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OFF THE CLIFF AND BACK? CREDIT CONDITIONS AND INTERNATIONAL TRADE DURING THE GLOBAL FINANCIAL CRISIS

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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 impact 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. Countries with higher interbank rates and thus tighter credit markets exported less to the US during the peak of the crisis. These effects were especially pronounced in sectors that require extensive external financing, have few collateralizable assets, or have limited access to trade credit. Exports of financially dependent industries were thus more sensitive to the cost of external capital than exports of less dependent industries, and this sensitivity rose during the financial crisis. The quantitative implications of our estimates for trade volumes highlight the large real effects of financial crises and the potential gains from policy intervention.

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1 Introduction and Motivation

The global financial crisis has had far-reaching repercussions on cross-border economic activity. After a sharp and sudden collapse in international trade in the last quarter of 2008, world trade flows declined by about 12% in 2009 according to the WTO. This greatly exceeds the estimated loss of 5.4% of world GDP during the same period.[1] The contraction in exports was especially acute for small open economies, several of whom saw their trade volumes in the second half of 2008 fall by up to 30% year-on-year. This decline in cross-border trade 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 scaled down production and employment in response to limited export opportunities.[2]

Two aspects of the global financial crisis are believed to have triggered this large decline in international trade. On the producer side, the credit crunch at the height of the crisis resulted in a severe reduction in the availability of external finance, thus curtailing firms' production and export capacities. On the consumer side, the gloomy economic outlook in turn led to a slowdown in global demand in general, and for imports in particular. The effects of these forces may very well have been amplified by disruptions to global production lines, and by inventories adjustments made by importing firms and distributors. To date, however, economists have only just begun to assess the role of each of these mechanisms. Understanding the factors that led to the collapse in trade flows can shed light on the potential long-term consequences of this crisis, and its uneven impact across countries and sectors. It can also facilitate the design of policy interventions to mitigate the real effects of future financial crises, particularly on international trade.

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 October 2009 period, and compare trade patterns before and during the crisis.[3] We identify the impact of credit conditions 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 vulnerability across sectors. We find that countries with higher interbank rates and thus tighter credit availability exported less to the US. These effects were exacerbated during the crisis period and were especially pronounced in sectors that require extensive external financing, have few collateralizable

[1] Based on authors' own calculations, using data on GDP in current prices from the IMF's World Economic Outlook Database for April 2010.

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

[3] Based on the developments in global financial markets described in Section 2, we date the crisis period from September 2008 (when credit conditions started unraveling in earnest) to August 2009 (one year after, when conditions had largely calmed down). We discuss the robustness of our results to alternative ways of dating the crisis period later below.

assets, or have limited access to buyer-supplier trade credit.[4] 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 rose during the financial crisis. These results are robust to controlling for countries' industrial production index, indicating that credit tightening had a disproportionately large disruptive effect on trade flows beyond its effect on domestic output. Our findings are also not driven by cross-country differences in initial overall development (GDP and GDP per capita) or factor endowments, which themselves could influence trade patterns.

We also find suggestive evidence that higher pre-crisis levels of financial development mitigated the adverse effects of the crisis. In particular, the exports of countries with stronger initial financial institutions (as measured by private credit as a share of GDP or accounting standards) were more resilient to the crisis, especially in financially dependent sectors. 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 the trade impact of a financial crisis.

Our findings imply that credit conditions played an important role in shaping the evolution of trade flows at the height of the recent global crisis. We infer how US imports would have evolved under two alternative scenarios: (1) credit conditions remained tight, with interbank rates fixed at their September 2008 peak levels throughout the crisis period; and (2) credit conditions eased considerably, with interbank rates dropping immediately after September 2008 to their low levels of August 2009. We view these exercises as providing rough upper and lower bounds for the crisis-induced damage to trade flows mediated through the credit channel. We conservatively conclude that the 2008-2009 crisis would have reduced US imports by 2.5% more and 5.5% less under these respective scenarios. Estimates from less restrictive specifications that use the full cross-country variation in credit conditions indicate that these magnitudes may be as high as a 35.2% reduction and a 30.5% improvement respectively.

Our results also signal that credit tightness contributed substantially to the cross-industry variation in the decline in trade flows. Under the same scenarios as above, there would have been large and systematic differences in the response of exports across sectors at different levels of financial vulnerability. For example, US imports in the most external finance dependent sector would have dropped 13.4% more or 8.2% less than imports in the least dependent sector, under the respective hypothetical scenarios. 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 constitute new evidence on the importance of credit and external financing for export

[4] Throughout this paper, 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 an immediate 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.

activities. Access to outside capital clearly matters for both domestic production and exporting because firms often have to incur substantial upfront costs that cannot be funded out of internal cash flows or accumulated reserves. Some of these costs are of a fixed nature, such as for product development and equipment investment, while others are variable, such as intermediate input purchases, advance wage payments, and land or equipment rental fees.

Exporting is associated with additional outlays that further increase firms' reliance on external finance. Sunk and fixed costs specific to international trade include costs incurred in learning about the profitability of export opportunities; in making market-specific investments in capacity, product customization, and regulatory compliance; and in setting up and maintaining foreign distribution networks. Some variable trade costs, such as shipping and duties, may also have to be incurred before export revenues are realized. Exporters' need for working capital is further magnified by the fact that cross-border transactions on average take between 30-90 days longer to process than domestic sales.[5] To overcome these liquidity constraints, firms routinely rely on bank financing or export letters of credit. The added risk that is faced in exporting relative to domestic activities further necessitates insurance for many international transactions.

These factors have 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 or insurance, with the total size of this market estimated at about $10-12 trillion in 2008 (Auboin 2009). Given these considerations, firms located in countries with access to cheaper bank credit should in principle be able to produce and export more. Our finding that economies with lower interbank rates systematically export more to the US is thus a reflection of the liquidity constraints that firms face when engaging in international trade.

While credit availability is generally 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 growth and finance literature has recently identified several measurable dimensions that characterize a sector's financial vulnerability. First, production and exporting in some industries are associated with larger capital expenditures 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 buyer-supplier trade credit which gives them an alternative to and thus reduces their dependence

[5] See Djankov et al. (2010) and the *Doing Business* dataset. It can take up to 30 days in some countries to secure passage of a shipment from the factory to the export dock, and a further 30 days between arrival at the import dock and delivery at the destination warehouse. This does not include the time in shipping transit.

[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 deeper financial systems facilitate a dampening in sectoral volatility in sectors that have high liquidity needs.

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), these being sectors with relatively high dependence on external finance, low intensity of tangible assets, and/or limited access to trade credit (see Appendix Table 2).[7]

We consider the central result in our paper to be the finding that exports in financially vulnerable sectors became particularly sensitive to the cost of credit during the height of the global crisis. This result cannot simply be attributed to countries with more expensive external capital having a comparative advantage in financially dependent industries, since this would not explain the intensification of this effect during the crisis period. Instead, we offer two potential interpretations for this key stylized fact. First, US import demand 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 found it more difficult to raise the necessary bank credit from home country lenders for their export transactions. A second interpretation recognizes the fact that exporting firms may in practice access trade financing in their destination market, as well as in their home country. As the crisis unfolded, the availability of bank loans and trade financing in the US sharply declined. Both the fall in US demand and credit tightening in the US would have increased the cost of trade financing for firms exporting to the US. This in turn is likely to have posed a bigger problem in countries with a high cost of credit, and especially so in sectors that require more external finance, or that have limited tangible assets and access to trade credit. In other words, the uneven impact of the crisis across countries and sectors can be attributed to the multiplicative effects of tighter credit at home, tighter credit and depressed demand in the export market, and sectors' varying degree of financial dependence.

Although we are unable to distinguish between these two alternative mechanisms, we emphasize that both underscore the importance of credit constraints and financial intermediation in international trade. Looking ahead, our results also raise the open question whether credit conditions and financial development will become quantitatively more important determinants of the 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

[7] See articles by Healy (2009) and Rampell (2009) in *The New York Times*.

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 over GDP, accounting standards, or creditor rights protection) that exhibit very limited or no time-series variation. By contrast, we explore the response of trade flows to short-term fluctuations in the cost of capital 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 renewed interest in academic and policy circles in 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] This is also what Bricongne et al. (2010) find in the experience of French firms during the recent financial crisis episode.

Our paper also falls within a broader research agenda on the impact of banking and financial crises on economic outcomes such as sectoral growth (Kroszner et al. 2007, Dell'Ariccia et al. 2008).[10] More recently, Campello et al. (2010) document that the ongoing financial crisis has had a more severe impact on planned R&D, employment, and capital spending in credit-constrained firms. With regards to the impact 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. They also exploit the 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.

Finally, 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. (2010) document that the decline in world trade has been more pronounced relative to the decline in GDP in the most recent global economic downturns, especially during this ongoing crisis.[11] Several papers have sought to explain this large collapse in trade relative to output. Eaton et al. (2010) evaluate the relative contributions of changes in demand versus

[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 empirical evidence at the country level.

[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.

[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] See also Berman and Martin (2010) who detail the impact of the crisis on African countries' exporting prospects.

changes in trade frictions, using a general equilibrium model of production and trade. While they deduce that the fall in demand was much more important, trade frictions nevertheless accounted for a significant 15% of the overall decline in the trade to GDP ratio.[12] Alessandria et al. (2010) explore the role of inventories, while Bems et al. (2010) and Levchenko et al. (2010) focus on the disruption of global production lines and the reduction in trade in intermediate goods.[13] Separately, there has also been work examining the extent to which the decline in trade can be attributed to a rise in protectionist policy behavior (Evenett 2009, Kee et al. 2010). We view these alternative mechanisms as potentially magnifying the role of credit tightening during the crisis.

The remainder of the paper is organized as follows. Section 2 provides an 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 vulnerability. Section 4 presents our regression results, while Section 5 interprets their economic significance 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. We focus on these data because they are readily available from the US Census Bureau website and because of the timely fashion with which they are released (with a lag of about 3 months).

Figure 1 offers an overview of the main trends in US imports and exports over the 2007-2009 period. Trade volumes were in fact recording modest trend growth 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. This coincided with the height of the global credit crunch. While nervousness over the exposure of financial institutions to the subprime mortgage market had been building up steadily 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.

[12] The World Bank has similarly 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), although these figures do appear to be relatively loose estimates. See also McKibbin and Stoeckel (2009) who emphasize the much larger contraction of trade in durables relative to its production during the crisis.

[13] This builds on the idea in Yi (2003) that any shock to final goods demand would have a multiplier effect on the volume of total recorded trade (which includes both intermediates and consumer goods).

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 23.1% between October and November 2008, while its exports fell 13.6%. This reflects the particularly sharp decline in consumer sentiment and import demand in the US relative to other countries.[14] Second, trade flows in the manufacturing sector (NAICS code first digit = 3) mirrored closely this aggregate decline. US manufacturing imports were 19.3% lower in November 2008 compared with the previous month, while the corresponding fall for manufacturing exports was 13.8%.[15] Third, this contraction in US manufactures was very broad-based (see Table 1). Focusing on the import figures, no 3-digit industry was spared, with the only difference across industries being one of severity. The worst-hit sector 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, food (311) and furniture manufacturing (337) saw the most moderate reductions, but these still registered a more than 5% fall.

How much of this trade decline was due to decreases in prices versus decreases in quantities? Trade-related price indices are unfortunately not readily available at a monthly frequency for the US. However, using quarterly price indices from the National Income and Product Accounts (NIPA), Levchenko et al. (2010) show that most of the contraction in measured trade reflects decreases in quantities with one key exception: The especially sharp drop 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. Nevertheless, excluding this sector does not change the overall picture of a sharp decline in trade flows. Less petroleum and coal-related products, the month-on-month decrease in November 2008 in US manufacturing imports was only a slightly more moderate 17.7%, while the corresponding fall in exports was 13.6%.

