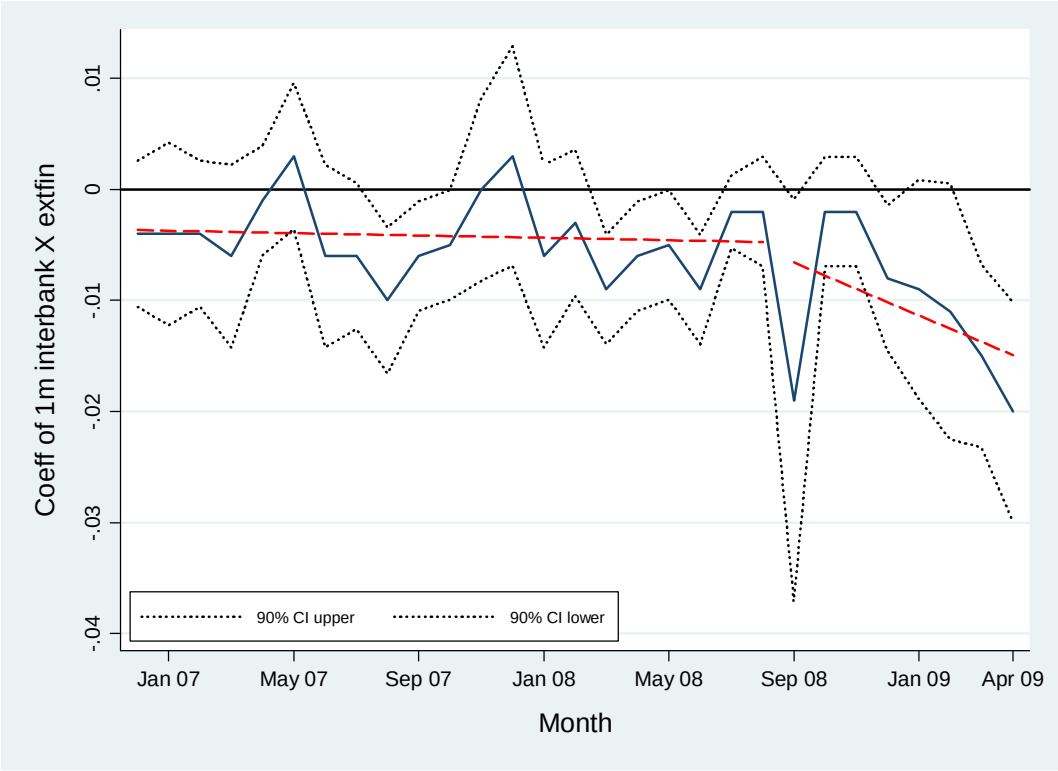
Figure 2
Interbank Rates during the Global Financial Crisis



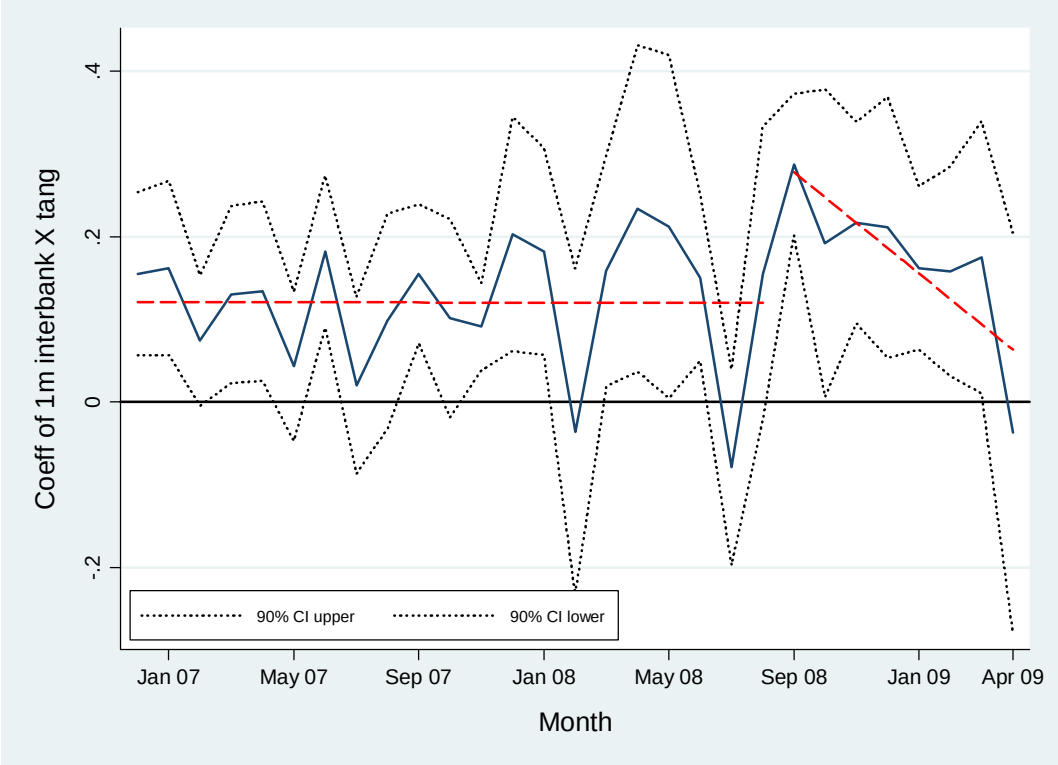
Source: Thomson Datastream.

