Trade Finance and Great Trade Collapse

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Abstract

Economic models that do not incorporate financial frictions only explain about 70 to 80 percent of the decline in world trade that occurred in the 2008-2009 crisis. We review some of the evidence that shows financial factors also contributed to the great trade collapse, and we uncover two new stylized facts in support of it. First, we show that the prices of manufactured exports rose relative to domestic prices during the crisis. Second, we show that U.S. seaborne exports and imports, which are likely to be more sensitive to trade finance problems, saw their prices rise relative to goods shipped by air or land.

For nearly half a century (*c.f.* Houthakker and Magee (1969)), economists knew that trade flows were two to three times more volatile than GDP despite the fact that standard theories predicted an elasticity of one. A major puzzle developed in the fourth quarter of 2008 as standard econometric models, which already incorporated these very high elasticities, could only predict 70 to 80 percent of the decline in world trade (see, for example, the OECD estimates in OECD (2009)).

Over the next two years, economists have tried, with little success, to improve on this "seventy percent solution". Much progress has been made in building theoretical models to explain why trade elasticities might differ from one and calibration exercises soon began to match the econometric evidence. For example, Bems, Johnson, and Yi (2010) argue that once one takes into account input-output linkages, one can replicate the elasticity of imports with respect to GDP of three and explain 70 percent of the decline in world trade. Similarly, Eaton, Kortum, Neiman, and Romalis (2010) obtained an eighty-percent solution using a more elaborate general equilibrium model. As a result of this, many economists have been arguing that one needs to consider trade finance-based explanations for why calibration exercises to date have underestimated the decline in world trade.

This paper reviews some of the evidence that financial factors may have resulted in a greater decline in exports than were predicted in models without financial frictions. We provide two new pieces of evidence that support the trade finance channel. First, we show that export prices rose relative to domestic manufacturing prices across a large number of countries. Second, we find that import and export prices of goods shipped by sea, which are likely to be affected by most trade finance contractions, rose disproportionately more than those shipped by air or land.

I. What is Trade Finance and Why does it Matter For Exports?

At the most basic level, trade finance consists of borrowing using trade credit (accounts receivable) as collateral and/or the purchase of insurance against the possibility of trade credit defaults. In traditional trade finance contracts, exporters obtain working capital loans, credit lines, discounted prepayments, or credit default insurance based on foreign purchase orders or credit guarantees provided by the importer's bank. Exporters tend to be much more heavy users of trade finance than domestic firms because international transactions tend to take much longer to execute than domestic transactions and because of the perceived higher risk of international transactions. As Amiti and Weinstein (2009) have argued, the higher sensitivity of exports to financial forces provides a reason why exports should be more susceptible to financial shocks than domestic sales. Ahn (2010) formalized and expanded on this intuition by developing the first general equilibrium framework for understanding why trade is particularly sensitive to financial shocks.

There are several reasons why these normally quiet markets may have provided an important conduit through which financial shocks affected trade flows in the recent crisis. First, Lehman's default caused interbank lending markets to seize up. As one can see in the LIBOR-OIS spread[1] in Figure 1, the Lehman bankruptcy caused the spread to rise sharply in most countries. This dramatic rise in interbank borrowing rates is strong evidence in favor of the idea that banks were facing enormous difficulties raising short term funds. The higher borrowing costs were naturally passed through to trade finance contracts since these contracts are typically indexed to interbank rates. However, the impact of the financial crisis on the trade finance market was even larger. Six of Lehman's thirty largest unsecured creditors were institutions

[1] LIBOR is the London Interbank Offered Rate, and OIS is the Overnight Indexed Swap rate. The LIBOR-OIS spread is essentially is the rate at which banks borrow less the rate on treasuries in that currency.

providing letters of credit (Amiti and Weinstein (2009)). Moreover, the troubles of AIG and Citigroup meant that financial counterparties became much more concerned about AIG's credit default insurance and Citibank's credit guarantees. Amiti and Weinstein (2009) report the results of an IMF-BAFT survey of 88 banks in 44 countries that revealed that the average spreads on trade-related lending rose by 70 to 107 basis points during the crisis. These increases are remarkable given that typical spreads are around one fifth as large. By April 2009, the G20 countries pledged 250 billion dollars in trade finance in an effort to alleviate the difficulties faced by exporters.