This collapse in US trade flows coincided with a severe contraction in trade financing, a by-product of the overall freeze in lending activity at the height of the crisis. While it is difficult to obtain definitive figures, estimates of the worldwide shortfall in trade finance range from $25-500 billion for the second half of 2008 (Auboin 2009, Chauffour and Farole 2009). Separately, IMF reports have suggested that banks' trade-finance capacity constraints affected about 6-10 percent of developing country trade, implying a trade finance gap in the order of $100-300 billion.[16]

In terms of the cost of trade financing, all available accounts point to sharply rising interest rates during the last quarter of 2008. 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

[14] This contrast is even starker when the figures are calculated in year-on-year terms for November 2008: US imports fell 17.5%, while US exports dropped a more moderate 4.9%.

[15] Borchert and Mattoo (2009) document that trade in services has been more resilient than trade in manufactured goods during the global financial crisis. They attribute this to the demand for services being less cyclical, and to services production and trade being less dependent on external finance.

[16] See IMF-BAFT (2009).

trade-related credit instruments between October 2008 and January 2009. While the exact magnitudes vary across countries, there was a near doubling in the spread between banks' cost of funds and the rates on lines of credit or export credit insurance. A similar World Bank survey of firms and banks in 14 developing countries found that the crisis led to a fall in export pre-payments, forcing firms to stretch out their cash flow cycles. While the prices of different credit instruments apparently peaked and started to moderate by the first quarter of 2009, these were still well above their pre-crisis levels (Malouche 2009). These developments prompted many economists and policy-makers to press the case for a coordinated push from country governments to shore up lines of credit (Ellingsen and Vlachos 2009), as evidenced by the April 2009 G20 Summit commitment to raise $250 billion for trade finance.

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

3 Data Description

Our empirical exercise utilizes trade flow data for the US at a monthly frequency in order to track the rapid unfolding of the crisis, especially during the second half of 2008. Since our interest is in understanding how source-country differences in the severity of the credit crunch affected trade performance, we focus on US import flows.[17] We use monthly data for a three-year window, starting from November 2006. It is helpful to have the data series start before 2007, as the unsustainable state of the US subprime mortgage market was becoming ever more apparent in the second half of 2007. Our sample ends in October 2009, amid signs of a steady recovery in trade flows (Figure 1).[18]

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 are 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 and time coverage, as well as (potentially) in the cross-country comparability of the credit instruments for which 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

[17] We limit ourselves to the data for the US' top 100 trading partners, as ranked by the total manufacturing imports observed from each country in 2007. Countries ranked lower typically report more zeros in their industry trade flows. Since our empirical work focuses more on the intensive margin of trade, it appears more appropriate to drop these smaller trading countries. Data on credit conditions and interbank rates are also generally not available for these smaller countries.

[18] While the Census Bureau typically posts the trade data for each month within 3 months, it periodically updates past data, presumably as more precise figures become available. Any such revisions are, however, minor, typically not exceeding 1% of the trade value initially reported. We view this as part of the standard noise in our regression models.

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 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. As an example, it is not uncommon for interest rates on loans such as housing mortgages to be pegged to the interbank rate. To the extent that the interbank rate is a noisy measure of the actual cost of trade financing to exporting firms, it would introduce measurement error and bias our estimation results downwards.[19]

Credit conditions are often also measured by the interbank spread, namely the interbank rate minus a baseline discount or treasury bill rate. Conceptually, the base rate reflects the risk of systemic default common across all borrowers in a given economy, while the spread captures the premium that is paid to compensate lenders for the potential risk of default on interbank loans. This spread typically widens during periods of adverse credit conditions, reflecting the increased risk of bank default.

In our empirical work, we will primarily use the interbank rate rather than the spread for two reasons. First, the interbank rate in principle better captures the total cost of capital that exporting firms have to incur.[20] Second, our analysis focuses on a period of extreme financial duress, during which both the baseline cost of borrowing and bank default risk would have risen. These two components of the interbank rate need not move together, however. Since the baseline risk of systemic default may vary across countries and over time, ignoring its contribution to the cost of credit would remove useful variation for identifying the effect of credit conditions on international trade flows. For completeness, we will nevertheless report some results based on a measure of the interbank spread.

There are some practical issues in obtaining a measure of the interbank rate. At any given time, the actual terms quoted may differ across individual interbank lending contracts, depending for example 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 developed economies where the banking industry is competitive. 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

[19] Survey and anecdotal evidence indicate that at the height of the crisis, credit tightening manifested itself in both higher costs of credit and limited availability of financial capital. Both mechanisms would in principle hamper firms' ability to export. While we cannot evaluate each mechanism directly because of the absence of systematic data on credit rationing across countries and over time, our results for the interbank interest rate provide a lower bound for the combined effect of both margins of credit tightening.

[20] It would be even more preferrable 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. That said, there are constraints to obtaining these data similar to those faced in procuring information on the terms of such financing, especially since commercial paper tends to be used as a primary means of raising capital only in North America and select European markets.

(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 BBA, European Banking Federation (FBE), or Financial Markets Association (ACI).[21] 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 use the one-month (or thirty-day) interbank rate, to be consistent with the typical duration needed to complete an international trade shipment. Our results turn out to be extremely similar using the three-month (or ninety-day) rate instead (available on request).[22] We average the interbank rate quoted across business days to obtain a monthly measure of the cost of credit in each country. In all, Datastream provides information on interbank rates for a sample of 31 economies. While this may not be a large sample in terms of numbers, it nevertheless covers most of the US' key trading partners and up to 72% of total US manufacturing imports in 2007.[23] The list also reflects a broad spectrum of countries in terms of their overall level of economic and financial development, including most of the OECD, several key emerging markets (Romania, Hungary) and some small open economies (Singapore, Hong Kong). We do not view the lack of coverage of developing countries as a major problem, as the interbank rate is likely a poorer indicator of the cost of credit in countries with less-developed banking sectors, where interbank lending activity is muted.

Figure 2 and Appendix Table 1 illustrate the evolution of the one-month interbank rate over the November 2006 to October 2009 period. Borrowing rates typically peaked in mid to late 2008 in most major economies. This reflects the rising cost of private credit as banks became extremely averse to lending and preferred instead to shore up their capital positions. Lending rates spiked in September 2008, when Lehman Brothers collapsed and AIG failed. Credit conditions only began easing in November 2008, in response to the broad range of extraordinary monetary policy moves deployed by central banks around the world to bolster liquidity. These successfully lowered the interbank cost of borrowing from a median in our sample of 4.66% (September 2008) to 0.44% (October 2009).

Beneath this broad trend, there are important differences in the time paths of the interbank rate across countries, reflecting differences in the severity and timing of the credit crunch and subsequent policy interventions. This cross-country variation in the cost of credit will be crucial to our empirical

[21] 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.

[22] This is because the sample correlation in the monthly averaged one-month and three-month rates is in excess of 0.99.

[23] The three largest US trade partners by import value that are missing from our sample are Mexico, Israel, and Korea.

strategy for estimating 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 before an abrupt reversal in October and November 2008. In contrast, interbank rates were declining from a much earlier date in Canada and Singapore, where central bankers intervened earlier 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 credit availability across sectors. We follow closely the methodology in the prior literature in constructing three such variables of industry financial vulnerability. External finance dependence ($EXTFIN$) is measured as the fraction of total capital expenditure not financed by internal cash flows from operations, and reflects firms' requirements 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. This captures firms' ability to pledge collateral in securing credit (Braun 2003, Claessens and Laeven 2003). Finally, access to (buyer-supplier) trade credit ($TCRED$) is calculated as the ratio of the change in accounts payable over the change in total assets, and indicates how much credit firms receive *in lieu* of having to make upfront or spot payments (Fisman and Love 2003). In principle, the availability of such trade credit thus provides a potential substitute to formal trade financing. Note that while $EXTFIN$ proxies for firms' long-term needs for external finance, $TCRED$ relates to their short-term working capital requirements.

To construct each of these variables, we use data on all publicly-traded firms in Compustat North America. 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 its impact on firm behavior does not contaminate the measures. We then use the median value across firms in each NAICS 3-digit category as the industry measures of $EXTFIN$, $TANG$ and $TCRED$, respectively. Appendix Table 2 lists these values and provides some summary statistics for the 21 industries in our data.

These three variables are widely viewed as capturing technologically-determined characteristics of a sector which are innate to the manufacturing process and exogenous from the perspective of an individual firm. This is corroborated by the relative stability of these measures over time and their much greater variation across industries than among firms within a given industry. The value of these sector characteristics may in principle differ across countries, but we measure them with a proxy based on US data. This is motivated by three considerations. First, similar firm-level data are not systematically available for a broad range of countries. Second, the US has one of the most advanced financial systems,

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

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

4 Evidence: Credit Conditions and Trade Flows during the Crisis

We examine how the deterioration in credit conditions affected trade flows during the global financial crisis in three steps. We first show that countries with higher interbank rates exported relatively less in financially dependent sectors, and that this effect intensified during the peak crisis months. Exploiting the variation across countries and sectors in this way allows us to isolate the effect of credit tightening from that of other confounding factors. Next, we document that at the cross-country level, a higher interbank rate was indeed associated with lower exports to the US during the height of the crisis, but not in the months before or after it. Together, these two steps make it possible to gauge the magnitude of the effect of financial constraints on the level and sectoral composition of trade flows during the crisis. Finally, we explore the extent to which strong pre-crisis financial institutions mitigated the subsequent impact of the crisis on export activity.

4.1 Effects across countries and sectors

We begin by examining the differential effect of the crisis across exporting countries with varying levels of credit tightness and across sectors with varying levels of financial dependence. We examine 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 ($TCRED$). Focusing on one sector measure at a time, for example $EXTFIN$, we estimate the following specification:

$$\begin{aligned} \ln Y_{ikt} &= \beta_1 IBRATE_{it} \times EXTFIN_k + \beta_2 D_{crisis} \times IBRATE_{it} \times EXTFIN_k \\ &\quad + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \end{aligned} \tag{1}$$

where Y_{ikt} is the value of US imports from country i in sector k and $IBRATE_{it}$ is the interbank rate in that exporting country during month t. We report standard errors clustered by country, to allow for correlated idiosyncratic shocks at the exporter level. Similar results obtain under clustering at the country-industry level instead (available on request).

We define D_{crisis} as a binary variable equal to 1 from September 2008 to August 2009, which we will refer to as the crisis period. We date the start of this crisis period to a key month (September 2008) marked by several major financial institution failures and bailouts, including Lehman Brothers and AIG,

that triggered a sharp escalation in the global credit crunch. On the other hand, trade flows were on a steady recovery path by the second half of 2009, as can be seen from Figure 1. We thus designate August 2009 as the last month for the crisis dummy, one year after the onset of the crisis. That said, our intention is not to provide a canonical dating for the end of the crisis, since the fallout from the global downturn is still being felt in many parts of the world. Our results are similar if we allow the crisis dummy to stretch to the last month in our sample (October 2009).

The main variables of interest to us are the double and triple interaction terms. The coefficient on $IBRATE_{it} \times EXTFIN_k$ estimates the effect of fluctuations in countries' cost of capital over time on the sectoral composition of their exports. We expect that countries may export relatively less in financially dependent sectors when they experience higher interbank rates, namely $\beta_1 < 0$. Given the fixed effects included in the regression (see below), β_1 is identified from the variation in financial dependence across industries within a given country-month, the variation in the cost of credit across exporting countries in a given industry-month, and the variation in the cost of credit over time within a given country-sector.

The triple interaction term ($D_{crisis} \times IBRATE_{it} \times EXTFIN_k$) in turn tests whether the sensitivity of financially vulnerable sectors to the cost of capital intensified during the crisis period. Equivalently, it shows whether the role of credit conditions in explaining industry-level trade patterns grew or waned in importance. Yet another way to rephrase this is that β_2 establishes whether any negative effect of the crisis on exports was not only stronger in countries with tighter credit markets, but also concentrated on the most financially dependent sectors in those countries. We thus anticipate that $\beta_2 < 0$. Conceptually, β_2 reports the difference between the crisis-driven change in exports of a country with tight credit markets in a financially dependent sector versus a financially less dependent sector, and compares that to the same difference for a country with lower interbank rates.

We condition on an extensive set of fixed effects to guard against omitted variables bias. First, we include industry-month pair fixed effects, D_{kt}. These capture movements in sector-specific import demand in the US from month to month. They also control for the time-series variation in the availability of trade financing in the US, as well as any monthly seasonality in the data. Importantly, these fixed effects subsume the average effect of the crisis on US bilateral imports (namely, the main effect of D_{crisis}), and any differential effect that the crisis had on sectors at different levels of financial dependence ($D_{crisis} \times EXTFIN_k$).