Figure 3
The Importance of Credit Channels of Comparative Advantage over Time

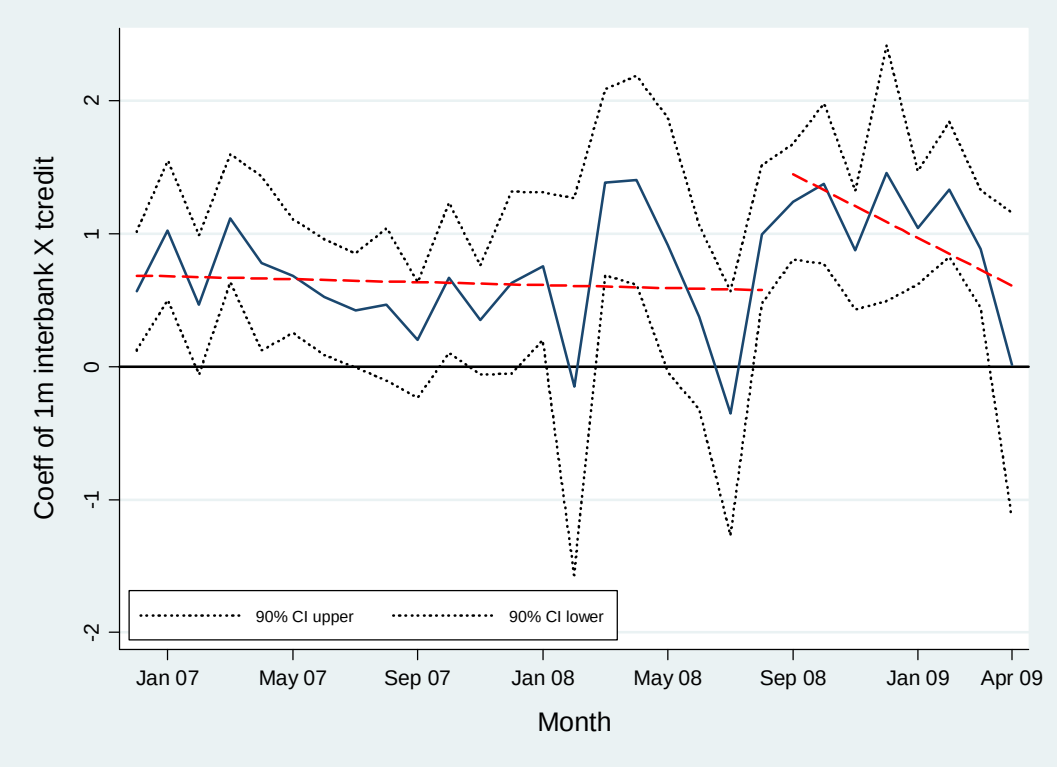
A: Interbank rate X EXTFIN



B: Interbank rate X TANG



C: Interbank rate X TCRED



Notes: Panel A plots the coefficients β_t obtained from the following regression specification: $LogTrade_{ikt} = \Sigma_m \ \beta_m * D_{t=m} * Interbank_{it} * EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \varepsilon_{ikt}$. Here, *i*, *k*, and *t* index the exporting country, industry, and month respectively, while D_{it}, D_{kt}, and D_{ik} are exporter-month, industry-month, and exporter-industry fixed effects respectively. $D_{t=m}$ is a dummy variable equal to 1 if the month in question is *m*. We use a full set of these dummy variables for each month in our sample, and interact each against the product of the one-month interbank rate in country *i* in month *t* and the external finance dependence characteristic of the industry *k*. (We drop the dummy variable for the first month, *t=1*, to avoid a collinearity problem with the country-industry fixed effects.) The evolution of the β_m coefficients is plotted, to illustrate the importance credit channel of comparative advantage over time. Panel B and C do likewise, with *EXTFIN* replaced by *TANG* and *TCRED* respectively. In each panel, the dotted lines indicate the bounds of the 90% confidence intervals of each β_m coefficient. Two linear regression trend lines for the β_m's are plotted, one for pre-September 2008 and a second line for September 2008 and after. A horizontal line at 0 is included.