Amiti and Weinstein (2009) show that a deterioration in the health of Japanese banks in the current crisis caused their client firms' exports to fall by more than their domestic sales even after controlling for industry-time fixed effects. More recently, Paravasini et al. (2010) have used Peruvian data from the crisis to find that exports by firms whose banks had liquidity problems fell. Other papers that have used *external finance dependence* measures at the industry level as measures have, for the most part, also found that exports declined the most in industries with high external finance dependence. Bricogne et al. (2009), Chor and Manova (2010), argue that sectors that were more financially dependent cut back on exports more. By contrast, Levchenko et al. (2010b) failed to find a relationship between external finance dependence and U.S. imports. However, Hadad et al. (2010) provide a simple explanation for this finding. The reason why import values did not fall more in financially dependent sectors in the U.S. is that import prices in sectors with high levels of external finance dependence rose by much more than the prices in other sectors. These higher import prices offset the declines in quantities and propped up import values making it appear that there was no external finance effect on import values.

Although measures of external finance dependence are attractive to empirical researchers because they provide a way of linking aggregate data to financial conditions, there are serious issues with most of the aggregate measures of trade finance. The first is that *the conventional measure of external finance dependence is completely uncorrelated with levels of trade finance*. To see this, consider the definition of external finance dependence used in the literature: the share of capital expenditures that cannot be financed by cash flow. The definition of cash flow can be written as: (Cash Receipts – Cash Payments) – (Change in Inventories) – (Change in Receivables) + (Change in Payables). Firms with high trade finance needs are those with high levels of receivables and firms with low trade finance needs will have low levels of receivables, but if these needs remain unchanged, firms with high and low trade finance needs will have identical measures of external finance dependence. This, of course, does not mean that external finance dependence does not matter, but it does mean, as Feenstra et al. (2010) note, that the trade finance channel is a *different* channel than that of the conventional external finance channel.

A second issue in the literature surrounds the usage of trade credit intensity as a measure of trade finance intensity. For example, Levchenko et al. (2010b) assess trade finance dependence by looking at whether industries with high levels of accounts receivable relative to sales were hit harder. A problem with this measure is that trade finance has ambiguous effects on this ratio – more trade finance enables companies to finance their accounts receivable, but also many trade finance products like letters of credit and export factoring enable exporters to *remove* trade credits from their balance sheets in exchange for discounted prepayments.

Indeed, the impact of credit problems affecting these export factors are likely to be extremely hard to discern using only aggregate data on interbank rates and sectoral finance

dependence. CIT, for instance, was a major export factor in 2008 with $80 billion of assets that received $2.3 billion in TARP funds. At the time of its bankruptcy in 2009, CIT had over a million customers in over 50 countries spread across 30 industries.[2] As this example illustrates, it is probably quite difficult to capture the effects of massive trade-finance-related insolvencies without matched exporter-financial institution data.

II. Do Price Movements Indicate an Export Supply Shock?

Despite the substantial data problems associated with identification, one can conjecture that if the trade finance mattered in macro data, it would appear as a form of supply shock to exporters. The problem of discerning trade finance shocks from the data is that exporters were also buffeted by a series of demand shocks. However, some studies have provided evidence that supply shocks were particularly important for exporters. For example, Levchenko et al. (2010a) find that automobile imports – which fell quite rapidly in the crisis – actually experienced a rise in import prices. This seems to contradict the notion suggested by Alessandria et al. (2010) that the key driver of the decline in automobile sales was demand. Similarly, Hadad et al. (2010) decompose the declines in imports in the U.S. and E.U. and find that import prices of manufactures actually *rose* in these countries: a fact that is more consistent with relatively large falls in imports arising from relatively large supply contractions.

We can also see these forces in operation by looking at the aggregate price evidence. Overall, the prices of manufacturing goods fell sharply in the EU, Japan, and the US, so there is no question that the global economy was hit by a massive demand shock. This is the basis of the seventy percent solution. However, there is also some evidence of supply shocks differentially affecting exporters.

[2] http://ir.cit.com/phoenix.zhtml?c=99314&p=irol-newsArticle&ID=1170834&highlight=

We can examine this more generally by looking at what happened to export prices relative to domestic producer prices. Our approach is to construct measures of the log change in export prices less the log change in producer prices for a series of OECD countries. Figure 2 shows the plot for the U.S. As one can see from the graph, U.S. non-agricultural export prices staged their highest relative price increase in the first several quarters after the Lehman bankruptcy that they had experienced in the last ten years. And this happened in spite of the fact that the trade weighted dollar appreciated over this time period.