We further allow for country-month fixed effects, D_{it}. These take into account the impact of shocks to aggregate production and credit conditions in each exporting country over time, as well as bilateral exchange rate fluctuations. They also accommodate the possibility that the financial crisis can affect exports differentially across countries with varying degrees of credit tightness. This would have entered as $D_{crisis} \times IBRATE_{it}$ had country-month fixed effects been excluded.

Finally, we incorporate country-industry fixed effects, D_{ik}. These account for time-invariant sources of comparative advantage that affect the average pattern of country exports across sectors. In particular, they control for the comparative advantage that countries with higher interbank rates might have in financially dependent sectors *on average*.

It should be emphasized that this estimation approach provides a very stringent test. In particular, the set of fixed effects included is exhaustive in that only explanatory variables that vary by country, industry and month simultaneously can be estimated. This should significantly allay concerns regarding omitted variables and alternative explanations. Consider, for instance, the possibility that the interbank rate might capture the effect of some other unobserved country characteristic which was the actual driving force behind the impact of the crisis on trade flows. This could rationalize why countries with higher interbank rates may have seen their export levels decline during the crisis (an effect implicitly controlled for with the country-month fixed effects). It could not, however, explain why the crisis exerted a disproportionately large effect on financially vulnerable industries in such countries.

4.1.1 Core results

We present our results from estimating equation (1) in the top panel of Table 2, which uses the industry measure of external finance dependence ($EXTFIN$). 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 precisely estimated. However, this effect intensified significantly during the crisis period ($\beta_2 < 0$, Column 2, significant at the 10% level).

We obtain similar results in the top panel of Table 3 when we explore the variation in sectors' endowment of tangible assets ($TANG$). Since industries characterized with more hard assets can in principle offer greater collateral to secure a loan, such sectors should be less sensitive to worsening credit conditions. We thus expect the signs of the coefficients in this table to 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 (Column 1). Moreover, this comparative advantage was markedly stronger during the financial crisis (Column 2, $\beta_2 > 0$, significant at the 1% level).

Finally, in Table 4 we explore the role of access to trade credit ($TCRED$). On the one hand, trade credit that is extended by upstream suppliers or downstream buyers *in lieu* of cash in advance or spot payments can offer firms a substitute for 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 high costs of trade financing. On the other hand, it is possible that the willingness to extend trade credit may have

dried up as a result of the general liquidity crunch at the height of the crisis. If so, trade credit may have diminished during this period, with a more severe export contraction witnessed in countries with higher interbank rates, where both formal and informal credit would presumably have been hit harder.

The results in the top panel of Table 4 point strongly to the former interpretation. Columns 1 and 2 reveal that countries with high interbank rates exported relatively more in sectors with greater access to trade credit, and this effect became more pronounced during the crisis period ($\beta_2 > 0$, significant at the 1% level). Note that this result is not inconsistent with the anecdotal evidence of a collapse in overall financing during the crisis for two reasons. First, our measure of $TCRED$ is based on firms' use of trade credit in 1996-2005, before the crisis began. Second, and more importantly, our identification relies on the technologically-determined variation in this measure across sectors. Fisman and Love (2003) have shown that the relative ranking of sectors is similar when $TCRED$ is computed using firm-level data from different decades. This suggests that the ranking of sectors by $TCRED$ would likely remain stable when the level of total trade credit available, and presumably that available in each sector, drops.

The closely-related results in Levchenko et al. (2010) bear some careful discussion here. Levchenko et al. (2010) find weaker evidence for the role of trade credit in explaining sector-level trade flows during the crisis. Their analysis, however, focuses on the cross-industry variation in access to trade credit. By contrast, we exploit both this cross-industry variation, as well as the cross-country variation in the cost of formal bank financing to uncover the role of $TCRED$. In addition, while they examine the annual change in trade between the second quarter of 2008 and the second quarter of 2009, we analyze the substantial movements in export patterns and credit conditions at the monthly frequency.

How should 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, D_{crisis} (Figure 2). Our results therefore cannot be attributed to a non-linear effect of the cost of capital on export performance. We offer two potential explanations why countries with higher interbank rates may have experienced larger falls in their exports during the crisis, especially in financially dependent sectors.

First, the crisis period was marked by a dramatic decline in the demand for imported final goods 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, 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, though, that our regressions implicitly control for the sector-specific decline in US demand with the industry-month fixed effects.

What can explain our results, however, is that the sudden drop in US demand presented a bigger challenge to exporters that faced tighter credit conditions. When firms need external finance to cover

their fixed upfront costs, they require sufficiently large export revenues to guarantee lenders a high enough expected return. A decline in anticipated foreign sales would thus make it more difficult for firms to raise trade financing. 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, faced with tighter credit conditions, both the number of firms exporting from each country to the US, as well as the value of each firm's exports would contract in response to a sharp decline in US demand. Moreover, this contraction would be amplified in countries with high interbank rates, and felt most acutely in financially vulnerable sectors. 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 access trade financing 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 secure financing in the US, where the availability of bank loans and trade credit declined sharply during the crisis period. Once again, these developments in the US cannot by themselves explain the differential effect of the financial crisis across countries with varying costs of external capital, since our estimation implicitly includes month fixed effects. On the other hand, 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, especially those firms engaged in financially dependent sectors. This interpretation raises the possibility that financial frictions in one country can amplify the effect of credit constraints in its trade partners.[24]

While we do not distinguish between these two alternative explanations, we emphasize that they both underscore the importance of credit constraints and financial intermediation in international trade. Both interpretations support the idea that credit tightening amplified the effect of the global crisis on trade flows.

4.1.2 Sensitivity analysis

While the extensive set of fixed effects in Tables 2-4 go a long way towards mitigating concerns about omitted variables, we nevertheless perform a series of additional robustness tests.

In Column 3, we control for the role of initial factor endowments in determining the pattern of export specialization. Specifically, we interact countries' initial physical and human capital per worker ($\log(K/L)_i$ and $\log(H/L)_i$) respectively with measures of industry factor intensities ($\log(k/l)_k$ and

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

$\log(h/l)_k$), as well as with the crisis dummy. This is in the spirit of Romalis (2004), who finds that skill-abundant countries tend to export more in skill-intensive industries (likewise with physical capital). The only difference here is that we allow the strength of such factor-endowment motives for trade to change during the crisis. (The double interaction terms between country endowments and industry factor intensities are subsumed by the country-industry fixed effects. We therefore control only for the triple interaction terms, $D_{crisis} \times \log(K/L)_i \times \log(k/l)_k$ and $D_{crisis} \times \log(H/L)_i \times \log(h/l)_k$.)

Column 4 further considers the possibility that export patterns may be correlated with country size or overall level of development, and that it is such effects which our key country variable, $IBRATE$, is picking up. To address this concern, we include the triple interactions of an initial measure of country GDP with D_{crisis} and a full set of industry fixed effects; we also include a similar set of triple interactions based on initial country GDP per capita. (Once again, the double interactions of initial GDP and GDP per capita with industry fixed effects are subsumed by the D_{ik}'s.) Even with these controls for the role of country endowments and income, our main findings on the importance of credit conditions continue to hold: The triple interaction coefficients for $EXTFIN$ and $TCRED$ remain highly significant in Columns 3 and 4 of their respective tables. While that for $TANG$ (in Table 3) is no longer statistically significant, the point estimate retains the same sign and comparable magnitude.

In Column 5, we report results treating the Euro zone member countries as one cluster when computing the robust standard errors. This helps to address the concern that interbank rates in different Euro zone countries track each other very closely because of the common monetary policy regime. Reassuringly, our results are largely unaffected by this standard error adjustment. Column 6 confirms the stability of the estimates to removing the industry (NAICS 324; petroleum and coal products) for which changes in prices appear to have been more important than quantity adjustments for the decline in US imports. Likewise, our conclusions are unchanged when dropping the country with the highest interbank rates (Turkey) in the sample (Column 7). Our findings are also robust to lagging the interbank interest rate by one month to account for the possibility that firms need to borrow in advance of the export delivery date (Column 8). The results are very similar too if we alternatively use the three-month instead of the one-month interbank rate (available on request), given that the correlation between the two monthly rate series is in excess of 0.99. Finally, our findings continue to hold when we date the start of the crisis period to March 2008, the month of the Bear Stearns collapse (Column 9).

Although statistical significance varies somewhat across specifications, the magnitude of the estimated effects and their economic significance remain fairly stable. The results for $TCRED$ are particularly robust in both quantitative and qualitative terms. This suggests that in the very short run, at the monthly frequency, firms' access to trade credit matters more for the sensitivity of their exports to credit tightening relative to firms' long-term external capital requirements and their availability of collateral.

This is further confirmed by the first three columns of Table 5, where we report regressions including the triple interactions with all three sector measures of financial vulnerability at the same time: The coefficient for $TCRED$ remains statistically significant, although those for $EXTFIN$ and $TANG$ report larger standard errors. The signs and magnitudes of the point estimates are, however, similar to those in Tables 2-4. That the regressions in Table 5 are estimated with less precision presumably reflects the fact that these coefficients are identified from the variation in three sector characteristics across a relatively small number of only 21 industries.

While we are primarily interested in the total impact of the financial crisis on trade flows via the credit conditions channel, it is important to establish whether this effect holds over and above that on domestic output. To the extent that both domestic producers and exporters incur the same costs in developing and manufacturing a product, they may be equally hurt by tighter credit conditions. But exporters may be affected more because of the additional costs they bear that are specific to production for and shipping to foreign markets.

The bottom panel in each of Tables 2-4 attempts to isolate the effect of the crisis on trade flows above and beyond that on domestic output. To do so, we would ideally like to control for each exporting country's sector-level industrial production at the monthly frequency. Such data are unfortunately not available for a large number of countries. Instead, we control for the monthly log industrial production index (IPI) in each exporting country interacted with a full set of industry fixed effects. We also include the corresponding triple interactions with the crisis dummy. Our objective here is to account as best we can for the overall effect of aggregate production on trade flows, while allowing the strength of this effect to vary freely across sectors, as well as during the crisis period. Nevertheless, there are two limitations to this estimation approach: First, output fluctuations across different industries need not be proportional to those in aggregate production. Second, the IPI is not available for all economies in our sample of 31 countries.

Bearing in mind these caveats, the data indicate that credit tightening did have more severe repercussions for international trade than for domestic output. While the point estimates for $EXTFIN$ and $TANG$ in the lower panels remain largely unchanged, they are now more imprecisely estimated. The results for $TCRED$, on the other hand, remain highly statistically and economically significant. In other words, rising costs of capital had a disproportionately larger effect on the pattern of trade than on the pattern of production. This finding dovetails with the larger decline in trade flows relative to GDP reported in Freund (2009) and Levchenko et al. (2010).

Our results so far raise the interesting question whether credit access in the exporting country matters more for international trade than credit access in the destination country. Column 10 in Tables 2-4 provides a first pass at answering this question. As the outcome variable, we now consider US *exports* by

destination country and sector, and regress it on the interactions of the interbank rate in the importing market with sectors' financial dependence and the crisis dummy. The largely insignificant effects we find are suggestive evidence that the cost of capital at the export dock is substantially more important for trade activity than that in the importing country.

Last but not least, in Column 11, we take a first step towards decoupling the effect of movements in the cost of capital due to changes in the valuation of systemic risk and those due to changes in the perceived default risk that is specific to banking institutions. We re-estimate equation (1), this time using the spread between countries' interbank and treasury bill rates in place of our key $IBRATE$ explanatory variable. As three-month rates are typically quoted for treasury bills, we use the difference between the three-month interbank and treasury bill rates to calculate this spread. (Recall that our central results based on the interbank rate are virtually identical if we had used the three-month instead of the one-month rate.) Once again, the availability of data on treasury rates (taken from the IMF's International Financial Statistics) unfortunately constrains our sample size. Although we typically find point estimates of the same sign and comparable magnitudes as those with $IBRATE_{it}$ (except in the case of $TCRED$), these are almost always imprecisely estimated. Overall, we view this as indicative that some of the trade collapse during the crisis may have been driven by the default risk component of the total cost of credit.