Table 1
The Month-on-Month Fall in US Manufacturing Imports (Oct-Nov 2008)

A: Industries (NAICS 3-digit) with sharpest declines in imports (top 5)

324:	Petroleum and Coal Products Manufacturing	-53.0%
315:	Apparel Manufacturing	-34.1%
316:	Leather and Allied Product Manufacturing	-23.2%
331:	Primary Metal Manufacturing	-22.6%
325:	Chemical Manufacturing	-22.5%

B: Industries (NAICS 3-digit) with smallest declines in imports (bottom 5)

336:	Transportation Equipment Manufacturin	-12.1%
322:	Paper Manufacturing	-11.9%
326:	Plastics and Rubber Products Manufacturing	-10.1%
311:	Food Manufacturing	-7.5%
337:	Furniture and Related Product Manufacturing	-6.3%

Table 2
Country Credit Conditions and Trade Volumes

Crisis = 1: **Sep 09 and after**	(1)	(2)	(3)	(4)	(5)	(6) 3m rate	(7) Lag rate	(8) Mar 09	(9) Less TUR
	Dependent variable: **Log (Total exports to the US)**								
IBrate	-0.203**	-0.199**	-0.208*	-0.130***	-0.095	-0.097	-0.079	-0.075	-0.229*
	[0.082]	[0.092]	[0.103]	[0.040]	[0.111]	[0.111]	[0.110]	[0.112]	[0.126]
Crisis X IBrate		-0.012	-0.034	-0.005	-0.046	-0.047	-0.063*	-0.067*	0.027
		[0.044]	[0.035]	[0.018]	[0.029]	[0.028]	[0.032]	[0.036]	[0.059]
Log(K/L), Log(H/L)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Log(GDP), Log(GDPpc)?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	869	869	809	839	809	809	809	809	779
R-squared	0.17	0.17	0.21	0.65	0.63	0.63	0.62	0.63	0.65
	Dependent variable: **Log (Industry exports to the US)**								
IBrate	-0.169**	-0.159*	-0.183*	-0.092***	-0.036	-0.036	-0.025	-0.018	-0.070
	[0.080]	[0.085]	[0.094]	[0.032]	[0.061]	[0.061]	[0.060]	[0.061]	[0.104]
Crisis X IBrate		-0.030	-0.055	-0.024	-0.065*	-0.064*	-0.064*	-0.074*	-0.068
		[0.035]	[0.035]	[0.020]	[0.035]	[0.036]	[0.037]	[0.039]	[0.082]
Log(K/L), Log(H/L)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Log(GDP), Log(GDPpc)?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18040	18040	16825	17410	16825	16825	16825	16200	16200
R-squared	0.29	0.29	0.33	0.57	0.57	0.57	0.57	0.57	0.58

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau for 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009; this is aggregated at the exporter level in the top panel, and at the exporter-industry level for the bottom panel. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter, except in Column (8) where the cutoff month is Mar 2009. The upper panel controls for month fixed effects, while the lower panel controls for industry-month fixed effects. Columns (3) and (5)-(9) control for Log(K/L) and Log(H/L), as well as Crisis X Log(K/L) and Crisis X Log(H/L). Columns (4)-(9) control for Log(GDP) and Log(GDPpc), as well as Crisis X Log(GDP) and Crisis X Log(GDPpc). Column (6) uses the three-month interbank rate for IBrate instead of the one-month rate. Column (7) uses a three-month lag of the one-month rate for IBrate. Column (9) drops TUR from the sample. Results are similar if clustering by country-industry is adopted instead in the lower panel. Country variables included as controls on the right-hand side are 1996-2005 averages.