Figure 3 repeats this exercise for the countries of the European Union using Eurostat data for manufacturing exports and output. Once again the same pattern emerges. European exporters raised their prices relative to domestic manufacturers.[3] Similarly, as we can see in Figure 4, Japan, which suffered the largest quarterly decline in exports of any OECD country during the crisis (a 20 percent decline in the export to GDP ratio in the first quarter of 2009), also saw its export prices rise sharply relative to its producer prices. The fact that exporters in the U.S., E.U., and Japan – which jointly accounted for 51 percent of world exports in 2009 – raised their relative export prices suggests that exports may have been facing a larger supply shock than domestic sales.

Amiti and Weinstein (2009) argue that the greater shipping times mean that trade financing needs are likely to be more important for goods shipped by sea than those shipped by air because exporters shipping by sea need more short-term working capital financing and face greater payment default risk while their goods are in transit. For the U.S., goods shipped by land from Canada and Mexico also have quite short shipping times. Therefore, we examine whether

[3] Eurostat database allows us to further decompose export prices into intra-EU and extra-EU exports, and we found similar patterns hold for both sets of export prices (corresponding figures available on request). This confirms that the relative price movement we report here is not driven by changes in exchange rate.

goods shipped by sea, which were likely to be more susceptible to trade finance shocks, experienced greater price increases than goods shipped by air or land.

We use monthly U.S. bilateral export and import data at the HS-10 level by mode of transport from the Census Bureau for the period from January 2007 through July 2010 for all manufactured goods.[4] One problem with these data is that the quantity information at the HS-10 level by country is not produced by mode of transport. Fortunately, at this level of aggregation most goods exported to or imported from a country are done so predominantly using a single mode of transport. We therefore categorized shipments as "seaborne" if more than 90 percent of the value of the goods exported to or imported from a country in a particular month were done by sea. Similarly, we classified goods as "not seaborne" if more than 90 percent of the shipments were not done by sea. We were able to classify 84 percent of exports and 83 percent of imports in this manner as either seaborne or not-seaborne and construct unit value accordingly.[5]

Our basic regression specification is presented below

$$\ln p_{hct} = \alpha_{ht} + \alpha_{ct} + \beta_1 * SEA_{hct} + \beta_2 * SEA_{hct} * CRISIS_t + \epsilon_{hct},$$

where, p_{hct} is the unit value of HS code *h* exported to or imported from country *c* in month *t*, SEA_{hct} is an indicator variable that equals one if the shipment was made by sea and $CRISIS_t$ is an indicator variable if the shipment occurred during the financial crisis, and all Greek variables are parameters to be estimated. Our specification includes a full set of HS-time and country-time dummies which should eliminate any good-specific or country specific demand shock such as macro or exchange rate shocks. Based on Figure 1, we use two definitions for the crisis period.

[4] http://www.census.gov/foreign-trade/download/dvd/index.html#merch.

[5] We define the export price as the ratio of the value of exports to the quantity shipped from the US to country *c* at time *t*, and the import price as the ratio of the value of imports to the quantity shipped into the US from country *c* at time *t*. We clean the data by dropping the top and bottom 12.5 percentiles based on the 12 month changes in log unit value. We drop any HS 10-digit code if the unit of measurement changed. In order to reduce the number of fixed effects and make the estimation easier, we dropped any country that made up less than 0.1 of a percent in total imports or exports. This leaves us with 57 countries that export to the U.S. and 71 countries that import from the U.S.

First, we define it from the point of the Lehman bankruptcy (i.e. September 2008) until the point it fell below 50 basis points (June 2009). Second we define it from the point of the Lehman bankruptcy until it returned to its long-run typical value of around 10 basis points (September of 2009).

The results from this estimation exercise are presented in Table 1. The coefficient on the sea dummy is negative indicating that goods shipped by sea tend to be substantially cheaper than goods shipped by air. What is most interesting from our perspective is that goods exported by sea tended to see their FOB prices rise by about 3 percent relative to goods shipped by air or land during the crisis period. Similarly, U.S. seaborne imports saw their prices rise by 2 percent relative to goods delivered by land and sea during the crisis period. In other words, we see that the prices of goods that are likely to be the most sensitive to trade finance shocks were the ones that experienced the greatest relative price increases. While this evidence is not as clear cut as the firm-level evidence in Amiti and Weinstein (2009) and Paravasini et al. (2010), it is suggestive of the idea that supply shocks in trade finance intensive transactions contributed to the decline in world trade during the crisis.