To summarize, countries with higher interbank rates and hence worse credit conditions displayed a lower volume of exports in financially dependent sectors, and this effect was more pronounced during the recent crisis period.

4.1.3 An illustration of the short-run effects of credit conditions

We conclude the discussion of our triple interaction results with an exercise to illustrate how the importance of credit conditions for the pattern of trade evolved as the financial crisis unfolded. To this end, we employ a more flexible empirical specification that relaxes the implicit assumption in (1) of a stepwise change in trade patterns after September 2008. Consider the following:

$$\ln Y_{ikt} = \sum_{m=1}^{M} \beta_m D_m \times IBRATE_{it} \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \tag{2}$$

Relative to (1), this expanded specification allows the effect of credit conditions on the composition of exports to vary non-linearly over time: We use a full series of month dummies, D_m (equal to 1 in month m) instead of the crisis indicator, and interact each of the D_m's with the product of the interbank rate in country i in month t and the external finance dependence of industry k. The D_{it}, D_{kt} and D_{ik} are country-month, industry-month, and country-industry fixed effects as before.

We plot the evolution of the β_m coefficients from (2) in Figure 3A, to illustrate how the strength of the credit channel of comparative advantage changed over time. Figures 3B and 3C present similar

graphs from running (2), but using instead $TANG$ and $TCRED$ respectively as the industry measure of financial vulnerability. In each figure, the dotted lines indicate the 90% confidence intervals of each β_m coefficient. Two linear regression trend lines for the β_m's are also plotted, for the pre- and post-September 2008 periods. (Appendix Table 3 presents in full the point estimates and standard errors for the β_m's from these regressions.)

Two patterns stand out. First, despite some month-to-month volatility, the coefficients on the interactions with $EXTFIN$ are almost always negative, while those with $TANG$ and $TCRED$ 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, or enjoy less access to trade credit.

Second, all three figures clearly indicate that the importance of credit conditions for the composition of exports increased dramatically as the crisis deepened. There is a pronounced break right around September 2008, the month we use as the start date for D_{crisis} in our earlier analysis. This is consistent with the core results presented above from the more parsimonious specification in (1).

Figure 3 naturally raises the question whether the unusually severe and rapid crisis of 2008-2009 will have long-lasting consequences for the pattern of countries' exports. Put simply, will the heightened importance of credit channels of comparative advantage persist. In other words, will the global economy transition to a new steady state in which the availability of external finance becomes a more important determinant of trade patterns? Or will the relevance of credit conditions for trade ease off once the 2008-2009 crisis is decisively behind us? While all three graphs exhibit a clear jump in the magnitude of β_m in and after September 2008, they however display different trends over time. Figure 3A suggests that $EXTFIN$ became progressively more important for the sectoral composition of trade as the crisis unfolded. Figures 3B and 3C for $TANG$ and $TCRED$, on the other hand, indicate that the increased magnitude of the β_m's may be tapering off. Based on this, we cannot conclusively determine whether the crisis has indeed permanently raised the importance of credit channels of comparative advantage, and a complete verdict will have to await the availability of more data.

4.2 Level effects of the crisis

The econometric approach above exploits the variation in financial dependence across sectors, and permits the inclusion of a demanding set of fixed effects. This alleviates concerns regarding control variables and allows us to isolate a plausibly causal effect of credit tightening on trade flows during the financial crisis. However, it precludes an evaluation of the *level* effect of credit conditions on trade volumes. In this subsection, we turn to the study of this level effect. This will later allow us to gauge the impact of credit conditions during the crisis on overall trade volumes in Section 5.

4.2.1 Cross-country estimation

We first examine the effect of the crisis on sector-level trade flows across exporting countries with varying levels of the cost of capital. In particular, we estimate the following:

$$\ln Y_{ikt} = \gamma_1 IBRATE_{it} + \gamma_2 D_{crisis} \times IBRATE_{it} + D_{kt} + \epsilon_{ikt} \quad (3)$$

As before, Y_{ikt} and $IBRATE_{it}$ are respectively the value of US imports from country i in 3-digit NAICS industry k and the interbank rate in that country during month t. D_{crisis} is again a binary variable equal to 1 between September 2008 and August 2009. We include industry-month fixed effects which subsume the average effect of the crisis on US sectoral imports. These also control for sector-specific US import demand fluctuations, as well as any monthly seasonality in the data. We report standard errors clustered by country; results are similar when clustering by country-industry.

The coefficients of interest, γ_1 and γ_2, are now identified purely from the variation in the cost of credit across exporting countries in a given month and sector. The main effect of $IBRATE_{it}$ thus establishes the extent to which countries with a lower cost of capital are able to export more to the US. The interaction term in turn identifies the effect of credit tightness on trade flows at the height and immediate aftermath of the turmoil in financial markets. (We will turn to a specification that focuses on the within-country variation in credit conditions and trade flows later in this subsection.)

We present the results from estimating (3) in Table 6. Throughout these specifications, we also control for the log monthly-averaged nominal bilateral exchange rate with the US dollar ($\log EXCH_{it}$) and its interaction with the crisis dummy ($D_{crisis} \times \log EXCH_{it}$), given the importance that the exchange rate potentially plays in explaining short-term fluctuations in trade flows. Note that its role can now be identified because we do not include country-industry fixed effects in these regressions.[25]

As the top panel of Table 6 shows, countries with lower interbank rates systematically exported more to the US (Column 1). This effect is statistically significant at the 10% level, with the point estimate implying that a one percentage point rise in the cost of bank financing would be associated with approximately a 16% drop in that country's exports to the US market. This result is consistent with the broader body of evidence in the prior literature demonstrating that financial frictions constrain firms' export levels, or even prevent firms from exporting altogether.

We also find that tight credit conditions became particularly damaging to a country's exports during the crisis. While the point estimate of γ_2 is negative but not significant in Column 2, this finding strengthens considerably when we further control for cross-country differences in per worker factor endowments,

[25] The coefficients on $IBRATE_{it}$ and $D_{crisis} \times IBRATE_{it}$ are not particularly sensitive to controlling for the bilateral exchange rate. This is evidently because the movements in exchange rates during this period were relatively small compared to the observed movements in the interbank rate and trade volumes. The effect of $\log EXCH_{it}$ itself shows up as expected, with a stronger exporter exchange rate being associated with lower exports to the US (results available on request).

GDP and GDP per capita, along with their respective interactions with the crisis dummy (Columns 3 and 4; γ_2 now significant at the 5% level). The results are similar when we treat Europe as one cluster (Column 5), exclude the petroleum and coal industry (Column 6), or drop Turkey as an outlier in terms of its interbank rate (Column 7).[26] We also obtain similar results when lagging the one-month interbank rate (Column 8), or extending the start of the crisis period to March 2008 (Column 9). Finally, we find qualitatively similar but imprecisely estimated effects when we use the spread instead of the interbank rate in the last column.

The bottom panel of Table 6 explores the extent to which credit tightening during the crisis was disproportionately damaging for trade flows relative to overall production. In particular, we control for countries' log industrial production index, as well as its interaction with the crisis dummy. In contrast to our earlier findings in Section 4.1, we now find weaker evidence that financial frictions restricted the overall volume of cross-border activity over and above total output. The cross-industry composition of countries' exports thus appears to be important for explaining the substantially higher drop in trade flows relative to GDP during the crisis, and the role of credit tightening in this context.

The level effects we find here are consistent with the two possible interpretations we offered earlier for the differential effect that the crisis had on cross-country, cross-sector trade flows. First, import demand in the US plummeted at the height of the crisis, and the subsequent expectation of lower export revenues could have magnified the detrimental trade effects of tight credit in export markets. Second, the severe liquidity crunch in the US during the crisis period crimped export activity from the rest of the world that relies on some form of financing in the US destination market. This would have had more severe consequences in exporting countries with high interbank rates. Overall, these findings underscore the importance of credit conditions and financial intermediation in international trade.

4.2.2 Within-country estimation

We next explore the extent to which these level effects of the interbank rate were also manifest in the within-country experiences. To this end, we consider a more stringent econometric specification that includes country-industry fixed effects (D_{ik}). Specifically, we estimate the following fully saturated model:

$$\ln Y_{ikt} = \gamma_1 IBRATE_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \tag{4}$$

The D_{ik}'s now control for time-invariant determinants of comparative advantage that affect the average pattern of country exports across sectors, including the average effect that high interbank rates might

[26] Turkey stands out with its particularly high interbank rates, which is often in excess of 15 percentage points. When we exclude it from the regression, 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 (31), and more specifically to the low coverage of developing countries where the external capital is presumably costlier.

have on financially dependent sectors. These also control for all other country characteristics that are relatively stable over time. The coefficient of interest, γ_1, is thus identified purely from the variation in the cost of capital within countries over time; this abstracts from the variation in the (average) interbank rate in the cross-section of countries. In practice, we will estimate (4) for different subperiods in our sample, to explore whether the level effect of the interbank rate varied over time. This is similar in spirit to (3), but slightly more flexible in that we do not restrict ourselves to a stepwise change during the crisis period in the effect of $IBRATE$.

We first report results for the full sample period (November 2006 to October 2009) in the top panel of Table 7. In contrast to our findings in Table 6 which were based on the cross-country variation in $IBRATE_{it}$, we now document a positive, if weak within-country association between exporting countries' interbank rates and sales to the US (Column 1, significant at 5%). This within-country effect of the interbank rate is not driven by movements in countries' bilateral exchange rates against the US dollar (Column 2) or outliers in $IBRATE_{it}$ (Column 6). However, this effect is not robust to controlling for exporters' industrial production index (Column 3), treating Europe as a cluster (Column 4), dropping the petroleum and coal products industry (Column 5), lagging the interbank rate (Column 7), or using the interbank spread instead of the interest rate (last column). We have separately also run (4) with $D_{crisis} \times IBRATE_{it}$ further included on the right-hand side, to facilitate a comparison to the specification in (3). The results are similar to the top panel in Table 7, with $D_{crisis} \times IBRATE_{it}$ typically yielding a positive coefficient (available on request).

It turns out that uncovering the more subtle level effects of $IBRATE$ requires that we delve further into the data. We next break the sample into three subperiods and regress $\ln Y_{ikt}$ on the exporting country's $IBRATE_{it}$ alone, controlling for country-industry and industry-month fixed effects as in (4). We designated these subperiods to correspond to the months before the crisis unfolded in earnest (November 2006 to August 2008), the most acute stage of the crisis (September 2008 to December 2008), and the remainder of the sample period (January 2009 to October 2009). The results in the rest of Table 7 point to a strong and very robust negative relationship between a country's interbank rate and export performance concentrated at the very peak of the financial crisis (September 2008 to December 2008). On the other hand, no systematic pattern emerges for the periods before or after this peak. In unreported regressions, we have also experimented with extending the most acute phase of the crisis (September 2008 to December 2008) to include more months, either with an earlier start or a later end month. The relationship that we find between $IBRATE$ and log exports tends to become successively less negative as we expand this period, before eventually turning positive and insignificant. It thus appears that September through December 2008 best captures the height of the crisis when increases in the cost of credit within countries were associated with decreases in exports to the US.

How should we interpret these results? Conceptually, the prevailing cost of credit in an economy reflects the equilibrium between the demand for external capital and the supply of such financing. During normal economic times or business cycle expansions, higher interbank rates likely reflect firms' increased demand for bank financing in order to service attractive investment and export opportunities. By contrast, during a period of unusual financial turmoil as was the case during the recent crisis, higher interbank rates likely capture instead the limited availability of financial capital. In this context, our results suggest that the latter effect dominated during the height of the crisis, and it is precisely during this period that within-country rises in the cost of capital can be viewed as tightening credit conditions.[27] On the other hand, in the periods before and after the height of the crisis, within-country fluctuations in the interbank rate do not seem to have been driven by credit shortages that ultimately affected trade flows.

It is moreover important to emphasize that these findings do not contradict our earlier results in Table 6. First, in the cross-section of countries, it may still be the case that credit availability is generally higher and export performance stronger in countries with lower average interbank rates. In particular, the sector-month fixed effects in (3) control for changes in US import demand that affect all exporting countries equally. The effects of the interbank rate are thus identified mostly from cross-country differences on the supply side, namely credit availability. On the other hand, the country-industry fixed effects in (4) ensure that the effect of the interbank rate in Table 7 is identified from time-series fluctuations in both supply and demand within each exporting country.