Table 3
The Global Financial Crisis and Credit Channels of Comparative Advantage: EXTFIN

	Dependent variable: Log (Industry exports to the US)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crisis = 1: Sep 09 and after						3m rate	Lag rate	Mar 09	Less TUR	Less 325
IBrate X EXTFIN	-0.020**	-0.018**	0.000	-0.007	-0.009	-0.008	-0.009	-0.008	-0.027	-0.055
	[0.009]	[0.009]	[0.010]	[0.008]	[0.011]	[0.011]	[0.011]	[0.010]	[0.025]	[0.042]
Crisis X IBrate X EXTFIN		-0.006	-0.005	0.002	-0.002	-0.002	-0.003	-0.003	0.012	-0.010
		[0.005]	[0.007]	[0.006]	[0.006]	[0.006]	[0.007]	[0.007]	[0.014]	[0.024]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No	No
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.68	0.68	0.70	0.74	0.73	0.73	0.73	0.73	0.74	0.72
IBrate X EXTFIN	-0.007	-0.002	-0.003	-0.001	-0.001	-0.001	-0.008	-0.002	0.001	0.027**
	[0.005]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.006]	[0.005]	[0.004]	[0.012]
Crisis X IBrate X EXTFIN		**-0.006***	**-0.006**	**-0.004**	**-0.008****	**-0.008****	**-0.007****	**-0.009****	**-0.013***	**-0.006**
		[0.003]	**[0.004]**	**[0.003]**	**[0.004]**	**[0.004]**	**[0.003]**	**[0.004]**	**[0.007]**	**[0.007]**
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter, except in Column (8) where the cutoff month is Mar 09. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. Columns (3) and (5)-(10) control for Log(K/L) X Log(k/l) and Log(H/L) X Log(h/l), as well as Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(10) control for Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as Crisis X Log(GDP) X Industry fixed effects and Crisis X Log(GDPpc) X Industry fixed effects. Since the lower panels control for country-industry fixed effects, we drop Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, from the relevant specifications as these cannot be identified. Column (9) drops TUR from the sample. Column (10) drops NAICS 325 from the sample. Results are similar if clustering by country-industry is adopted instead. Country variables included as controls on the right-hand side are 1996-2005 averages.

Table 4
The Global Financial Crisis and Credit Channels of Comparative Advantage: TANG

	Dependent variable: Log (Industry Exports to the US)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crisis = 1: Sep 09 and after						3m rate	Lag rate	Mar 09	Less TUR	Less 325
IBrate X TANG	0.036	0.074	0.307**	0.243*	0.261*	0.274*	0.236*	0.234*	0.298	0.314*
	[0.164]	[0.145]	[0.142]	[0.131]	[0.147]	[0.147]	[0.132]	[0.128]	[0.494]	[0.156]
Crisis X IBrate X TANG		-0.119	-0.159	-0.1	-0.136	-0.14	-0.02	-0.024	-0.263	-0.177
		[0.085]	[0.094]	[0.104]	[0.110]	[0.115]	[0.086]	[0.110]	[0.237]	[0.125]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No	No
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.68	0.68	0.70	0.74	0.73	0.73	0.73	0.73	0.74	0.72
IBrate X TANG	0.199*	0.159	0.166	0.173	0.198	0.214	0.256*	0.220*	0.116	0.207
	[0.105]	[0.115]	[0.121]	[0.123]	[0.131]	[0.130]	[0.126]	[0.111]	[0.156]	[0.146]
Crisis X IBrate X TANG		**0.053*** **	**0.035***	**0.059****	**0.026**	**0.025**	**-0.011**	**0.003**	**0.075**	**-0.01**
		[0.015]	**[0.019]**	**[0.023]**	**[0.040]**	**[0.038]**	**[0.038]**	**[0.032]**	**[0.060]**	**[0.054]**
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter, except in Column (8) where the cutoff month is Mar 09. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. Columns (3) and (5)-(10) control for Log(K/L) X Log(k/l) and Log(H/L) X Log(h/l), as well as Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(10) control for Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as Crisis X Log(GDP) X Industry fixed effects and Crisis X Log(GDPpc) X Industry fixed effects. Since the lower panels control for country-industry fixed effects, we drop Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, from the relevant specifications as these cannot be identified. Column (9) drops TUR from the sample. Column (10) drops NAICS 325 from the sample. Results are similar if clustering by country-industry is adopted instead. Country variables included as controls on the right-hand side are 1996-2005 averages.

Table 5
The Global Financial Crisis and Credit Channels of Comparative Advantage: TCRED

