The Great Trade Collapse:
Supply shocks during the global financial crisis

by

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Abstract

This paper analyzes the role of supply-side shocks in the collapse of trade during the global financial crisis. In particular, we investigate the impact of banking crises on the exports of manufacturing industries with different levels of financial dependence. Using data from 22 countries that experienced a banking crisis during the period 2007 – 2011, we find that industries highly dependent on external finance experienced a substantially greater contraction in their export growth rates in comparison to industries less dependent on external finance. This result also holds for industries relatively more dependent on inter-firm finance. The effect of the financial crisis on exports is robust to a series of checks that include controlling for industry characteristics and asymmetrical shocks.

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1. Introduction

When the housing bubble collapsed in the United States near the end of 2006, few had foreseen the severe impact it would have on the American financial sector. Even fewer had recognized the magnitude with which it would affect countries and financial institutions worldwide. The global epidemic gave rise to the largest wave of banking crises experienced since the great depression and led to a sudden decline in cross border economic activity (Laeven & Valencia, 2012). During the last quarter of 2008, world trade contracted by about 30%, exceeding the decline in world GDP, which fell by less than 5% in the same time frame. The dynamics of trade in 2008–09 were in fact so severe that it has come to be known as the, " Great Trade Collapse " (Baldwin, 2009).

The large decline in international trade has been attributed to two different but not mutually exclusive aspects of the global financial crisis: Demand-side shocks and supply-side shocks (Ahn, 2011). Demand shocks act through the consumer side where the slowdown in economic growth decreases global aggregate demand, particularly for imports. Supply shocks occur on the producer side where financial constraints and liquidity shortages can disrupt output and potentially decrease exports. While the effects of adverse demand shocks have been found to play a prominent role in the crisis, simulations aimed at determining the contribution of the demand channel have been unable to replicate the magnitude of the decline in world exports. This suggests that additional factors such as the credit shortage may have played a role at least in the short run to explain the sharp fall in trade (Benassy-Quere et al., 2009).

The goal of this paper is therefore to establish the effect of supply shocks on exports during the global crisis. Specifically, this paper analyzes different channels of financial dependence through which the banking crisis could have affected the growth of exports for manufacturing industries. In order to isolate the impact of finance (supply) shocks from adverse demand shocks, the paper exploits the fact that manufacturing industries differ in their needs of external financing. The premise of the empirical strategy is that, if the exports of industries that are more dependent on finance are hurt more severely after experiencing a banking crisis, then it is likely that the banking crisis had an independent negative real effect on the growth of exports.

We use three different measures of financial dependence based on prior literature that characterize an industry's financial vulnerability. First, the domestic production and exporting process for some industries that have larger capital expenditures cannot be financed internally and requires external finance (Rajan & Zingales, 1998). Second, exporters in some industries are recipients of buyer-supplier trade credit, which provides an alternative channel of finance (Fisman & Love, 2003). Lastly, various studies have emphasized the importance of an industry's tangible assets to serve as collateral and enable easier access to external finance (Kroszner et al., 2007). The differences in these three measures across manufacturing industries drive our identification strategy.

Recent firm level studies have also highlighted the importance of credit and financing for export level activities (Weinstein et al., 2011; Bricongne et al., 2012). There are high level fixed costs associated with entering a foreign market; Firms have to assess the profitability of foreign trade, make investments specific to the market, customize products, and set up distribution networks. There are also variable costs such as shipping, tariffs, and insurance that raise the amount of working capital required and are serviced through a combination of bank and trade credit (Weinstein et al., 2011). Any credit restrictions could then potentially lead to greater adverse effects on exports than on domestic output.

To preview our main result, we find that the export growth rates of manufacturing industries that are relatively more dependent on external finance experience a negative and significant effect during the presence of a banking crisis. We also find the same result to hold for industries more dependent on trade credit. Manufacturing industries that have a higher share of tangible assets however cannot be said to fare better than those with a lower share with any level of statistical significance. We find that these results are robust to tests for potential endogeneity and omitted variable bias.

The rest of the paper is structured as follows: Section 2 reviews the related literature. Section 3 explains the empirical methodology and the data. Section 4 discusses the results along with a series of robustness tests. Section 5 speaks upon potential caveats not addressed in our approach. Section 6 concludes.

2. Related literature

This paper is related to several bodies of work in the economic literature. First, our paper falls under the broader category of research that analyzes the mechanisms linking banking crises and real activity. Dell'Ariccia, Detragiache, & Rajan (2008) examine industrial growth of manufacturing industries with different levels of dependence on external finance for crises during the period 1980-2000. Their results reveal that periods of financial turbulence have larger negative effects for manufacturing industries relatively more dependent on bank finance. Kroszner et al. (2007) use a similar methodology for the same time period and find that highly dependent manufacturing industries situated in financially developed locations experienced a relatively greater decline in industrial growth in comparison to highly dependent industries in less financially developed locations.

Second, our paper contributes to the body of work that investigates the role of financial constraints in international trade. Various theoretical and empirical studies such as Becker & Greenberg (2007), Beck (2002, 2003), and Manova (2008a) indicate that a greater level of financial development lowers the search cost for financial intermediaries providing the exports of financially dependent industries with a comparative advantage. Specifically, our work is related to the recent literature that explicitly analyzes the impact of banking crises on trade. Chor & Manova (2012) utilize data on monthly imports of the United States to find that countries with tighter credit markets, indicated by their interbank rates, exported less to the U.S. during the recent crisis. Their results also provide evidence that financially dependent industries were more susceptible to tighter credit conditions. Bricongne et al. (2012) use firm-level data on French exports with firm-level credit constraints and also come to the conclusion that the exports of industries highly dependent on external finance performed relatively worse. They find that while smaller firms may be perceived as being more vulnerable to demand shocks and credit restrictions, firms of all sizes were evenly impacted. Large and small firms in their sample experienced a similar decline in their exports with larger French firms reducing the range of products exported and smaller firms choosing to decrease the number of export destinations. Iacovone & Zavacka (2009) examine the impact of banking crises on export growth rates during the period 1980-2000. Relying on data from 23 banking crisis episodes, the authors demonstrate that the

export growth rates of more financially dependent industries grow significantly less during a systemic banking crisis. They also find that the effects of exogenous demand shocks are independent and additional to those of banking shocks.