Second, our results in Tables 6 and 7 are consistent with our findings on the differential effect of the crisis across sectors (Tables 2-4). Note that while movements in the interbank rate reflect evolving demand and supply conditions in the market for bank financing, differences in financial dependence across sectors isolate specifically differences in reliance on external finance. This implies that even when a rise in the interbank rate is driven by increased demand for capital due to better investment opportunities, firms in financially dependent sectors will be able to expand less because of their higher sensitivity to the cost of capital.

For completeness, we have also explored how US exports responded to the variation in interbank rates across importing countries and over time. Column 10 in Table 6 suggests that, in the cross-section of importing countries, US exports at the height of the crisis did in fact decline relatively more to destinations with higher interbank rates. Column 8 in Table 7, however, suggests that this could be driven by omitted country variables, since with the inclusion of country-industry fixed effects, we no longer obtain any systematic correlation.

[27] This interpretation is consistent with the evidence in Campello et al. (2010) that the 2008-2009 financial crisis prevented credit-constrained firms from pursuing attractive investment projects.

4.3 Strength of financial institutions across countries

Thus far, we have focused on the interbank rate as an indicator of short-term conditions in credit markets. The cost of lending in an economy, however, depends not only on the amount of available external financing, but also on the underlying level 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 underlying institutions. To provide further evidence on the effect of credit conditions on trade flows, this subsection briefly explores whether the export performance of countries with more advanced initial financial institutions was in fact more resilient to the global downturn.

We explore two commonly-used measures of long-term financial development. 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 take 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. Alternatively, we also consider the quality of accounting standards in a country ($ACCT$), taken from Rajan and Zingales (1998). This index reflects the detail and nature of the accounting information that companies are required to provide to authorities in a country.

To explore the differential effect of the crisis across countries at different levels of financial development, we estimate the following specification (using PC as an illustration):

$$\ln Y_{ikt} = \delta_1 D_{crisis} \times PC_i \times EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \epsilon_{ikt} \tag{5}$$

As before, this empirical model includes country-month, industry-month and country-industry fixed effects. The triple interaction term allows us to test whether the comparative advantage of financially developed countries in financially dependent sectors magnified during the crisis (δ_1). The PC and $ACCT$ variables do not vary over time, as these capture deep features of the financial system that reflect its initial underlying strength. We therefore do not include a $PC_i \times EXTFIN_k$ term in (5), as this is subsumed by the country-industry fixed effects.

As Table 8 for private credit (PC) illustrates, the exports of financially advanced economies were indeed relatively more resilient to the crisis 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). These results are fairly robust to controlling for the potential role of factor endowments and overall income as determinants of comparative advantage. They also obtain when we condition on the log industrial production index by exporting country interacted with sector fixed effects and the crisis dummy.

The results are however weaker when we consider $ACCT$ instead in Table 9. Countries with stronger

accounting standards were indeed better able to sustain exports in sectors dependent on external finance and with few tangible assets, although the coefficients are only significant with the former ($EXTFIN$). The effect of $TCRED$ is of the opposite sign to what theory would predict, but this is not statistically significant. We attribute these findings to the more limited country coverage and variation in the $ACCT$ variable compared to PC.[28]

5 Interpreting the Magnitudes

Section 4 provides strong evidence that credit conditions were an important determinant of aggregate trade flows and their sectoral composition, particularly 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, on exporting activity. In this section, we perform some exercises to gauge how large a role credit conditions played in contributing to the overall trade collapse witnessed during the financial crisis.

To do so, we use the 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 had interbank rates remained at their peak levels of September 2008 throughout the crisis period. We view this as providing a rough 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 interbank rates had dropped immediately after September 2008 to their low levels of August 2009. This in principle provides a lower bound for the effects of the crisis on trade flows.

It is naturally tempting to interpret the first scenario as one in which the policy response by monetary authorities to ease credit conditions was not particularly effective, resulting in persistently high interbank rates. Conversely, the latter scenario might be viewed as one of exceptionally aggressive policy interventions to lower interbank rates. We would however caution that our analysis is not a precise welfare calculation or policy evaluation. Given the reduced-form nature of our empirical approach, our point estimates are not strictly adequate for projecting the general equilibrium effects of policy reforms. We instead view this exercise as providing a ballpark estimate to make sense of how much credit conditions affected international trade flows.

5.1 Case 1: persistently high cost of credit

We examine first the evolution of trade flows under the scenario of a permanently high cost of credit throughout the crisis period. We assume in particular that the interbank rate in each country remained

[28] We have also run regressions with the triple interactions for all three sector characteristics jointly in Table 5 for PC (Columns 4-6) and $ACCT$ (Columns 7-9) respectively. The results are similar to when each sector variable is included separately.

fixed at its peak September 2008 level in that country through August 2009.

To infer the additional decline in overall trade volumes that would have resulted, we consider the estimates from equation (3). 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. Recall that in this specification, the level effect of credit conditions is estimated primarily from the cross-country variation in the cost of capital.

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 compute the predicted trade flows under the counterfactual path of interest rates. Based on the estimates from the Column 2 specification in the top panel of Table 6, we find that the US would have imported 35.2% less from the average country and sector between September 2008 and August 2009, had interbank rates remained at their elevated September 2008 levels.[29]

Recognizing that these figures rely on a less-restrictive specification, we next provide more conservative estimates based on equation (4). This regression controls for both industry-month and country-industry fixed effects, so that the coefficient on interbank rates is estimated purely from the fluctuation in the cost of capital within countries over time. Based on the point estimates in Column 2 of the "Sep 08 to Dec 08" panel in Table 7, we find that the crisis would have reduced US imports by 2.5% in December 2008 had interest rates remained at their peak levels. While this impact is considerably less severe, it is nevertheless quite sizable especially when considered against the overall 12% drop in trade flows for the whole of 2009. As another benchmark for comparison, these magnitudes are in line with some recent estimates on the firm-level impact of the crisis: Using French micro data, Bricongne et al. (2010) find that firms which had defaulted on a payment in the preceding 12 months, and hence presumably had limited access to finance during the crisis months, subsequently experienced a 2% worse export performance relative to firms that did not experience such a reported payments incident.

Our results also point to a more severe impact on trade flows in financially vulnerable sectors. To quantify the size of these cross-sector distributional effects, we use the estimates from the triple interaction specification (1). If all countries' interbank rates had been kept at their September 2008 levels through the end of August 2009, US imports would have been 13.4% 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 16.9% 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

[29] Note that the predicted effects of continued credit tightness would be about twice as large if we use the results in Column 4, which controls for cross-country differences in factor endowments and overall development.

credit (petroleum and coal product).[30]

These estimates provide a sense of the large impact of financial market disturbances on the real economy. They also indirectly suggest that actual interventions were likely quite effective in averting a substantially more severe collapse in trade flows.

5.2 Case 2: instantaneous drop in the cost of credit

We next consider the converse scenario, under which the interbank rate in each country dropped to its low August 2009 level immediately after September 2008. To gauge how much higher trade flows would have been, we once again use our point estimates from the respective regressions with double and triple interactions as described in the previous subsection. This time, we compare the predicted trade flows under the actual interbank rates to those under the assumption of permanently low interest rates after September 2008.

We conservatively conclude that the 2008-2009 crisis would have reduced US imports by 5.5% less under this scenario (based on the Table 7 specification). Our estimates from the less restrictive specification that uses the full cross-country variation in credit conditions indicate that this magnitude may be as high as a 30.5% improvement (based on the Table 6 specification). Once again, 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 8.2%. The corresponding difference when considering industries' endowment of tangible assets or access to trade credit would have been a 9.7% gap (coincidentally equal for both sectoral variables).

These results indicate that the impact of the financial crisis on trade flows would have been substantially milder had credit conditions improved faster. 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 monthly data on US imports, we find that countries with higher interbank rates and thus tighter credit conditions exported less to the US. These effects were exacerbated at the height of the crisis, and were especially pronounced in sectors that require extensive external financing, have few collateralizable assets, or have limited access to buyer-supplier trade credit. In other words, exports of financially dependent industries are more sensitive to the cost of

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

external capital than exports of less dependent industries, and this sensitivity rose during the financial crisis. Importantly, these effects of credit conditions on trade flows appear to hold, even after controlling as best we can for domestic production. Credit conditions thus mattered for international trade over and above their effect on output *per se*. Last but not least, we also present complementary evidence that the exports of countries with stronger long-term financial development were more resilient to the crisis, especially in financially vulnerable sectors.

Our findings imply that adverse credit conditions played an important role in the transmission of the effects of the crisis to international trade flows. They also suggest that policy interventions that contributed towards relaxing the high cost of credit substantially dampened the detrimental impact on cross-border trade. For example, our most conservative estimates based solely on the within-country variation in interbank rates indicate that US imports would have fallen by about 2.5% more had the cost of credit persisted at its peak September 2008 levels.

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 highlights the potential gains from 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

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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 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 $s > 8$. We use the average value of K/L and H/L

over 1996-2005 as our measures of initial factor endowments.

Exchange rates: From Thomson Datastream, in units of foreign currency per US dollar. A monthly average of daily rates is used.

Industrial Production Index: From the IMF International Financial Statistics.

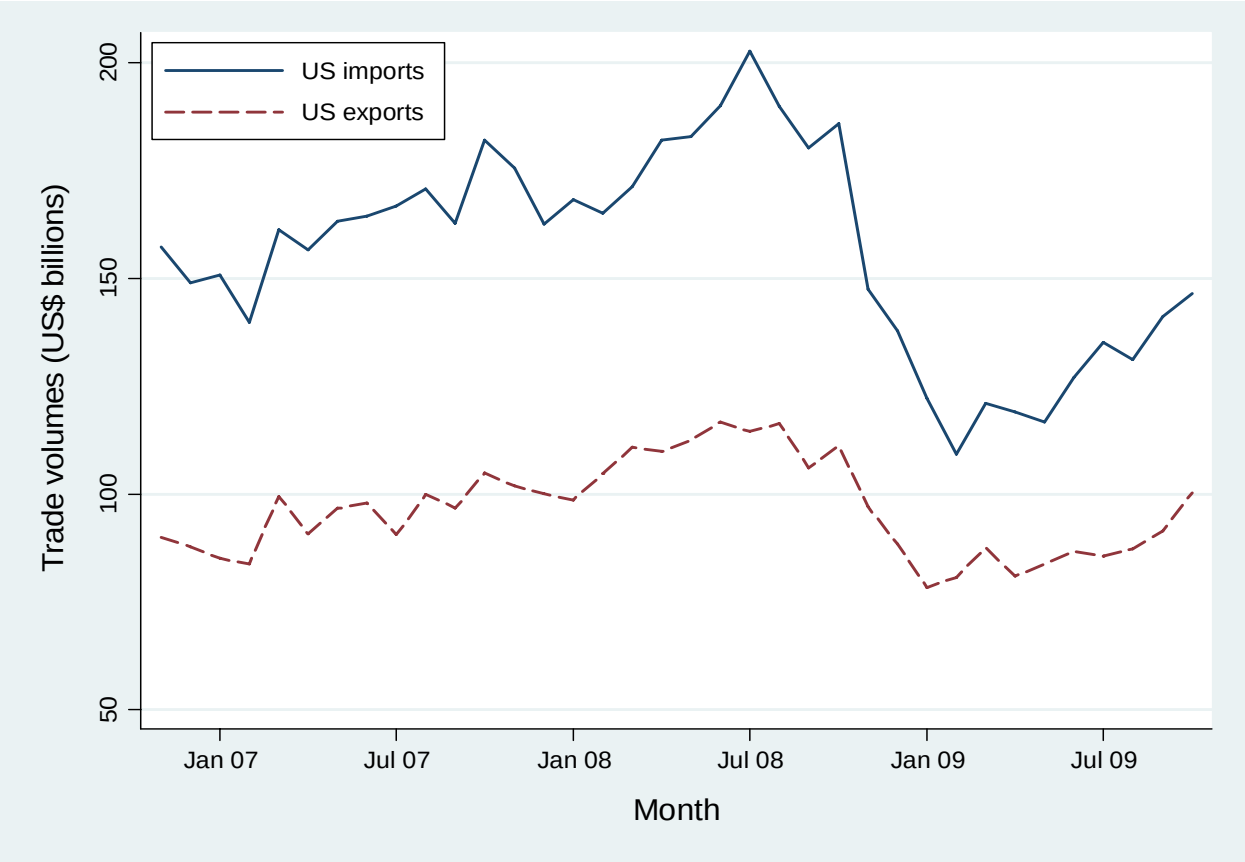
Treasury Bill rate: Three-month rate. From the IMF International Financial Statistics.