	Dependent variable: Log (Industry Exports to the US)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crisis = 1: Sep 09 and after						3m rate	Lag rate	Mar 09	Less TUR	Less 325
IBrate X TCRED	-0.176	-0.468	0.178	0.060	0.102	0.080	0.109	-0.035	-0.142	0.118
	[0.479]	[0.554]	[0.506]	[0.392]	[0.387]	[0.379]	[0.378]	[0.431]	[1.321]	[0.545]
Crisis X IBrate X TCRED		0.901*	0.685	0.982*	1.010*	1.058*	0.639	0.897	1.806**	1.113*
		[0.480]	[0.418]	[0.480]	[0.510]	[0.547]	[0.429]	[0.620]	[0.731]	[0.582]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No	No
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.68	0.68	0.70	0.74	0.73	0.73	0.73	0.73	0.74	0.72
1m IBrate X TCRED	1.180***	0.877**	0.941**	0.943*	1.037**	1.122**	1.239**	1.076**	0.849	1.080*
	[0.353]	[0.413]	[0.428]	[0.462]	[0.468]	[0.457]	[0.541]	[0.454]	[0.623]	[0.531]
Crisis X 1m IBrate X TCRED		**0.397****	**0.316****	**0.410****	**0.365***	**0.371****	**0.185**	**0.286**	**0.457**	**0.236**
		[0.146]	**[0.142]**	**[0.172]**	**[0.186]**	**[0.180]**	**[0.164]**	**[0.198]**	**[0.355]**	**[0.251]**
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18040	18040	16825	17410	16825	16825	16825	16825	16200	16016
R-squared	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter, except in Column (8) where the cutoff month is Mar 09. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. Columns (3) and (5)-(10) control for Log(K/L) X Log(k/l) and Log(H/L) X Log(h/l), as well as Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(10) control for Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as Crisis X Log(GDP) X Industry fixed effects and Crisis X Log(GDPpc) X Industry fixed effects. Since the lower panels control for country-industry fixed effects, we drop Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, from the relevant specifications as these cannot be identified. Column (9) drops TUR from the sample. Column (10) drops NAICS 325 from the sample. Results are similar if clustering by country-industry is adopted instead. Country variables included as controls on the right-hand side are 1996-2005 averages.

Table 6
Financial Development and Trade Flows during the Global Financial Crisis

	Dependent variable: Log (Industry Exports to the US) PC/GDP = Private Credit / GDP								
Crisis = 1: Sep 09 and after	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ind Char:	EXTFIN	EXTFIN	EXTFIN	TANG	TANG	TANG	TCRED	TCRED	TCRED
PC/GDP X Ind Char	0.317***	0.303***	0.035	-4.030***	-3.851***	-3.536**	-4.141	-3.600	-9.872*
	[0.082]	[0.082]	[0.108]	[1.224]	[1.210]	[1.684]	[4.678]	[4.674]	[4.996]
Crisis X PC/GDP X Ind Char		0.055***	0.020		-0.681***	-0.468*		-2.063	-2.185
		[0.019]	[0.027]		[0.240]	[0.264]		[1.496]	[2.278]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	No	Yes	No	No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	Yes	No	No	Yes	No	No	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No
Observations	43507	43507	39864	43507	43507	39864	43507	43507	39864
R-squared	0.69	0.69	0.74	0.69	0.69	0.74	0.68	0.68	0.74
Crisis X PC/GDP X Ind Char		0.048**	0.007		-0.758***	-0.731**		-1.867	-3.051
		[0.020]	[0.026]		[0.230]	[0.287]		[1.271]	[2.201]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?		No	Yes		No	Yes		No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?		No	Yes		No	Yes		No	Yes
Ind-Month and Cty-Month fixed effects		Yes	Yes		Yes	Yes		Yes	Yes
Cty-Ind fixed effects		Yes	Yes		Yes	Yes		Yes	Yes
Observations		43507	39864		43507	39864		43507	39864
R-squared		0.96	0.96		0.96	0.96		0.96	0.96

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. The industry characteristic in Columns (1)-(3) is EXTFIN, that in Columns (4)-(6) is TANG, and that in Columns (7)-(9) is TCRED. For each industry characteristic, the first two columns are lean specifications containing no auxillary controls, whereas the third column controls for Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as their respective triple interactions with the Crisis dummy. Since the lower panels control for country-industry fixed effects, and the private credit variable is not time-varying, we can only identify the Crisis X PC/GDP X Ind Char triple interaction coefficient in these specifications. Results are similar if clustering by country-industry is adopted instead. Country variables included on the right-hand side are 1996-2005 averages.