Finally, our work contributes to the literature examining trade credit behavior in times of crises. Disruptions in the availability of trade credit have strongly been suggested as one of the main financial channels through which international trade could have been affected during the global crisis (Baldwin, 2009). Love et al. (2007) investigate the dynamics of trade credit using data on Mexican firms during the 1994 peso devaluation and using data on East Asian firms during the Asian Financial crisis. While they do not specifically isolate for firms that trade internationally, they find that during periods of financial friction, firms are not able to substitute bank financing with trade credit granted by other firms. The implication is that crises affect all financial channels including trade credit. With regards to the recent crisis, Amit & Weinstein (2011) use firm level data from 1990 – 2010 to determine the role of credit in the Japanese financial crisis. Their estimates suggest that a 20% reduction in Japanese exports during the recent crisis can be directly attributed to adverse effects in the provision of trade credit. Chor & Manova (2012) also find evidence of industries relatively more dependent on trade credit reducing their exports to the United States during the crisis. Ahn (2011) attempts to develop a theoretical foundation to explain how restrictions on trade credit can impact trade compared to GDP for the global crisis. The model suggests that letters of credit between buyers and suppliers are used as a method to reduce asymmetric screening costs for banks, as international transactions are perceived to be riskier than domestic transactions. Given the inter-bank dimension in a letter of credit, a rise in the risk of bank default leads to a higher price charged on the letter of credit. This is representative of a rise in the cost of trade financing and leads to an increase in the relative price of export to domestic goods. As a result, the number of international transactions could potentially decline more than the number of domestic transactions during a crisis.

Some papers also find that a decline in trade credit does not necessarily take place during times of financial distress. Iacovone & Zavacka (2009) find that for financial crises occurring through 1980 – 2000, exports of industries more dependent on trade credit outperform industries less dependent on

trade credit. Moreover, Behrens et al. (2011) use firm data from the Belgian economy and find that while firms relying heavily on trade credit reduced their exports of trade, the drop in magnitude is small and explains little of the variation. Levchenko et al. (2011) use U.S. firm level data to find a similar result. Our paper therefore takes on the task of investigating the presence of a synchronized collapse in trade credit and its impact on the growth of exports.

Our research, like several others, builds upon the difference-in-difference approach proposed by Rajan & Zingales (1998). The popularity of this estimation strategy is due to its ability to address several endogeneity and identification concerns by exploiting within country differences in industries or firms. In their original paper, Rajan & Zingales investigate the impact of financial development on economic growth. Their empirical model involves using an interaction term between an industry characteristic, such as external finance, and a country characteristic, such as financial development, to determine whether industries relatively more dependent on external finance grow disproportionately faster in countries with more developed financial markets.

Our paper differs from other papers mentioned above in that it uses data provided by Laeven & Valencia (2012) to identify countries that specifically experienced a banking crisis during the global financial crisis. This is in contrast to other studies such as Chor & Manova (2012) and Bricongne et al. (2012), which prescribe a specific year as a crisis dummy in order to identify a period of banking troubles for all countries. Our dataset therefore allows us to focus on identified crisis episodes, arguably in order to capture the true effect of different financial channels. Moreover, it allows us to use a cross-country approach whereby the global exports of respective countries are taken into account in contrast to other works in the literature, which focus on the exports to or from a specific country. With regards to this aspect, our paper is similar to the previously mentioned research by Iacovone and Zavacka (2009).[1] We build upon their methodology in order to analyze the impact of a "global" financial crisis on exports in comparison to the "local" crises examined in their sample.

[1] Iacovone and Zavacka (2009) examine banking crises that occurred through the period 1980 – 2000. Only a few of the banking crises occurring in countries during this period overlap with one another and are thus defined as being local. This is in contrast to the recent global crisis where banking crises overlapped across several countries in a relatively short period of time.

3. Empirical strategy and data

3.1. Methodology

To study the impact of the global financial crisis on exports, we ask whether more financially vulnerable manufacturing industries experienced a larger drop in the growth of their exports after experiencing a banking crisis. In order to mitigate endogeneity bias and reverse causality, we adopt the difference-in-difference approach suggested by Rajan & Zingales (1998). Reverse causality issues arise from the fact that the same exogenous adverse shock that triggered banking problems may cause a decline in aggregate demand, leading to the slow growth of exports which may then reduce the financing needs of industries and ultimately effect bank credit. Alternatively, the slow growth of exports due to an adverse demand shock might create difficulty for exporters in paying off their bank liabilities and consequently lead to a banking crisis. Our difference-in-difference estimator relies on the assumption that there are inherent characteristics related to each manufacturing industry that do not vary across countries. We can then exploit variations within the manufacturing sector in order to identify the impact of a supply side finance shock on exports and alleviate concerns associated with reverse causality. Specifically, the difference in difference specification allows us to exploit differences in the sensitivity of credit available across sectors in order to gauge the impact of financial dependence on exports growth. If there is a supply-of-finance shock caused due to the banking crisis, then there should be a disproportionate negative effect on industries with greater dependency on finance. Reverse causality would then only be a concern in the case of an asymmetric demand shock where only the exports of highly dependent industries were found to decline.[2]

Similar to Iacovone & Zavacka (2009), we estimate the following benchmark model using OLS:

$$\Delta Expgrowth_{ijt} = \alpha_{ij} + \beta_{it} + \gamma_{jt} + \phi Share_{ijt-3} + \delta FinDep_j * Crisis_{it} + \epsilon_{ijt} \quad (1)$$

where $\Delta Expgrowth_{ijt}$ is the log growth rate of manufacturing exports in country i, industry j and time t. To account for the tendency of larger industries to experience slower growth (convergence effects), we include the lagged share of exports for industry j in total exports of country i; A larger

[2] We address this concern in the results section.

share would decrease the potential of an industry to grow therefore the expected sign of ϕ is negative.[3] Given that our identification strategy takes advantage of the variation between industries within a country, there is considerably less concern regarding country specific or sector specific shocks. However, to allay concerns regarding omitted variable bias and other alternative explanations, we utilize the panel nature of our data and condition on three sets of fixed effects. First, we include country-industry fixed effects, α_{ij}. These account for the time-invariant sources of comparative advantage that affect country exports across industries. Second we control for industry-year fixed effects, β_{it} which control for any time varying shocks that may affect the global exports growth of specific manufacturing industries. Third, country-year fixed effects, γ_{jt} take into consideration macroeconomic and institutional countrywide changes that may affect exports over time. The inclusion of these fixed effects implies that the only shocks not controlled for are those that vary across all three dimensions (country, industry and time). We report standard errors clustered by country to allow for correlated idiosyncratic shocks at the exporter country level.