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.

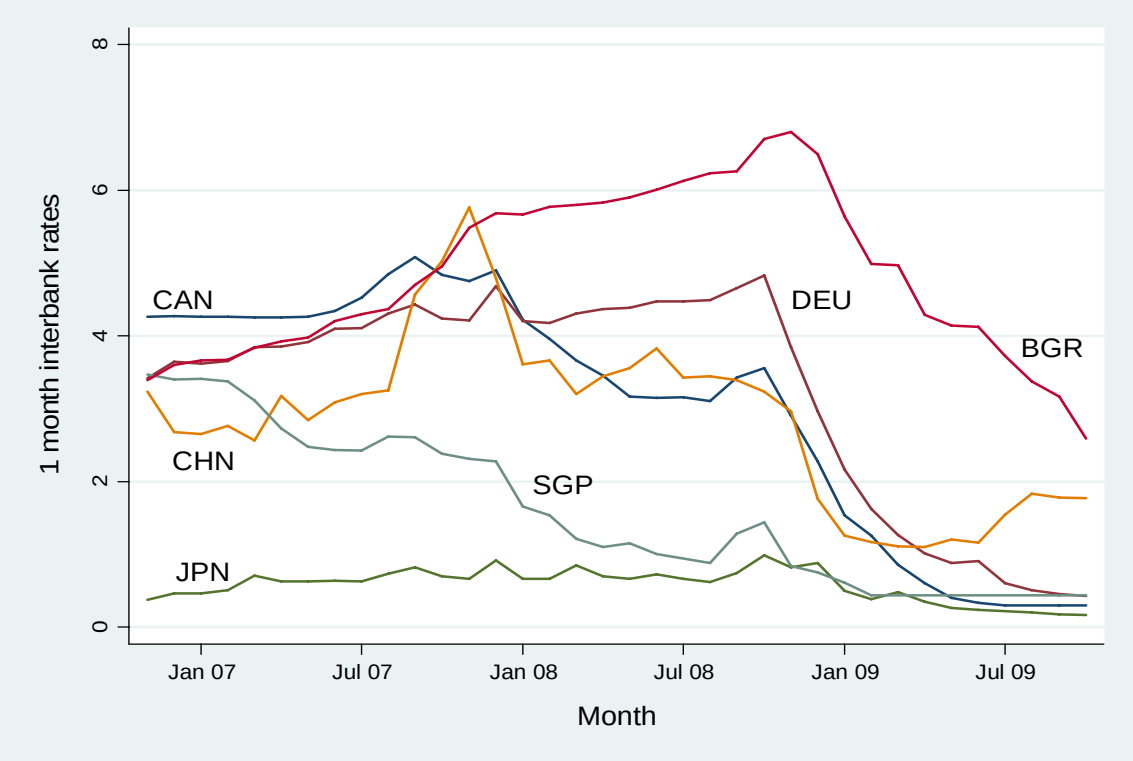
GDP and GDP per capita: From the World Development Indicators (WDI), in PPP units. Averaged over 1996-2005.

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



Source: US Census Bureau.

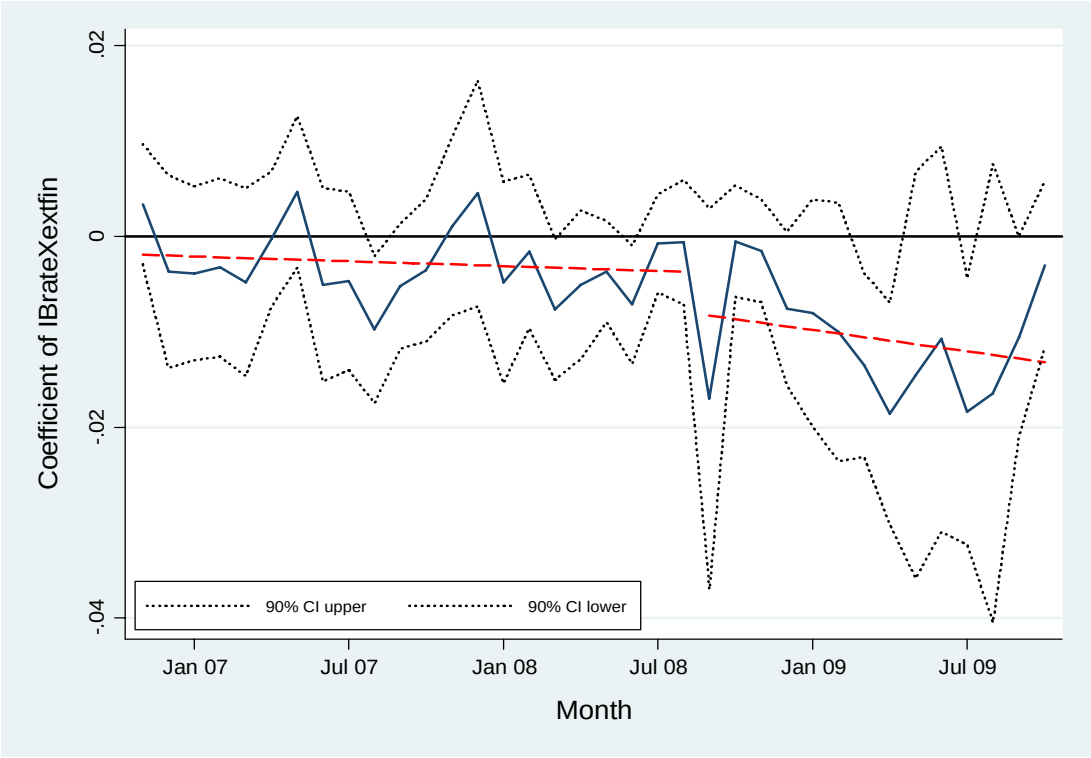
Figure 2
Interbank Rates during the Global Financial Crisis



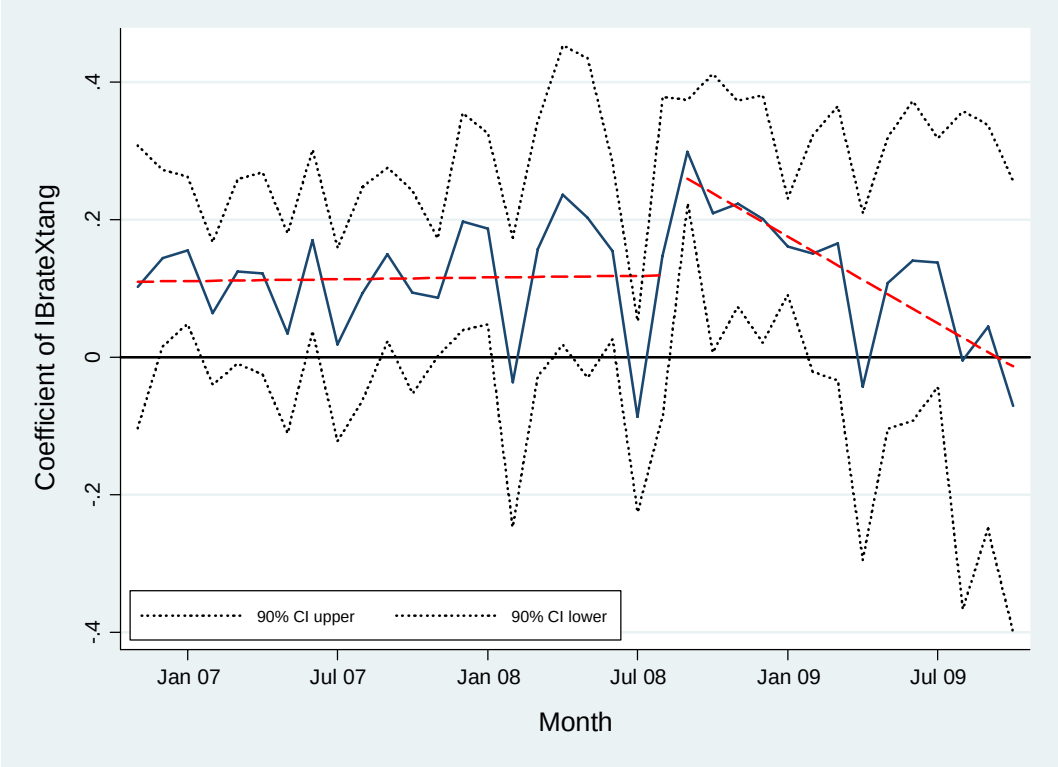
Source: Thomson Datastream.

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

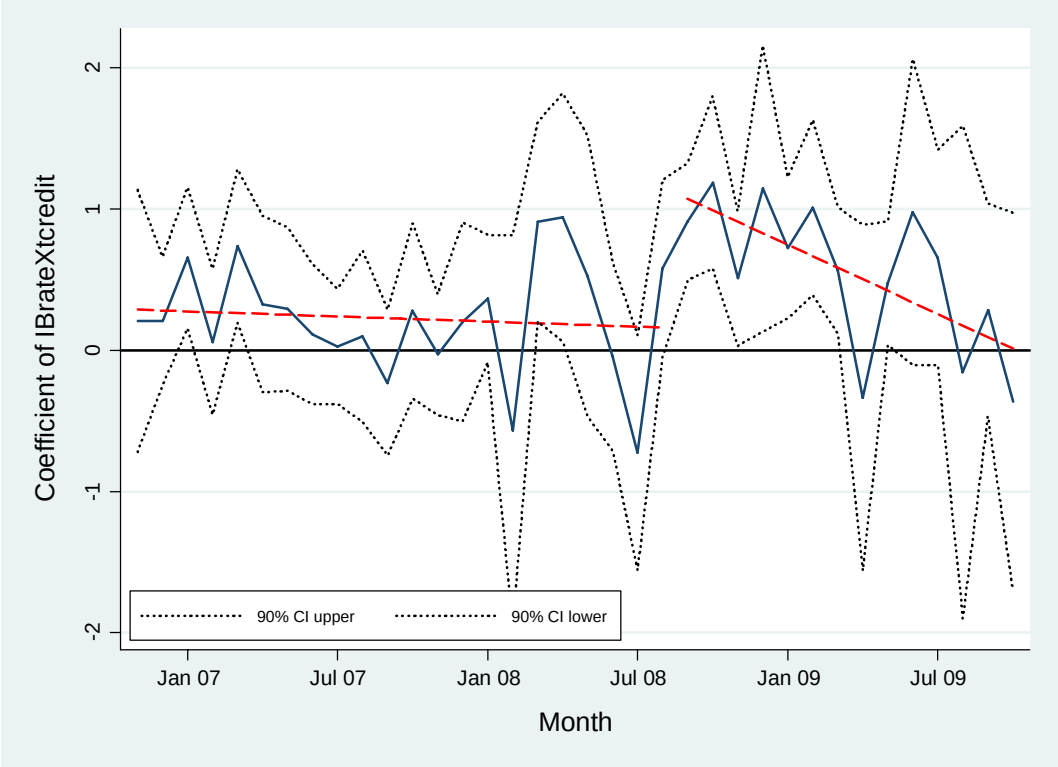
A: Interbank rate X EXTFIN



B: Interbank rate X TANG



C: Interbank rate X TCRED



Notes: Panel A plots the β_m coefficients obtained from the regression: $LogTrade_{ikt} = \Sigma_m \ \beta_m * D_m * Interbank_{it} * EXTFIN_k + D_{it} + D_{kt} + D_{ik} + \varepsilon_{ikt}$. Here, *i*, *k*, and *t* index the exporting country, industry, and month respectively, while D_{it}, D_{kt}, and D_{ik} are country-month, industry-month, and country-industry fixed effects respectively. D_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*. The β_m coefficients are plotted, to illustrate how the importance of the credit channel of comparative advantage evolves over time. Panels 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 interval 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	-54.0%
315:	Apparel Manufacturing	-33.3%
331:	Primary Metal Manufacturing	-23.7%
316:	Leather and Allied Product Manufacturing	-22.6%
335:	Electrical Equipment, Appliance, and Component Manufacturing	-22.3%

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

321:	Wood Product Manufacturing	-12.3%
336:	Transportation Equipment Manufacturing	-11.8%
326:	Plastics and Rubber Products Manufacturing	-10.1%
311:	Food Manufacturing	-7.3%
337:	Furniture and Related Product Manufacturing	-5.5%

Notes: Calculated from US Census Bureau Data on US imports from the rest of the world.