Table 7
Accounting Standards and Trade Flows during the Global Financial Crisis

	Dependent variable: Log (Industry Exports to the US) ACCT = Accounting Standards								
Crisis = 1: Sep 09 and after	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ind Char:	EXTFIN	EXTFIN	EXTFIN	TANG	TANG	TANG	TCRED	TCRED	TCRED
ACCT X Ind Char	0.006**	0.006*	0.001	-0.135***	-0.134***	-0.140**	0.079	0.059	0.006
	[0.003]	[0.003]	[0.003]	[0.049]	[0.048]	[0.054]	[0.184]	[0.184]	[0.205]
Crisis X ACCT X Ind Char		0.001	0.002**		-0.005	-0.005		0.078	0.077
		[0.001]	[0.001]		[0.009]	[0.010]		[0.050]	[0.060]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	No	Yes	No	No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	Yes	No	No	Yes	No	No	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No
Observations	24553	24553	23603	24553	24553	23603	24553	24553	23603
R-squared	0.64	0.64	0.69	0.64	0.64	0.69	0.63	0.63	0.69
Crisis X ACCT X Ind Char		0.001	0.002**		-0.001	-0.008		0.013	0.017
		[0.001]	[0.001]		[0.003]	[0.009]		[0.017]	[0.061]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?		No	Yes		No	Yes		No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?		No	Yes		No	Yes		No	Yes
Ind-Month and Cty-Month fixed effects		Yes	Yes		Yes	Yes		Yes	Yes
Cty-Ind fixed effects		Yes	Yes		Yes	Yes		Yes	Yes
Observations		24553	23603		24553	23603		24553	23603
R-squared		0.96	0.97		0.96	0.97		0.96	0.97

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. The industry characteristic in Columns (1)-(3) is EXTFIN, that in Columns (4)-(6) is TANG, and that in Columns (7)-(9) is TCRED. For each industry characteristic, the first two columns are lean specifications containing no auxillary controls, whereas the third column controls for Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as their respective triple interactions with the Crisis dummy. Since the lower panels control for country-industry fixed effects, and the accounting standards variable is not time-varying, we can only identify the Crisis X ACCT X Ind Char triple interaction coefficient in these specifications. Results are similar if clustering by country-industry is adopted instead. Country variables included on the right-hand side are 1996-2005 averages.

Appendix Table 1A
List of Countries with Interbank Rate Data (Datastream)

Australia (AUS); Belgium (BEL); Bulgaria (BGR); Canada (CAN); China (CHN); Germany (DEU); Denmark (DNK); Spain (ESP); Finland (FIN); France (FRA); Great Britain (GBR); Greece (GRC); Hong Kong (HKG); Hungary (HUN); Ireland (IRL); Italy (ITA); Japan (JPN); Malaysia (MYS); Netherlands (NLD); Norway (NOR); New Zealand (NZL); Poland (POL); Portugal (PRT); Romania (ROM); Singapore (SGP); Sweden (SWE); Thailand (THA); Turkey (TUR); Taiwan (TWN)

Note: Sample consists of 29 countries for which one-month interbank interest rate data was available from Thomson Datastream.

Appendix Table 1B
Summary Statistics of Country Characteristics

1-month interbank rates

	Min	5^{th} Pctile	Median	95^{th} Pctile	Max	Mean	Std Dev
Nov 06	0.46	1.70	3.66	8.07	19.24	4.59	3.21
Mar 08	0.85	1.22	4.31	10.27	16.35	5.04	3.01
Sep 08	0.74	1.28	4.66	12.99	18.12	5.42	3.39
Apr 09	0.15	0.27	1.01	10.78	13.31	2.47	3.24

Appendix Table 2A
Industry Characteristics

Summary Statistics

NAICS	Industry	External Finance Dep (EXTFIN)	Asset Tangibility (TANG)	Trade Credit (TCRED)	Phy Cap Intensity (Log(k/l))	Human Cap intensity (Log(h/l))
311	Food Manufacturing	-0.558	0.332	0.078	4.854	-1.424
312	Beverage and Tobacco Product Manufacturing	-0.452	0.321	0.044	5.132	-0.918
313	Textile Mills	-0.154	0.371	0.063	4.198	-1.893
314	Textile Product Mills	-0.335	0.264	0.024	3.313	-1.671
315	Apparel Manufacturing	-0.646	0.131	0.066	2.617	-1.943
316	Leather and Allied Product Manufacturing	-1.857	0.115	0.083	3.254	-1.853
321	Wood Product Manufacturing	-0.372	0.428	0.037	3.816	-1.820
322	Paper Manufacturing	-0.366	0.535	0.063	5.783	-1.459
323	Printing and Related Support Activities	-0.487	0.296	0.084	3.587	-0.628
324	Petroleum and Coal Products Manufacturing	-0.175	0.551	0.123	6.857	-1.040
325	Chemical Manufacturing	5.472	0.138	0.032	5.606	-0.848
326	Plastics and Rubber Products Manufacturing	-0.278	0.355	0.081	4.280	-1.571
327	Nonmetallic Mineral Product Manufacturing	-0.394	0.417	0.050	4.403	-1.562
331	Primary Metal Manufacturing	-0.364	0.406	0.084	5.584	-1.407
332	Fabricated Metal Product Manufacturing	-0.781	0.279	0.093	4.097	-1.391
333	Machinery Manufacturing	-0.237	0.182	0.070	4.380	-1.001
334	Computer and Electronic Product Manufacturing	0.435	0.116	0.054	4.686	-0.726
335	Electrical Equipment, Appliance, and Component Manufacturing	-0.288	0.197	0.080	3.973	-1.297
336	Transportation Equipment Manufacturing	-0.386	0.250	0.120	4.957	-1.643
337	Furniture and Related Product Manufacturing	-1.040	0.289	0.081	2.952	-1.387
339	Miscellaneous Manufacturing	0.549	0.135	0.042	3.597	-1.227