The main variable of interest is the coefficient of our interaction term, δ, which equals to the product of our measure of financial dependence for industry j and the banking crisis dummy for year j and country i. The coefficient of the interaction term measures the differential growth impact of the banking crisis on high dependent industries relative to low dependent industries. A negative and significant δ would indicate that the impact of the crisis was relatively worse for more financially dependent industries. Such a result would also confirm the presence of that particular financial channel operating during the financial crisis.

We focus upon three sector characteristics that reflect an industry's sensitivity to the availability of finance: First we have dependence on External Finance (EXTFIN). The interaction term (EXTFIN*Crisis) allows the financial crisis to have a differential effect on exports across industries with different levels of dependency on bank finance. Second, we include dependence on trade credit (TCRED). The interaction term (TCRED*Crisis) again allows the financial crisis to have a differential effect on exports across sectors with different levels of trade credit. Finally, we include

[3] Three lagged periods are chosen in order to avoid using trade shares from a crisis period.

the endowment of tangible assets (TANG). When interacted with our crisis dummy (TANG*Crisis), the interaction term measures the effect that the crisis had on industries at different levels of tangible assets. A positive and significant coefficient for this interaction term would indicate that the exports of industries with a higher level of tangible assets performed relatively better during the crisis presumably because of the larger levels of collateral they were able to provide.

The literature has argued that these three measures are technologically determined characteristics inherent to the industrial sector's manufacturing process and exogenous from the viewpoint of an individual firm. In the next section, we discuss the details behind the proxies used to capture our measures of financial vulnerability.

3.2. Data

We use the Laeven & Valencia (2012) dataset on systemic banking crises to identify countries that experienced a banking crisis during the global financial crisis. The dataset identifies 25 countries along with years the crises began. We remove three countries from our sample for which trade data is largely unavailable leaving us with 22 countries and consequently 22 banking crisis episodes.[4] Table 1 in the appendix presents the final list of crisis countries along with their inception dates and policy interventions. Laeven and Valencia define a banking crisis as systemic when at least three of the following conditions hold: Extensive liquidity support, significant guarantees on liabilities, significant restricting costs, significant asset purchases, and significant nationalizations. However we identify a banking crisis based on previous works that follow a similar methodology to ours such as Kroszner et al. (2007) and Dell'Ariccia et al. (2008) who identify a systemic banking crisis when at least one of the conditions mentioned above are found to occur.

The crisis dummy variable is equal to 1 if the country faces a banking crisis in year t as well as in the following year. We use a 2-year window under the hypothesis that the real effect of the crisis diminishes after two years. This allows us to capture not only immediate short run effects but also

[4] The excluded countries include Kazakhstan, Nigeria and Mongolia.

mid-term effects. Moreover, it is hard to determine exactly when the banking crisis began, implying that if the crisis took place at the end of the year, the effects are likely to be felt in the following year.

Data on exports for each industry in each country comes from the United Nations Commodity Trade Statistics Database and covers the period 1999-2011. Disaggregated exports data is gathered under the Standard International Trade Classification (SITC) and converted to the mix of three-digit and four-digit International Standard Industrial Classification (ISIC) codes used by Rajan & Zingales (1998). Data for each respective ISIC industry is then aggregated in order to reflect the exports of each industry on a yearly basis. The conversion method employed in this paper uses two different concordance tables: Muendler (2009) and the OECD concordance table. The Muendler table is used to convert exports data from SITC revision 2 at the four-digit industry level to ISIC revision 2 at the three-digit industry level. The OECD concordance table is used to convert exports data from SITC revision 2 at the four-digit level to ISIC revision 2 at the four-digit industry level.

To construct our dependent variable, export growth rate, we follow the cleansing procedure used by Iacovone and Zavacka (2009) and exclude industry trade values smaller than 1000 USD. We then calculate export growth rates by taking log differences of exports and trimming the top and bottom 5 percent of observations in order to avoid outliers on either tail of the distribution. The end result is an unbalanced panel with exports data from 36 manufacturing industries gathered for 22 countries for a total that is slightly over 8000 observations.[5]

We begin collecting data from the year 1999 and not from an earlier time period where countries in our sample were found to have experienced a crisis. In addition to maximizing sample size, this has the advantage of avoiding any other type of crises that may have occurred in our sample of countries. The Laeven & Valencia (2012) data set also confirms that no country in our sample experienced a banking, currency, or a sovereign debt crisis from the period of 1999 – 2011 with the exception of banking crises that began in 2007. This reduces several concerns, as the presence of a currency crisis with our banking crisis would have caused large devaluations negatively impacting firms with large amounts of foreign debt. Had these firms been highly dependent on external finance, the observed

[5] Dropping observations which do not have a value for trade share due to lagged periods results in 6929 observations.

effect of the crisis on exporters might have been due to balance sheet effects rather than a contraction in the credit channel.

The measure of external dependence on bank finance is taken from Rajan & Zingales (1998) who construct their index of dependence at the industry level for a sample of U.S. companies during 1980 - 1989. The proxy is calculated as the fraction of total capital expenditures that an industry is not able to finance with internal cash flow and reflects the firms' requirements for outside capital. They argue that the amount of external financing used by large firms in the United States is an appropriate benchmark as U.S. capital markets are highly advanced, open and thus relatively frictionless. In a frictionless financial environment, technological factors determine the degree of external financing used by industries and therefore best capture optimal external financing needs. This measure is then an accurate reflection of an industry's external dependence in locations worldwide under the additional assumption that the technological and economic factors influencing the level of external financing for industries are persistent across countries.