Table 2
Effects of the Crisis on Trade across Countries and Sectors: EXTFIN

	Dependent variable: Log (Industry exports to the US)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Crisis = 1: Sep 08 to Aug 09					EUR clus	Less 324	Less TUR	Lag IBrate	Mar 08	US exports	IBspread
IBrate X EXTFIN	-0.006	-0.001	-0.001	0.000	0.000	0.001	0.004	-0.002	0.000	0.005	0.004
	[0.005]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]	[0.005]	[0.003]	[0.008]
Crisis X IBrate X EXTFIN		**-0.007***	**-0.006**	**-0.009****	**-0.009****	**-0.009****	**-0.014***	**-0.009****	**-0.009****	-0.002	-0.014
		[0.004]	**[0.004]**	**[0.004]**	**[0.004]**	**[0.003]**	**[0.007]**	**[0.004]**	**[0.004]**	[0.003]	[0.010]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	No	No	No	No	No	No	No	No	No	No	No
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22901	22901	20208	20208	20208	19412	19461	20208	20208	20375	12793
R-squared	0.964	0.964	0.965	0.965	0.965	0.978	0.966	0.965	0.965	0.967	0.967
IBrate X EXTFIN	-0.006	-0.002	-0.001	-0.001	-0.001	0.002	0.008	-0.003	-0.002	0.008**	0.007
	[0.006]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.005]	[0.004]	[0.005]	[0.003]	[0.007]
Crisis X IBrate X EXTFIN		**-0.007**	**-0.007***	**-0.006**	**-0.006**	**-0.008**	**-0.014**	**-0.006**	**-0.007**	-0.003	-0.020**
		[0.004]	**[0.004]**	**[0.005]**	**[0.005]**	**[0.004]**	**[0.008]**	**[0.005]**	**[0.004]**	[0.003]	[0.008]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17695	17695	15758	15758	15758	15092	15011	15758	15758	15839	9842
R-squared	0.963	0.963	0.964	0.965	0.965	0.977	0.966	0.965	0.965	0.966	0.974

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09, except in Column (9) where the starting month is Mar 08. Columns (3)-(11) control for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(11) control for Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs. The lower panel additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Column (5) treats the Euro zone countries as a group when clustering the standard errors. Column (6) drops the petroleum and coal-related products sector. Column (7) drops TUR. Column (8) uses a one-month lag of IBrate and the Industrial Production Index. Column (10) uses US exports abroad as the dependent variable. Column (11) uses IBspread (IBrate net of local treasury bill rate) as the measure of credit conditions.

Table 3
Effects of the Crisis on Trade across Countries and Sectors: TANG

	Dependent variable: Log (Industry Exports to the US)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Crisis = 1: Sep 08 to Aug 09					EUR clus	Less 324	Less TUR	Lag IBrate	Mar 08	US exports	IBspread
IBrate X TANG	0.152*	0.120	0.106	0.137	0.137	0.029	0.048	0.148	0.138	-0.068*	0.078
	[0.081]	[0.092]	[0.100]	[0.109]	[0.109]	[0.056]	[0.148]	[0.104]	[0.097]	[0.037]	[0.149]
Crisis X IBrate X TANG		**0.057*** **	**0.065** **	**0.057**	**0.057**	**0.026**	**0.132** **	**0.040**	**0.036**	-0.011	0.061
		[0.017]	**[0.028]**	**[0.041]**	**[0.037]**	**[0.028]**	**[0.050]**	**[0.039]**	**[0.047]**	[0.035]	[0.172]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	No	No	No	No	No	No	No	No	No	No	No
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22901	22901	20208	20208	20208	19412	19461	20208	20208	20375	12793
R-squared	0.964	0.964	0.965	0.965	0.965	0.978	0.966	0.965	0.965	0.967	0.967
IBrate X TANG	0.100	0.069	0.059	0.080	0.080	0.050	-0.136	0.090	0.104	-0.066*	-0.026
	[0.078]	[0.104]	[0.119]	[0.122]	[0.124]	[0.060]	[0.172]	[0.113]	[0.092]	[0.037]	[0.051]
Crisis X IBrate X TANG		**0.064** **	**0.063**	**0.059**	**0.059**	**-0.005**	**0.203*** **	**0.038**	**0.028**	0.008	0.050
		[0.029]	**[0.047]**	**[0.049]**	**[0.043]**	**[0.038]**	**[0.070]**	**[0.048]**	**[0.044]**	[0.045]	[0.091]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17695	17695	15758	15758	15758	15092	15011	15758	15758	15839	9842
R-squared	0.963	0.963	0.964	0.965	0.965	0.977	0.966	0.965	0.965	0.966	0.974

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09, except in Column (9) where the starting month is Mar 08. Columns (3)-(11) control for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(11) control for Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs. The lower panel additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Column (5) treats the Euro zone countries as a group when clustering the standard errors. Column (6) drops the petroleum and coal-related products sector. Column (7) drops TUR. Column (8) uses a one-month lag of IBrate and the Industrial Production Index. Column (10) uses US exports abroad as the dependent variable. Column (11) uses IBspread (IBrate net of local treasury bill rate) as the measure of credit conditions.

Table 4
Effects of the Crisis on Trade across Countries and Sectors: TCRED

	Dependent variable: Log (Industry Exports to the US)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Crisis = 1: Sep 08 to Aug 09					EUR clus	Less 324	Less TUR	Lag IBrate	Mar 08	US exports	IBspread
IBrate X TCRED	0.565*	0.281	0.207	0.288	0.288	-0.330	0.300	0.328	0.258	-0.133	1.732
	[0.293]	[0.275]	[0.282]	[0.311]	[0.314]	[0.263]	[0.527]	[0.331]	[0.279]	[0.214]	[1.060]
Crisis X IBrate X TCRED		**0.495*** **	**0.501*** **	**0.587*** **	**0.587*** **	**0.484*** **	**0.675** **	**0.517*** **	**0.471***	-0.046	-0.811
		[0.109]	**[0.114]**	**[0.174]**	**[0.138]**	**[0.090]**	**[0.260]**	**[0.158]**	**[0.254]**	[0.243]	[2.147]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	No	No	No	No	No	No	No	No	No	No	No
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22901	22901	20208	20208	20208	19412	19461	20208	20208	20375	12793
R-squared	0.964	0.964	0.965	0.965	0.965	0.978	0.966	0.965	0.965	0.967	0.967
IBrate X TCRED	0.236	-0.105	-0.162	-0.149	-0.149	-0.503**	-0.846**	-0.160	-0.042	-0.273	0.778*
	[0.254]	[0.288]	[0.317]	[0.286]	[0.286]	[0.201]	[0.335]	[0.288]	[0.284]	[0.239]	[0.381]
Crisis X IBrate X TCRED		**0.557*** **	**0.608*** **	**0.706** **	**0.706*** **	**0.562*** **	**1.323*** **	**0.597** **	**0.412**	-0.139	-0.092
		[0.173]	**[0.211]**	**[0.288]**	**[0.209]**	**[0.156]**	**[0.265]**	**[0.274]**	**[0.262]**	[0.261]	[1.448]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17695	17695	15758	15758	15758	15092	15011	15758	15758	15839	9842
R-squared	0.963	0.963	0.964	0.965	0.965	0.977	0.966	0.965	0.965	0.966	0.974

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09, except in Column (9) where the starting month is Mar 08. Columns (3)-(11) control for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l). Columns (4)-(11) control for Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs. The lower panel additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Column (5) treats the Euro zone countries as a group when clustering the standard errors. Column (6) drops the petroleum and coal-related products sector. Column (7) drops TUR. Column (8) uses a one-month lag of IBrate and the Industrial Production Index. Column (10) uses US exports abroad as the dependent variable. Column (11) uses IBspread (IBrate net of local treasury bill rate) as the measure of credit conditions.

Table 5
Effects of the Crisis on Trade across Countries and Sectors: Joint Tests

	Dependent variable: Log (Industry Exports to the US)								
Crisis = 1: Sep 08 to Aug 09	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cty Cred Condition:	IBRATE	IBRATE	IBRATE	PC/GDP	PC/GDP	PC/GDP	ACCT	ACCT	ACCT
Cty Cred X EXTFIN	0.003	0.006	-0.001						
	[0.006]	[0.008]	[0.007]						
Crisis X Cty Cred X EXTFIN	**-0.003**	**-0.004**	**0.001**	**0.052****	**-0.002**	**-0.030**	**0.002***	**0.003****	**0.002***
	[0.005]	**[0.005]**	**[0.007]**	**[0.022]**	**[0.036]**	**[0.057]**	**[0.001]**	**[0.001]**	**[0.001]**
Cty Cred X TANG	0.122	0.146	0.083						
	[0.098]	[0.116]	[0.131]						
Crisis X Cty Cred X TANG	**0.035***	**0.026**	**0.039**	**-0.204**	**-0.695****	**-0.372**	**-0.005**	**-0.008**	**0.007**
	[0.017]	**[0.046]**	**[0.052]**	**[0.205]**	**[0.282]**	**[0.317]**	**[0.006]**	**[0.007]**	**[0.007]**
Cty Cred X TCRED	0.261	0.305	-0.244						
	[0.346]	[0.388]	[0.327]						
Crisis X Cty Cred X TCRED	**0.394****	**0.464***	**0.692***	**-0.247**	**-3.533**	**-5.992****	**0.094***	**0.073**	**0.063**
	[0.180]	**[0.243]**	**[0.367]**	**[1.346]**	**[2.327]**	**[2.573]**	**[0.047]**	**[0.060]**	**[0.127]**
Factor endowments controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Initial income controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
IPI controls?	No	No	Yes	No	No	Yes	No	No	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22901	20208	15758	57144	44891	20261	29489	28353	15855
R-squared	0.964	0.965	0.965	0.953	0.958	0.968	0.963	0.964	0.972

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09. The country variable 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 variable, the first column is a lean specification containing no auxillary controls; the second column controls for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l), as well as Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs; and the third column additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Since PC/GDP and ACCT are not time-varying, we can only identify the triple interaction coefficients in Columns (4)-(9).