Notes: EXTFIN and TANG and TCRED are calculated based on 1996-2005 Compustat data. Log(k/l) and Log(h/l) are calculated based on 1996 NBER-CES data for US manufacturing. For more details, please see the Data Appendix.

Correlation Coefficients

	EXTFIN	TANG	TCRED	Log(k/l)
TANG	0.2420**			
TCRED	-0.1515	-0.2312**		
Log(k/l)	0.3594	0.5392**	0.2659	
Log(h/l)	0.4197*	-0.1292	-0.0119	0.3940*

Notes: ** and * indicate significance at the 5% and 10% levels respectively.

Appendix Table 3
The Global Financial Crisis and Credit Channels of Comparative Advantage: Joint Tests

	Dependent variable: Log (Exports to the US)								
Crisis = 1: Sep 09 and after	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cty Char:	IBRATE	IBRATE	IBRATE	PC/GDP	PC/GDP	PC/GDP	ACCT	ACCT	ACCT
Cty Char X EXTFIN	-0.026**	-0.025*	-0.001	0.286**	0.275**	-0.125	0.006	0.006	-0.001
	[0.012]	[0.013]	[0.016]	[0.119]	[0.120]	[0.177]	[0.005]	[0.005]	[0.005]
Crisis X Cty Char X EXTFIN		-0.003	0.003		0.040	-0.003		0.002*	0.003**
		[0.007]	[0.010]		[0.025]	[0.037]		[0.001]	[0.001]
Cty Char X TANG	-0.002	0.053	0.259*	-3.516***	-3.370***	-3.534*	-0.133**	-0.132**	-0.148**
	[0.178]	[0.155]	[0.144]	[1.282]	[1.269]	[1.898]	[0.051]	[0.050]	[0.056]
Crisis X Cty Char X TANG		-0.167	-0.160		-0.557**	-0.403		-0.004	-0.003
		[0.100]	[0.116]		[0.236]	[0.285]		[0.009]	[0.010]
Cty Char X TCRED	-0.758	-1.078	-0.118	6.083	6.220	-9.278	0.351	0.317	0.113
	[0.648]	[0.762]	[0.676]	[5.854]	[5.924]	[7.052]	[0.227]	[0.231]	[0.246]
Crisis X Cty Char X TCRED		0.964	1.197		-0.521	-1.868		0.130**	0.136*
		[0.581]	[0.740]		[1.733]	[2.757]		[0.058]	[0.069]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes	No	No	Yes	No	No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	Yes	No	No	Yes	No	No	Yes
Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	No	No	No	No	No	No	No	No	No
Observations	18040	18040	16825	43507	43507	39864	24553	24553	23603
R-squared	0.68	0.68	0.73	0.69	0.69	0.74	0.64	0.64	0.69
Cty Char X EXTFIN	0.006	0.009	0.012						
	[0.011]	[0.007]	[0.009]						
Crisis X Cty Char X EXTFIN		-0.003	-0.007		0.030	-0.034		0.001	0.002*
		[0.004]	[0.007]		[0.025]	[0.038]		[0.001]	[0.001]
Cty Char X TANG	0.179	0.154	0.198						
	[0.114]	[0.118]	[0.135]						
Crisis X Cty Char X TANG		0.035**	-0.006		-0.659***	-0.702**		-0.006	-0.005
		[0.015]	[0.054]		[0.224]	[0.286]		[0.005]	[0.009]
Cty Char X TCRED	1.194**	0.972*	1.163**						
	[0.488]	[0.480]	[0.549]						
Crisis X Cty Char X TCRED		0.294	0.211		-0.447	-3.143		0.051**	0.069
		[0.202]	[0.297]		[1.471]	[2.672]		[0.023]	[0.067]
Log(K/L) X log(k/l), Log(H/L) X log(h/l)?	No	No	Yes		No	Yes		No	Yes
Log(GDP) X Ind fe, Log(GDPpc) X Ind fe?	No	No	Yes		No	Yes		No	Yes

Ind-Month and Cty-Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18040	18040	16825	43507	39864	24553	23603
R-squared	0.97	0.97	0.97	0.96	0.96	0.96	0.97