Rajan & Zingales (1998) also argue that the demand for external financing is likely to change as a result of technological shocks that alter an industry's investment opportunities. External financial dependence for U.S. industries in the 1980s may then not be a valid benchmark for manufacturing industries today. A more recent measure may better reflect the level of financial dependence of industries in our time period. Moreover, the Rajan & Zingales measure was calculated for a period when the United States itself was emerging from the effects of a banking crisis, which may bias the financing need and availability at the time.[6] For these reasons, we use a second measure of external finance taken from Kroszner et al. (2007). Their measure utilizes the Rajan and Zingales approach in order to calculate the median level of external financing required by manufacturing industries for the periods 1980-1999. Greater emphasis should then be placed upon the results obtained through this proxy, as it is arguably better suited in capturing the external financing needs of industries in our time period.

[6] Between 1980 – 1982, the U.S. economy experienced a severe recession (Laeven & Valencia, 2012)

The measure of trade credit dependence is obtained from Fisman & Love (2003) who closely follow Rajan & Zingales (1998) in order to calculate industry-level measures of trade credit in the U.S. manufacturing industry. Their measure is calculated as the ratio of accounts payable to total assets and is taken from the sample period ranging from 1980 to 1989. The ratio indicates the fraction of total assets that are financed by trade credit and represents an industry's reliance on informal credit rather than institutional financing. Since the values are once again based on the 1980s time period, similar concerns remain regarding whether the measure best captures the trade credit requirements of industries today.

The measure of tangible assets is obtained from Kroszner et al. (2007) who calculate an industry's propensity to have tangible assets on their balance sheets. This serves as a proxy for the ability of an industry to provide collateral and is calculated as the median level of the ratio of fixed assets to total assets for U.S. firms over the period 1980-1999.

The values of the measures explained above are presented in Table 2. Using the Kroszner et al. (2007) measure of dependence on bank finance, we find that the drugs industry has the greatest level of dependency on bank finance while the tobacco industry has the lowest. The negative levels of bank financing imply that industries were able to generate more internal financing (cash flows) than they require for their capital expenditures. When comparing this measure to the one calculated by Rajan & Zingales (1998), we find a rise in the external bank financing needs of most industrial sectors with the exception of the spinning and drugs industry. Table 3 presents the rank correlations and indicates that the two external finance measures are positively but not completely correlated. Dependence on external bank financing also does not necessarily lead to dependence on trade credit. The spinning industry for example is highly dependent on trade credit but does not require a great deal of bank financing. This relationship is captured by the rank correlations for the four measures. With the exception of the two measures of bank finance, we see the correlations are quite low amongst our proxies. This implies that each unique measure of financial vulnerability should be able to identify different dimensions when examining financial channels during the banking crisis.

3.3. Summary statistics

Summary statistics regarding export growth rates in crisis and non-crisis periods are provided in Table 4. To provide a brief example of the difference-in-difference methodology, we compare the growth rate of a highly dependent industry in the top 20th percentile of our external finance proxy to a less dependent industry that is in the bottom 20th percentile of our measure. Table 4 also provides summary statistics regarding the two industries, which are then used in Table 5 to demonstrate the difference-in-difference methodology.

When considering our measure of external finance provided by Kroszner et al. (2007), the industry that is highly dependent on bank finance (Electric machinery) experiences a decline in its average growth by 14.28 percent during the crisis relative to non-crisis periods. The industry that is less dependent on bank finance (Paper & products) experiences a decline of 9.7 percent in its average growth rate during the crisis relative to non-crisis periods. Taking the difference between these two numbers in Table 5, we observe that the growth rate of exports for the highly dependent industry drops by 4.54 percent during the crisis in comparison to the industry less dependent on external finance. Table 5 also presents a similar analysis where the growth rate of an industry within the top 20th percentile (Electric Machinery) of our Raj & Zingales (1998) proxy is compared to an in industry within the bottom 20th percentile (Apparel). We find that the difference between export growth rates in crisis and non-crisis periods for the highly dependent industry compared to the same difference for the low dependent industry is - 3.37 percent.

When considering dependency on trade credit in Table 5, we again find that highly dependent (Transportation equipment) and relatively less dependent (Professional goods) industries experience a decline in growth rates. Specifically, the highly dependent industry experiences a 2.39 percent larger drop in growth rates suggesting that the decline in worldwide trade credit during the crisis may be a valid hypothesis. Performing the same exercise for industries with our proxy for tangible assets, we find that the industry with a higher share of tangible assets (Basic chemicals) has an exports growth rate that is 2.15 percentage points higher than the industry with the lower share of tangible

assets (Drugs) during the crisis period. This result suggests that during the crisis, possession of tangible assets may have allowed for easier access to credit.

We undertake a more formal estimation of the difference-in-difference coefficients in the next section using the empirical methodology stated earlier in the paper.

4. Results

4.1. Benchmark results

The benchmark results, obtained from estimating Equation (1) are presented in Table 6. As expected, we find our trade share coefficient to be negative and highly significant for all our regressions. Column (1) presents our results using the external finance measure taken from Kroszner et al. (2007). We find that the estimates from the benchmark regression confirm the role played by bank financing in decreasing exports. The coefficient of the interaction term (-0.0258) is negative and significant at the one percent level. This implies that the export growth rate of industries with a greater level of reliance on external finance suffered more during the crisis in comparison to industries that were less dependent on bank finance.

The results can also be understood as follows: A highly dependent industry within the top decile of the measure (Office & Computing) with an external finance proxy value of 0.54,[7] experiences a 1.39 percent (-0.0258*0.54) drop in the growth of its exports in crisis years compared to non-crisis years. A manufacturing industry less dependent on external finance within the bottom decile (Footwear) with an external finance value of -0.74, experiences a 1.9 percent (-0.0258*-0.74) increase in its exports.[8] We therefore observe that during the banking crisis, the difference in the export growth rates between an industry in the top decile and an industry in the bottom decile of the external dependence distribution will be 3.29 percentage points higher when compared to non-crisis years.[9]

[7] Calculated as the fraction of capital expenditures not funded by internal funds for the sample of firms within that industry and obtained from Table 2.
[8] The rise in exports for the less dependent industry could potentially be explained by a mild weakening of the currency, where a mild decline in the strength of the currency does not necessarily indicate a severe currency crisis (Iacovone & Zavacka, 2009).
[9] -1.39 –1.9 = -3.29

Column (2) displays the results of our regression with the Rajan & Zingales index. We again find the coefficient of the interaction term (-0.0252) to be negative supporting the hypothesis that the banking crisis had an exogenous effect on exports of the manufacturing industry. While the magnitude of the coefficient is similar to the one obtained from column (1), the result is now only statistically significant at the ten percent level. The decrease in significance lends credence to the argument that the Kroszner et al. (2007) index better reflects the external financing needs of manufacturing industries in our sample.