Table 6
Country Credit Conditions and Trade Volumes across Countries

	Dependent variable: Log (Industry exports to the US)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Crisis = 1: Sep 08 to Aug 09					EUR clus	Less 324	Less TUR	Lag IBrate	Mar 08	US exports	IBspread
IBrate	-0.162*	-0.143*	-0.199*	-0.037	-0.037	-0.037	-0.098	-0.032	-0.021	-0.018	0.223
	[0.079]	[0.082]	[0.101]	[0.064]	[0.041]	[0.062]	[0.092]	[0.063]	[0.063]	[0.067]	[0.260]
Crisis X IBrate		**-0.036**	**-0.069****	**-0.059****	**-0.059****	**-0.066****	**-0.036**	**-0.060****	**-0.067***	-0.126***	-0.023
		[0.167]	**[0.030]**	**[0.026]**	**[0.028]**	**[0.026]**	**[0.042]**	**[0.028]**	**[0.034]**	[0.038]	[0.068]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	No	No	No	No	No	No	No	No	No	No	No
Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22145	22145	20208	20208	20208	19412	19461	20208	20208	20375	12793
R-squared	0.283	0.284	0.336	0.577	0.577	0.606	0.589	0.577	0.577	0.728	0.586
IBrate	-0.104	-0.093	0.015	0.019	0.019	0.012	-0.021	0.025	0.038	-0.025	0.203
	[0.068]	[0.075]	[0.110]	[0.067]	[0.041]	[0.067]	[0.120]	[0.066]	[0.065]	[0.076]	[0.306]
Crisis X IBrate		**-0.031**	**-0.102***	**-0.060**	**-0.060**	**-0.065***	**-0.051**	**-0.063**	**-0.074**	-0.083*	-0.066
		[0.035]	**[0.058]**	**[0.037]**	**[0.049]**	**[0.037]**	**[0.047]**	**[0.040]**	**[0.047]**	[0.041]	[0.101]
Factor endowments controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial income controls?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPI controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17695	17695	15758	15758	15758	15092	15011	15758	15758	15839	9842
R-squared	0.375	0.376	0.418	0.603	0.603	0.615	0.619	0.603	0.604	0.774	0.634

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09, except in Column (9) where the starting month is Mar 08. All columns control for the log bilateral exchange rate (EXCH) and Crisis X Log(EXCH). Columns (3)-(11) control for Log(K/L), Crisis X Log(K/L), Log(H/L), and Crisis X Log(H/L). Columns (4)-(11) control for Log(GDP), Crisis X Log(GDP), Log(GDPpc), and Crisis X Log(GDPpc). The lower panel additionally controls for Log(Industrial Production Index) and Crisis X Log(Industrial Production Index). Column (5) treats the Euro zone countries as a group when clustering the standard errors. Column (6) drops the petroleum and coal-related products sector. Column (7) drops TUR. Column (8) uses a one-month lag of IBrate, the Industrial Production Index, and EXCH. Column (10) uses US exports abroad as the dependent variable. Column (11) uses IBspread (IBrate net of local treasury bill rate) as the measure of credit conditions.

Table 7
Country Credit Conditions and Trade Volumes: The Within-Country Experience

	Dependent variable: Log (Industry Exports to the US)								
	(1)	(2)	(3)	(4) EUR clus	(5) Less 324	(6) Less TUR	(7) Lag IBrate	(8) US exports	(9) IBspread
Nov 06 to Oct 09:									
IBrate	0.016**	0.016*	0.008	0.008	0.005	0.015**	0.009	0.001	0.005
	[0.008]	[0.008]	[0.006]	[0.006]	[0.009]	[0.005]	[0.007]	[0.016]	[0.008]
Observations	22901	22145	17695	17695	17005	16948	17695	17782	10612
R-squared	0.961	0.961	0.960	0.960	0.971	0.961	0.960	0.959	0.971
Nov 06 to Aug 08:									
IBrate	0.028*	0.023	0.003	0.003	-0.003	-0.009	0.008	0.030	0.001
	[0.016]	[0.015]	[0.014]	[0.014]	[0.008]	[0.007]	[0.015]	[0.046]	[0.008]
Observations	14121	13659	10937	10937	10513	10478	10937	10976	6702
R-squared	0.966	0.966	0.964	0.964	0.975	0.965	0.964	0.963	0.974
Sep 08 to Dec 08:									
IBrate	-0.025**	-0.022**	-0.033***	-0.033***	-0.037***	-0.036***	0.021	-0.012	-0.002
	[0.010]	[0.009]	[0.009]	[0.008]	[0.012]	[0.009]	[0.018]	[0.029]	[0.053]
Observations	2566	2482	1988	1988	1908	1904	1988	2001	1144
R-squared	0.981	0.982	0.980	0.980	0.983	0.981	0.980	0.974	0.986
Jan 09 to Oct 09:									
IBrate	0.016	0.009	0.012	0.012	0.012	0.040***	0.007	0.030	0.031**
	[0.021]	[0.021]	[0.025]	[0.026]	[0.023]	[0.012]	[0.014]	[0.025]	[0.012]
Observations	6214	6004	4770	4770	4584	4566	4770	4805	2766
R-squared	0.968	0.969	0.969	0.969	0.976	0.970	0.969	0.966	0.977
Log (Exchange Rate)?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log (IPI)?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Ind, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry and industry-month fixed effects. Regressions are performed in each panel for the months stated. Columns (2)-(9) control for Log(EXCH), while Columns (3)-(9) control for Log (Industrial Production Index). Column (4) treats the Euro zone countries as a group when clustering the standard errors. Column (5) drops the petroleum and coal-related products sector. Column (6) drops TUR. Column (7) uses a one-month lag of IBrate, the Industrial Production Index, and EXCH. Column (8) uses US exports abroad as the dependent variable. Column (9) uses IBspread (IBrate net of local treasury bill rate) as the measure of credit conditions.

Table 8
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 08 to Aug 09	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ind Char:	EXTFIN	EXTFIN	EXTFIN	TANG	TANG	TANG	TCRED	TCRED	TCRED
Crisis X PC/GDP X Ind Char	0.059***	0.043	0.030	-0.358*	-0.831***	-0.502*	-1.685	-4.185**	-5.608**
	[0.019]	[0.028]	[0.047]	[0.205]	[0.278]	[0.283]	[1.217]	[1.984]	[2.206]
Factor endowments controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Initial income controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
IPI controls?	No	No	Yes	No	No	Yes	No	No	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57144	44891	20261	57144	44891	20261	57144	44891	20261
R-squared	0.953	0.958	0.968	0.953	0.958	0.968	0.953	0.958	0.968

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09. The industry variable in Columns (1)-(3) is EXTFIN, that in Columns (4)-(6) is TANG, and that in Columns (7)-(9) is TCRED. For each industry variable, the first column is a lean specification containing no auxillary controls; the second column controls for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l), as well as Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs; and the third column additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Since PC/GDP is not time-varying, we can only identify the triple interaction coefficients.

Table 9
Accounting Standards and Trade Flows during the Global Financial Crisis

	Dependent variable: Log (Industry Exports to the US) ACCT = Accounting Standards								
Crisis = 1: Sep 08 to Aug 09	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ind Char:	EXTFIN	EXTFIN	EXTFIN	TANG	TANG	TANG	TCRED	TCRED	TCRED
Crisis X ACCT X Ind Char	0.001	0.002*	0.002**	-0.006	-0.012	0.004	0.043	0.008	0.021
	[0.001]	[0.001]	[0.001]	[0.005]	[0.007]	[0.006]	[0.052]	[0.060]	[0.106]
Factor endowments controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Initial income controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
IPI controls?	No	No	Yes	No	No	Yes	No	No	Yes
Cty-Ind, Cty-Mth, Ind-Mth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29489	28353	15855	29489	28353	15855	29489	28353	15855
R-squared	0.963	0.964	0.972	0.963	0.964	0.972	0.963	0.964	0.972

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. All specifications include country-industry, country-month, and industry-month fixed effects. The Crisis variable equals 1 from Sep 08 to Aug 09. The industry variable in Columns (1)-(3) is EXTFIN, that in Columns (4)-(6) is TANG, and that in Columns (7)-(9) is TCRED. For each industry variable, the first column is a lean specification containing no auxillary controls; the second column controls for Crisis X Log(K/L) X Log(k/l) and Crisis X Log(H/L) X Log(h/l), as well as Crisis X Log(GDP) X Industry FEs and Crisis X Log(GDPpc) X Industry FEs; and the third column additionally controls for Log(Industrial Production Index) X Industry FEs and Crisis X Log(Industrial Production Index) X Industry FEs. Since ACCT is not time-varying, we can only identify the triple interaction coefficients.

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

Australia (AUS); Belgium (BEL); Bulgaria (BGR); Canada (CAN); China (CHN); Czech Republic (CZE); 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); Slovakia (SVK); Sweden (SWE); Thailand (THA); Turkey (TUR); Taiwan (TWN)

Notes: Sample consists of 31 countries for which one-month interbank rate data was available from Thomson Datastream.

Appendix Table 1B
Summary Statistics of Country Characteristics

1-month interbank rates

	Min	5 pct	Median	95th pct	Max	Mean	Std Dev
Nov 06	0.38	1.67	3.47	8.76	19.26	4.52	3.23
Mar 08	0.85	1.22	4.31	10.27	16.35	4.97	2.92
Sep 08	0.74	1.28	4.66	12.99	18.12	5.32	3.30
Jan 09	0.25	0.50	2.16	14.59	15.14	3.52	3.61
Oct 09	0.12	0.15	0.44	7.38	10.33	1.77	2.47

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 Manufact	-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, 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.

Appendix Table 2B
Industry Characteristics: 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
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
1	0.00338	[0.00383]	0.10263	[0.12513]	0.20688	[0.56321]
2	-0.00367	[0.00615]	0.14409*	[0.07807]	0.20644	[0.27584]
3	-0.00386	[0.00554]	0.15586**	[0.06499]	0.65452**	[0.30333]
4	-0.00325	[0.00568]	0.06407	[0.06293]	0.05976	[0.31314]
5	-0.00479	[0.00598]	0.12507	[0.08137]	0.73768**	[0.32977]
6	-0.00027	[0.00431]	0.12214	[0.08937]	0.32686	[0.37952]
7	0.00469	[0.00482]	0.03509	[0.08828]	0.29085	[0.35189]
8	-0.00506	[0.00616]	0.17052**	[0.08015]	0.11309	[0.30111]
9	-0.00466	[0.00569]	0.01855	[0.08535]	0.02722	[0.24767]
10	-0.00977**	[0.00468]	0.09319	[0.09404]	0.09928	[0.36896]
11	-0.00520	[0.00399]	0.14996*	[0.07670]	-0.22988	[0.31413]
12	-0.00353	[0.00453]	0.09455	[0.08936]	0.27730	[0.37700]
13	0.00104	[0.00567]	0.08721	[0.05216]	-0.03051	[0.25969]
14	0.00452	[0.00720]	0.19761**	[0.09593]	0.20071	[0.42808]
15	-0.00482	[0.00643]	0.18684**	[0.08456]	0.36590	[0.27385]
16	-0.00157	[0.00490]	-0.03620	[0.12810]	-0.56832	[0.84002]
17	-0.00765*	[0.00448]	0.15791	[0.11260]	0.90920**	[0.42900]
18	-0.00506	[0.00473]	0.23613*	[0.13235]	0.93986*	[0.53356]
19	-0.00367	[0.00323]	0.20275	[0.14117]	0.52407	[0.60383]
20	-0.00714*	[0.00377]	0.15444*	[0.07774]	-0.04270	[0.40620]
21	-0.00072	[0.00313]	-0.08617	[0.08454]	-0.72404	[0.50599]
22	-0.00060	[0.00397]	0.14719	[0.14090]	0.57939	[0.38064]
23	-0.01701	[0.01214]	0.29921***	[0.04554]	0.91069***	[0.25109]
24	-0.00050	[0.00355]	0.20981*	[0.12309]	1.18691***	[0.37032]
25	-0.00148	[0.00328]	0.22344**	[0.09091]	0.50832*	[0.28989]
26	-0.00757	[0.00488]	0.20139*	[0.10939]	1.14383*	[0.61581]
27	-0.00801	[0.00724]	0.16136***	[0.04242]	0.72508**	[0.30359]
28	-0.01001	[0.00824]	0.15104	[0.10445]	1.01001**	[0.37692]
29	-0.01348**	[0.00586]	0.16594	[0.12122]	0.56530**	[0.27144]
30	-0.01858**	[0.00708]	-0.04240	[0.15325]	-0.33645	[0.74444]
31	-0.01453	[0.01295]	0.10821	[0.12882]	0.47443*	[0.26553]
32	-0.01075	[0.01228]	0.14053	[0.14127]	0.97882	[0.65845]
33	-0.01834**	[0.00849]	0.13796	[0.10994]	0.65665	[0.46302]
34	-0.01643	[0.01461]	-0.00417	[0.22003]	-0.15455	[1.06013]
35	-0.01053	[0.00641]	0.04465	[0.17852]	0.28603	[0.45823]
36	-0.00301	[0.00531]	-0.07010	[0.19918]	-0.36433	[0.81224]
N	22901		22901		22901	
R^2	0.96365		0.96378		0.96379	

Notes: Standard errors are clustered by country, with ***, **, and * denoting significance at the 1%, 5%, and 10% 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 Oct 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 coefficients reported here are plotted in Figure 3.