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The dependent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. The Crisis variable is an indicator equal to 1 from Sep 2009 and thereafter. The upper panel controls for industry-month and country-month fixed effects, while the lower panel controls for industry-month, country-month, and country-industry fixed effects. The country characteristic in Columns (1)-(3) is the one-month interbank rate, that in Columns (4)-(6) is PC/GDP, and that in Columns (7)-(9) is ACCT. For each country characteristic, the first two columns are lean specifications containing no auxillary controls, whereas the third column controls for Log(K/L) X Log(k/l), Log(H/L) X Log(h/l), Log(GDP) X Industry fixed effects and Log(GDPpc) X Industry fixed effects, as well as their respective triple interactions with the Crisis dummy. Since the lower panels control for country-industry fixed effects, and the private credit and accounting standards variables are not time-varying, we can only identify the Crisis X PC/GDP X Ind Char and Crisis X ACCT X Ind Char triple interactions in the respective specifications in Columns (5)-(6) and (8)-(9). Results are similar if clustering by country-industry is adopted instead. Country variables included on the right-hand side are 1996-2005 averages.

Appendix Table 4
Regression Coefficients underpinning Figure 3

	(1)		(2)		(3)	
	Interbank X EXTFIN		Interbank X TANG		Interbank X TCRED	
month	Coefficient	Std Error	Coefficient	Std Error	Coefficient	Std Error
2	-0.004	[0.004]	0.155**	[0.060]	0.567**	[0.271]
3	-0.004	[0.005]	0.162**	[0.064]	1.025***	[0.319]
4	-0.004	[0.004]	0.074	[0.048]	0.464	[0.318]
5	-0.006	[0.005]	0.130*	[0.065]	1.116***	[0.293]
6	-0.001	[0.003]	0.134*	[0.066]	0.776*	[0.398]
7	0.003	[0.004]	0.043	[0.055]	0.680**	[0.260]
8	-0.006	[0.005]	0.182***	[0.056]	0.523*	[0.265]
9	-0.006	[0.004]	0.020	[0.065]	0.422	[0.260]
10	-0.010**	[0.004]	0.098	[0.079]	0.467	[0.349]
11	-0.006**	[0.003]	0.155***	[0.051]	0.200	[0.264]
12	-0.005	[0.003]	0.101	[0.073]	0.669*	[0.344]
13	0.000	[0.005]	0.091***	[0.032]	0.350	[0.249]
14	0.003	[0.006]	0.203**	[0.086]	0.631	[0.416]
15	-0.006	[0.005]	0.182**	[0.076]	0.754**	[0.338]
16	-0.003	[0.004]	-0.036	[0.120]	-0.151	[0.862]
17	-0.009**	[0.003]	0.159*	[0.085]	1.386***	[0.426]
18	-0.006**	[0.003]	0.234*	[0.120]	1.401***	[0.478]
19	-0.005*	[0.003]	0.212	[0.126]	0.912	[0.581]
20	-0.009***	[0.003]	0.150**	[0.061]	0.372	[0.421]
21	-0.002	[0.002]	-0.079	[0.072]	-0.351	[0.558]
22	-0.002	[0.003]	0.155	[0.108]	0.993***	[0.317]
23	-0.019	[0.011]	0.287***	[0.052]	1.238***	[0.264]
24	-0.002	[0.003]	0.192	[0.113]	1.376***	[0.367]
25	-0.002	[0.003]	0.217***	[0.074]	0.875***	[0.271]
26	-0.008**	[0.004]	0.211**	[0.096]	1.454**	[0.585]
27	-0.009	[0.006]	0.162**	[0.060]	1.043***	[0.258]
28	-0.011	[0.007]	0.158**	[0.077]	1.333***	[0.309]
29	-0.015***	[0.005]	0.175*	[0.100]	0.886***	[0.269]
30	-0.020***	[0.006]	-0.037	[0.147]	0.014	[0.696]
N	18040		18040		18040	
R^2	0.97		0.97		0.97	

Notes: Standard errors are clustered by country, with *, **, and *** denoting significance at the 10%, 5%, and 1% levels respectively. The depedendent variable is log monthly exports to the US as recorded by the US Census Bureau in 3-digit NAICS manufacturing industries, covering Nov 2006 to Apr 2009. Each specification estimates the coefficient of the interbank rate interaction with EXTFIN, TANG or TCRED for each month in a pooled regression setting, while controlling for industry-month, country-month, and country-industry fixed effects. The term for the first month is omitted, to avoid a collinearity problem with the country-industry fixed effects. The reported coefficients are plotted in Figure 3.