Column (3) contains the results when considering an industry's access to trade credit. We would expect the coefficient of the interaction term to be positive if business partners of firms were able and willing to provide trade credit during the global crisis. A positive coefficient on the interaction term would indicate that the exports of industries more reliant on trade credit performed better than those industries less reliant on trade credit. This could possibly be due to the fact that they were able to replace some of their domestic financing with trade credit. A negative interaction term would suggest that the willingness to supply trade credit might have decreased due to the global liquidity crunch. Firms abroad may have withdrawn the credit they could extend and would have been particularly reluctant to lend to firms in countries experiencing a banking crisis. The results in column (3) suggest that this may have indeed been the case. The coefficient on the interaction term (-0.4319) is negative and statistically significant at the ten percent level indicating that the exports of industries with a greater dependency on trade credit suffered a relatively larger contraction during the crisis.[10]

Performing the same exercise we did with external finance, we observe that a highly dependent industry in the top decile of our trade credit measure (Motor Vehicle) with a proxy value of 0.112,[11] experiences a 4.83 percent (-0.4319*0.112) drop in the growth of its exports in crisis years compared to non-crisis years. A manufacturing industry less dependent on trade credit in the bottom decile (Non Metal Products) with a trade credit value of 0.064, experiences a 2.76 percent (-0.4319*0.064) decrease in its exports growth rate. The estimated coefficient therefore suggests that the difference in the growth rates between an industry highly dependent on trade credit and an industry relatively less

[10] The result is close to being significant at the five percent level with a p-value of 0.055.
[11] Calculated as the ratio of accounts payable in total assets and taken from Table 2.

dependent on trade credit will be 2.07 percentage points higher during the crisis compared to non-crisis years.[12]

Column (4) considers the level of tangible assets for our manufacturing industries. The positive sign on the coefficient of our interaction term supports the hypothesis that higher levels of tangible assets may serve as collateral and provide easier access to bank finance. The result though is statistically insignificant at the ten percent level but only just as the obtained p-value is 0.117.

Examining column (5) and (6), we see that our financial dependence measures are not capturing each other's effects, as our proxies for trade credit and external finance remain significant when all three proxies are included together. The last four columns of Table 6 allow for the possibility that our measures of financial dependence may be picking up the effects of financial development within a country. Our proxy for the depth of a financial system is based on previous literature (Rajan & Zingales, 1998) that uses the ratio of private credit to GDP taken from Demirguc-Kunt et al. (2012). Similar to Iacovone & Zavacka (2009), we address this concern by interacting our proxy for financial development with our proxies for financial dependence. We find our results remain almost unchanged and retain their respective significance levels.[13]

Our results are consistent with the likes of Chor & Manova (2012) and Bricongne et al. (2012), who have also highlighted the importance of the external finance channel in the recent financial crisis. As mentioned above, our coefficient indicates a 1.39 percent drop in the exports growth rate for the financially dependent office and computing industry during the crisis. This is a large effect when compared to the average growth rate of 4.5 percent the office and computing industry had in non-crisis years. The less dependent industry on the other hand, seems to have benefited from an increase in its export growth rate during the crisis.

With reference to trade credit, the coefficient estimate suggests a 4.83 percent decline in the exports growth rate of the highly dependent motor vehicle industry. The economic magnitude of this

[12] - 4.83 – (- 2.76) = -2.07

[13] The similarity of the R-squared values across our calculations is in line with the results of (Iacovone & Zavacka, 2009) and Dell'Ariccia et al. (2008). This is arguably due to the same set of fixed effects (which are large in quantity) included in each of our regressions.

decrease is quite substantial when compared to the average growth rate of 8.98 percent the industry enjoyed during non-crisis periods. The less dependent non metal products industry experiences a milder decline of 2.76 percent in its exports growth rate when compared to its average growth rate of 8.64 percent during non-crisis periods. Our results provide further evidence to the literature that suggests trade credit played a large role in the decline of international trade during the crisis. Interestingly, our result is different from the work of Iacovone & Zavacka (2009) who examine crises through the years 1980-2000 and find that the export growth rates of manufacturing industries with greater dependence on trade credit outperformed those with less dependence on trade credit. This is possibly due to our examination of a "global crisis" where multiple banking crises were experienced simultaneously across countries compared to their "local" crisis episodes where a banking crisis in one period did not overlap with one another. The difference in their result and ours demonstrates how a global crisis can differ from local crisis episodes.

Iacovone & Zavacka (2009) also find the coefficient for the tangibility measure to be positive and statistically significant indicating that industries with higher levels of tangible assets experienced relatively higher export growth rates compared to industries with lower levels of tangible assets. While our positive yet statistically insignificant coefficient suggests a similar outcome for the current crisis, our results are in line with Chor & Manova (2012) who also find the result to be statistically insignificant.[14] This once again highlights the difference between crises of the past and the recent crisis where the ability to provide collateral may have not necessarily eased access to finance.

In the following section, we further examine our statistically significant measures of financial dependence in order to assess the robustness of our findings.

[14] Chor & Manova (2012) find the result to be insignificant after taking into account country and industry effects.

4.2. Reverse causality concerns & asymmetric industry-specific shocks

The identification methodology employed in this paper reduces the endogeneity concerns regarding the relationship between export growth rates and banking crises that occurred during the global financial crisis. However, some concerns still remain regarding reverse causality due to the types of industries that may be represented in bank portfolios. If the importance of exporting industries is sufficiently high in the portfolios of the banks, an asymmetric industrial demand shock concentrated on the exports of bank dependent industries could potentially lead to a banking crisis rather than the other way around. This would call into question the endogeneity of the banking crisis variable. We address this concern using a strategy similar to the one utilized by Dell'Ariccia et al. (2008) and Iacovone & Zavacka (2009). As we do not have data regarding the industrial composition of bank portfolios, we hypothesize that industries with a greater share in total exports are relatively larger industries that are better represented in bank portfolios. These industries are also likely to have a greater dependency on external finance due to their exporting volume. The possibility of an asymmetrical shock should then lead to high trade share industries suffering a greater decline in their export growth rates compared to the export growth rates of low trade share industries, which should be left relatively unaffected. Such a result would lend support to the reverse causality explanation and indicate that banking crises were arguably caused by problems originating in a subset of larger externally dependent industries.