III. Conclusion

While there is no question that demand played a predominant part in the decline in world trade, there is increasing evidence that the liquidity contractions that rocked the financial world also played a part. Firm level evidence indicates that exporters whose financial institutions became credit constrained cut back on exports more than other firms, and imports declined more in sectors that had greater external financial dependence. This paper shows that some of these shocks may have appeared in price movements. Export prices rose relative to domestic

manufacturing prices during the crisis and the prices of seaborne imports and exports – which are more sensitive to financial shocks – rose relative to goods sent by land or air. These are all indicative of important supply side shocks that may help us move beyond the seventy percent solution.

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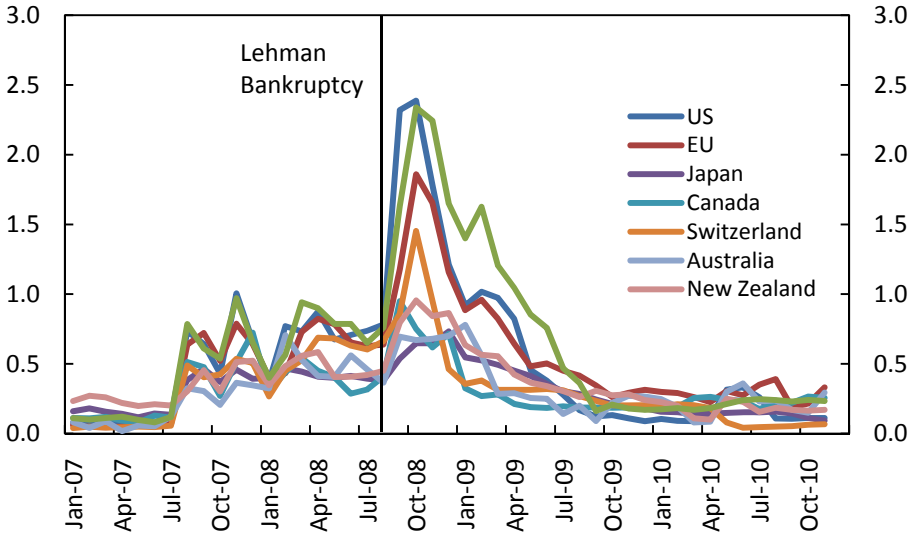
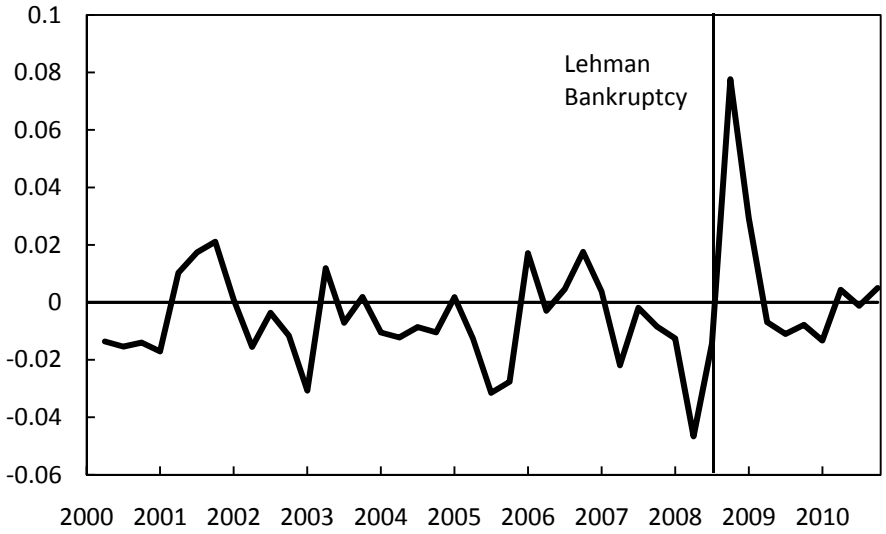
Figure 1: Libor-OIS Spread