To test this, we separate the sample around the median for trade share, three years before the first crisis episode.[15] The results of the test are presented in Table 7. In the case of reverse causality, we would expect the coefficient of the interaction term for industries with a large trade share to be negative, significant and greater in magnitude, while industries with a small trade share would have a statistically insignificant interaction term. Our results though for both types of industries are statistically insignificant. Moreover, the insignificant interaction term for industries with a smaller trade share is relatively larger in magnitude suggesting that bank dependent industries representing a

[15] Recall that trade share was lagged by three years.

smaller portion of bank portfolios also experienced adverse effects during the crisis.[16] When the test is repeated in Column (2) using the measure of external finance created by Rajan & Zingales, we find the coefficient of the interaction term is negative, larger in magnitude in comparison to small industries but not significant.[17] Our findings therefore cast doubt over the hypothesis of asymmetrical industrial shocks.

We perform the same test to see whether an asymmetrical shock was experienced by industries that were highly dependent on trade credit. The assumptions again being that industries with a higher trade share are relatively larger industries with greater dependence on trade credit. Column (3) of Table 7 indicates that our interaction coefficient for industries with larger trade shares is negative and statistically significant (-0.334). We also find the coefficient of our interaction coefficient for industries with smaller trade shares to be negative and statistically significant (-0.876). In fact, the magnitude of the effect in smaller industries is greater than that of industries with a larger trade share, leading us to conclude that the hypothesis of asymmetrical industrial shocks on trade credit should be rejected.

4.3. Are the proxies measuring something else?

The use of proxy measures comes with the concern that our stated measures of financial vulnerability might potentially capture industrial characteristics that are not directly related to finance. Caballer and Hammour (1994) demonstrate that industrial sectors that manufacture durable goods are disproportionately affected by financial crises. Our interaction term could then potentially be capturing the fluctuation in the exports of industries that produce durable goods rather than their variation in exports due to their dependence on external finance.

To test whether our external finance measure is not simply a proxy for durables, we make use of a dummy variable that is equal to one if an industrial sector is manufacturing durable goods. The measure is taken from Kroszner et al. (2007) who use the classification of U.S. industries by the U.S.

[16] Coefficient for large industries -0.0140, coefficient for small industries -0.0405
[17] Coefficient for large industries -0.0372, coefficient for small industries 0.00507

Bureau of Economic Analysis to construct the variable. We interact this variable with our variable for crisis years and present the results in Table 8. For both measures of external finance, we find that the results of our main interaction term remain unchanged from our baseline regressions and the durable term to be insignificant.

We run the same test for our measure of trade credit to check if our interaction term is potentially capturing the variation in the exports of industries that produce durable goods rather than the change in exports due to their dependence on trade credit. The results displayed in the third panel of Table 8 indicate that our main interaction term remains unchanged and the durables interaction term is again statistically insignificant.

Industries that are capital intensive or make substantial investment in research and development could determine the financial needs of an industry. Our measures of financial vulnerability, especially external finance, could arguably be driven by the sophistication of the industry. To address this concern, we interact a proxy for research and development for an industry with our crisis dummy and insert it into our baseline regression as an additional control. Similarly in a separate regression, we take a proxy for capital intensity, interact it with our crisis dummy and add it into our regression. Both proxies are taken from Cowan & Neut (2007) who develop their measure of an industry's capital intensity by calculating the median level of the ratio of fixed assets over the number of employees of U.S. firms in Compustat. They follow a similar process in order to calculate an industry's level of R&D where they take the median level of the ratio of research and development expenses over sales for U.S. firms.

The complexity of the product exported by various industries could also play a role in driving external finance. Arguably, there could be a greater number of potential tasks involved in making a product of higher complexity, which in turn could raise the working capital and external financing requirements. To account for this, we introduce a complexity index created by Cowan & Neut (2007) into our baseline regression. The index provides intermediate good requirements for each ISIC sector using data from the 1992 United States Input-Output matrix. Another potential measure of complexity is the industry level Herfindahl index taken again from Cowan & Neut (2007). This index

measures the level of diversification in each sector using both the number of inputs and the quantity of each individual input effectively used in the final product. Compared to the complexity index, the Herfindahl index captures the overall dispersion of intermediate purchases and therefore avoids giving excessive weight to commodities from which purchases are very small. We interact each of these terms by our crisis indicator and insert them separately into our baseline regressions.

The results following the addition of these controls are also presented in Table 8. Examining columns (2) – (4), we find our interaction term for external finance is robust to the inclusion of the above mentioned control variables. Moreover, none of the controls enter significantly with the exception of the capital/labor ratio. The coefficient value of this term though is extremely small. Using the Rajan & Zingales measure of external finance in Table 8, we find that our main interaction term becomes insignificant due to the inclusion of our control variables. While this could place some doubt over our earlier findings, we do not find it as a source of severe concern. We have already argued that the Rajan & Zingales measure based exclusively on the 1980s time period may not be an accurate reflection of the external financing needs of industries today. The updated measure of Kroszner et al. (2007) is arguably a more reliable indicator as it better reflects the technologically determined characteristics innate to the manufacturing process. This viewpoint is corroborated by our earlier findings in Table 6 where results of greater statistical significance were obtained through the external finance index constructed by Kroszner et al. (2007). We continue to provide results based on the Rajan & Zingales index for the duration of this paper but again place greater emphasis on the results obtained using our updated measure.

We do the same tests for our measure of trade credit. High level of dependency on trade credit could also be a reflection on the intensity of capital or intermediate goods required to export the final good. This is however unlikely given that trade credit is usually used to finance short-term working capital. Unsurprisingly, columns (2)-(4) for the trade credit panel indicate that the inclusion of these variables do not weaken the significance of our main interaction term nor do they enter significantly.

4.4. Depth of the crisis

The work of Braun and Larrain (2005) suggests that a banking crisis accompanied by a significant loss of GDP could generate a greater contraction in financial credit. Pessimism regarding the economic climate could potentially lead banks to employ more stringent lending standards, which in turn could lead industries reliant on external finance to suffer larger export losses. To test this, we split countries in our sample around the median of output loss. Output losses are computed as the cumulative difference between actual GDP and trend real GDP over a period of four years and expressed as a percentage of trend real GDP. The cumulative difference, calculated for the start of a banking crisis for a country and the three following years, is taken from Laeven & Valencia (2012). It should be noted that the period for which output loss is calculated is greater than our crisis dummy by a period of two years.[18] While this may then be a slightly inaccurate measure of the depth of the crisis for our sample, it is still capable of providing meaningful insight if the cumulative difference over the course of four years is driven mainly by the initial losses incurred in the first two years.

The results of our test are summarized in Table 9. The top panel reports the benchmark regression estimated only for countries whose output loss was larger than the median loss. The lower panel reports the results from below median countries. The results of column (1) in Table 8 depict our main interaction term with regards to the external finance measure from Kroszner et al. (2007). As we would expect, there is a larger, statistically significant, negative coefficient on the interaction term for industries in countries that suffered a higher output loss (-0.0389) in comparison to the coefficient on the interaction term for industries in countries that suffered a lower loss in output (-0.0103). This indicates that countries with a deeper crisis had stronger differential effects on export growth rates across industries.

The results of column (2) depict our main interaction term with regards to the external finance measure from the 1980s. Again, there is a larger, statistically significant negative coefficient on the interaction term for industries in countries that suffered a higher output loss compared to the coefficient on the interaction term for industries in countries that suffered a lower loss in output.

[18] As mentioned earlier, we consider a crisis period to include the year of the crisis and the following year.

We perform the same exercise for trade credit. The statistically significant magnitude of the interaction term for industries in countries that suffered a greater loss in output is once again relatively larger. This result suggests that industries highly dependent on trade credit were also affected by the depth of the crisis in their respective countries.

4.5. The impact of financial development

We also attempt to understand whether the impact of the global financial crisis on manufacturing industries that are more financially dependent varies with the level of financial development in a country. The original result of Rajan & Zingales (1998) indicates that financially dependent industries are at an advantage in a country where financial markets are well developed. A higher level of financial development potentially reflects the greater efficiency with which markets perform their financial and legal functions. Such an environment allows financially dependent industries to experience greater growth rates, as financial markets are able to efficiently allocate resources. Kroszner et al. (2007) however find that financially dependent industries are at a disadvantage in locations with well-developed financial markets during a crisis. Industries that have benefited from developed markets should experience a disproportionate negative impact on their value-added output in comparison to less dependent industries that do not benefit as much from well-developed financial markets.

Table 10 examines the effect of financial development on the link between financial dependence and exports growth during the global financial crisis. As mentioned earlier, our proxy for financial development is the ratio of private credit to GDP taken annually for each country from Demirguc-Kunt et al. (2012. The triple interaction term (EXTFIN2*Crisis*FD) reports the difference between the change in the exports of an industrial sector dependent on external finance in a financially developed country vs. a financially less vulnerable sector, and compares that to the same difference for a country with a less developed financial system. In other words, the triple interaction term tests whether any negative effect of the crisis on exports was larger in countries with developed financial markets and whether this effect was concentrated on financially dependent sectors in those countries.

While the coefficients of our dual interaction term remains significant, the coefficients of our triple interaction do not reflect statistically significant results. However, it may still be of conceptual value to examine their coefficient values. Had our results aligned with the hypothesis that there is a disproportionate impact on industrial sectors in a financially developed system during a crisis, we would have seen a negative coefficient on our triple interaction term. We observe a positive value; the exports of financially dependent industrial sectors in well-developed financial systems were relatively more resilient. This result is in line with Iacovone et al. (2009) for crises occurring through 1980 – 2000, and with Chor & Manova (2012) for their work examining U.S. imports for the most recent crisis. A potential explanation that may explain why these results differ than those of Kroszner et al. (2007) involves our specification of examining exports of manufacturing industries. This is in contrast to Kroszner et al. (2007) who focus only on domestic output. Exporters in countries with a more developed financial system are arguably at better odds to secure foreign loans during a crisis given the credibility and experience they have with foreign banks. Well-developed financial systems could also benefit from organized government agencies committed to helping firms in their exporting activities during times of crises (e.g., Export Development Canada). Domestic producers in regions with weaker financial institutions may be inexperienced in dealing with foreign banks and may also have less favorable reputations regarding the probability with which contracts are honored. Moreover, multinational firms are likely to have a stronger presence in well-developed financial markets and can potentially leverage their network in order to better absorb effects of the banking crisis. Similar arguments could be made for the triple interaction term (TCRED*Crisis*FD) in column (3) where the positive coefficient is again in line with previous research: Inter-firm credit is likely to be more resilient in locations where financial institutions are perceived to be strong and well developed.

5. Serial correlation

The economic literature mentioned during this paper has largely employed the difference-in-difference methodology used by Rajan & Zingales. However most of these papers, including Kroszner et al. (2007), Chor & Manova (2012), Dell'Ariccia et al. (2008), Rajan & Zingales (1998),

have not completely accounted for nor mentioned the serial correlation problem inherent in difference-in-difference estimation as pointed out by Bertrand et al. (2004). Not accounting for serial correlation could cause our standard errors to be biased downwards, leading to a higher possibility of type 1 errors: we are more likely to reject the null hypothesis and obtain false positives. Utilizing clustered standard errors has been found to address part of the problem but does not account for autocorrelation.[19] Moreover, clustered standard errors propose an additional problem if they are too few in quantity (Bertrand et al., 2004). Our sample of 22 countries allows us to have 22 clusters for our benchmark regressions. While these many clusters would not be considered as too small, 30-50 clusters are usually referred to as the adequate amount required for estimating accurate standard errors. Blocked bootstrapped standard errors can potentially correct for problems due to small clusters and autocorrelation but are imprecise when the number of clusters is too small and become computationally intensive when required for a large number of parameters (Cameron et al., 2004).[20]

While it is not in the scope of this paper to formally test for this concern, we propose a potential methodology based on Bertrand et al. (2004) that could be used to address the issue of serial correlation specific to our methodology. The method would require us to collect exports data for countries that did not experience a crisis between 1990 and 2011. We would then randomly assign 22 "placebo" (fake) crisis episodes to our new sample of countries and run our benchmark models. This process would be repeated approximately 100- 200 times with crisis episodes being randomly assigned each time from a specified distribution. If the coefficient of our interaction term turns out to be negative and significant for a frequent number of cases, our results could be attributed to serial correlation. However, if the coefficient of our interaction term turned out to be negative and significant for only a few of our regressions, we could conclude that our standard errors are correct and not biased by serial correlation. From Table 1, we gathered that our measure of external finance was significant at the 1% level. Running our placebo crises, we should reject the null of no significant effect of the external finance channel in approximately 1% of our observations if our

[19] Bertrand et al. (2004) study the effects of difference-in-difference estimates and find substantial over-rejection even after correcting for clustering.
[20] Clusters numbering less than 5 would be considered too small. Moreover, given the large number of fixed effects involved in our calculations, estimating bootstrapped standard errors would arguably become computationally intensive.

standard errors are indeed correct.