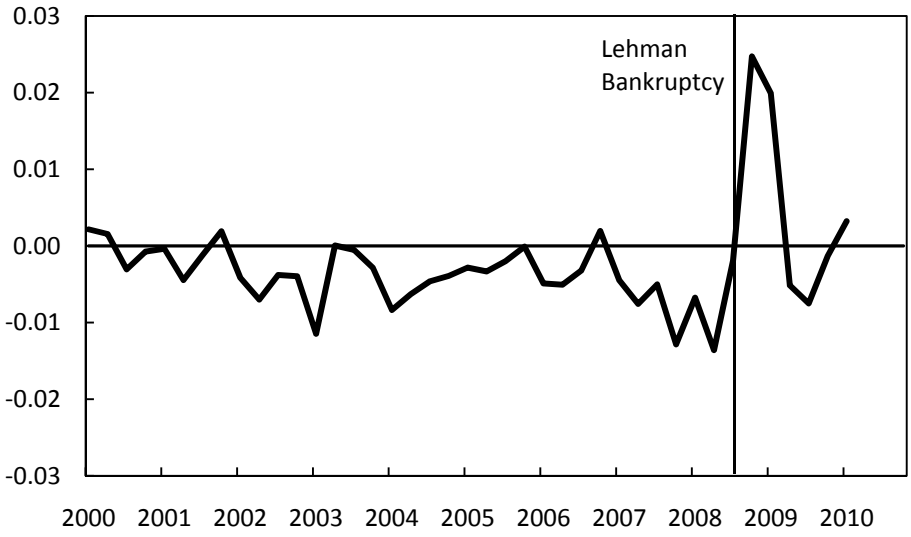
Source: Bloomberg.com

Figure 2: Log Change in US Non-Agricultural Export Prices less Log Change in Producer Price Index for Industrial Commodities



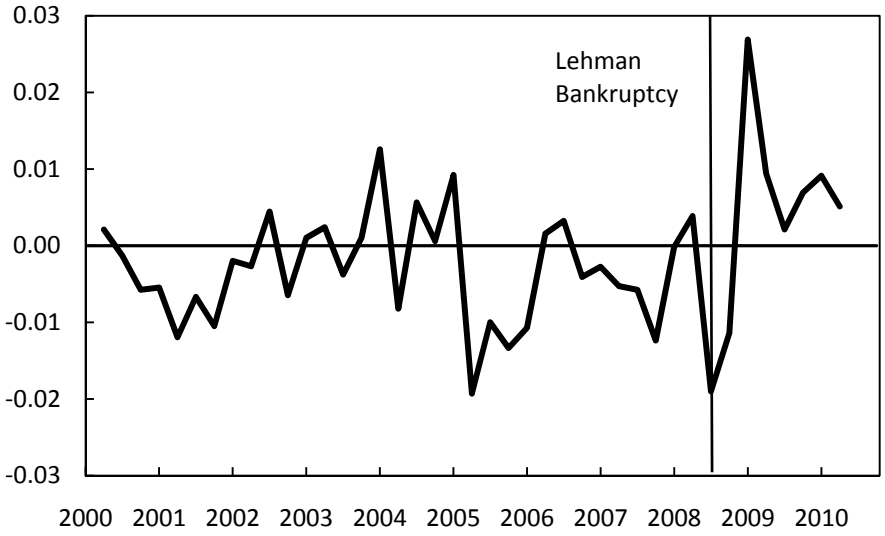
Source: Bureau of Labor Statistics

Figure 3: Log Change in E.U.-27 Producer Price Index for Manufactured Exports less Log Change in Domestic Producer Price Index for Manufactured Goods



Source: Eurostat

Figure 4: Log Change in Japanese Export Prices less Log Change in Domestic Corporate Manufacturing Goods Price Index



Source: Bank of Japan

Table 1: Export and Import Prices of Sea shipping

Dependent Variable	ln(export unit value)$_{h,c,t}$	ln(export unit value)$_{h,c,t}$	ln(import unit value)$_{h,c,t}$	ln(import unit value)$_{h,c,t}$
	Crisis=1 if September 2008 to June 2009	Crisis=1 if September 2008 to September 2009	Crisis=1 if September 2008 to June 2009	Crisis=1 if September 2008 to September 2009
Sea=1 if value share shipped by sea>90%	-0.512***	-0.513***	-0.890***	-0.892***
	(0.002)	(0.002)	(0.003)	(0.003)
Sea x crisis	0.032***	0.030***	0.021***	0.022***
	(0.005)	(0.004)	(0.006)	(0.006)
Fixed Effects:				
HS10-time	yes	yes	yes	yes
Country-time	yes	yes	yes	yes
Observations	2,897,503	2,897,503	2,675,669	2,675,669
Adjusted R^2	0.91	0.91	0.82	0.82

Notes: Bootstrapped standard errors in parenthesis with 200 repetitions. *** significant at 1% level.