6. Conclusion

We have studied the effects of the global financial crisis on the growth of exports in manufacturing industries and find that banking crises during this period had a disproportionate impact on industries relatively more dependent on external finance. We interpret our results as evidence consistent with the existence of supply shocks operating through the banking system and disrupting international trade. It should be noted that our recorded outcomes do not diminish the important role that demand shocks have been said to play in the collapse of international trade. The reduction in the demand of exports for finance-intensive industries could have had an additional and independent effect, which could have amplified the problems transmitted through credit channels. Moreover, our analysis focuses only upon the relative impact of the crisis on manufacturing industries and does not address the contraction in aggregate trade due to adverse financial conditions.

Nevertheless, our findings reinforce the notion that healthy financial institutions are important for the growth of manufacturing exports. Our findings further imply the importance of distinguishing different financial channels. Bank credit could not easily be substituted for trade credit during the crisis resulting in a relatively larger decline in the export growth rates of industries more dependent on buyer-supplier trade credit. This outcome is in line with the literature that suggests that a lack of inter-firm financing was a contributing factor to the trade dynamics observed during the turbulent period. These findings have implications for future research and policy design aimed at mitigating the effects of financial crises on trade. First, they indicate the importance of understanding the links between the fields of international trade and international finance in order to prepare for the challenges of trade finance. Second, they highlight the need of targeted measures to improve financing for financially dependent industries as opposed to broader policy actions that have a uniform affect on all industries.

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8. Appendix

Table 1: Banking crises, 2007 – 2011

Country	Start of crisis	Extensive liquidity support	Significant guarantees on liabilities	Significant restructuring costs	Significant asset purchases	Significant nationalizations
Austria	2008	√	√	√		√
Belgium	2008	√	√	√		√
Denmark	2008	√	√			√
France	2008	√	√			
Germany	2008	√	√			√
Greece	2008	√	√	√		
Hungary	2008	√	√			
Iceland	2008	√	√	√		√
Ireland	2008	√	√	√	√	√
Italy	2008	√	√			
Latvia	2008	√	√			√
Luxembourg	2008	√	√	√		√
Netherlands	2008	√	√	√		√
Portugal	2008	√	√			
Russia	2008	√	√			
Slovenia	2008	√	√			
Spain	2008	√	√	√		√
Sweden	2008	√	√			
Switzerland	2008	√			√	
Ukraine	2008	√		√		
United Kingdom	2007	√	√	√	√	√
United States	2007	√	√	√	√	√

Notes: The above table is sourced from Laeven & Valencia (2012). Banking crises are defined as cases where at least one of the listed interventions took place. Liquidity support is considered to be extensive when the ratio of central bank claims on the financial sector to deposits and foreign liabilities exceed 5 percent and more than doubles relative to its pre-crisis level. This also includes any liquidity support extended directly by the Treasury. Direct bank restructuring costs are considered significant when they exceed 3 percent of GDP and exclude spending on liquidity and asset purchases. Guarantees on liabilities are defined to be significant when they include measures that guarantee liabilities of financial institutions beyond just increasing deposit insurance coverage limits. Nationalizations are significant when they affect systemic financial institutions.

Table 2: Financial dependence

ISIC	Manufacturing Industries	Kroszner et al.		Rajan & Zingales		Fisman & Love		Kroszner et al.	
isic	Industry	**EXTFIN2**	rank	**EXTFIN**	rank	**TCRED**	rank	**TANG**	rank
311	Food products	-0.15	24	0.14	25	0.112	3	0.37	13
313	Beverages	0.03	12	0.08	27	0.091	16	0.4	9
314	Tobacco	-1.14	36	-0.45	36	0.066	32	0.19	28
321	Textile	0.01	14	0.4	11	0.101	7	0.31	17
322	Apparel	-0.21	26	0.03	30	0.111	5	0.15	32
323	Leather	-0.95	35	-0.14	34	0.055	35	0.12	36
324	Footwear	-0.74	34	-0.08	32	0.093	13	0.13	35
331	Wood products	0.05	10	0.28	15	0.088	18	0.32	15
332	Furniture	-0.38	31	0.24	17	0.092	15	0.28	18
341	Paper and products	-0.35	30	0.18	22	0.081	26	0.42	7
342	Printing and publishing	-0.42	33	0.2	21	0.075	29	0.21	26
352	Other chemicals	-0.3	29	0.22	20	0.097	10	0.27	23
353	Petroleum refineries	-0.02	15	0.04	29	0.118	2	0.62	1
354	Petroleum and coal products	0.13	8	0.33	13	0.096	11	0.46	4
355	Rubber products	-0.02	16	0.23	19	0.088	18	0.36	14
356	Plastic products	-0.02	17	1.14	2	0.099	9	0.38	11
361	Pottery	-0.41	32	-0.15	35	0.067	31	0.28	18
362	Glass	-0.03	18	0.53	7	0.089	17	0.42	7
369	Nonmetal products	-0.29	28	0.06	28	0.064	34	0.48	3
371	Iron and steel	0.05	11	0.09	26	0.094	12	0.44	5
372	Nonferrous metal	-0.12	23	0.01	31	0.078	27	0.32	15
381	Metal products	-0.25	27	0.24	17	0.088	18	0.28	18
382	Machinery	-0.04	19	0.45	10	0.086	22	0.22	25
383	Electric machinery	0.24	7	0.77	6	0.082	25	0.21	26
384	Transportation equipment	-0.08	22	0.31	14	0.105	6	0.23	24
385	Professional goods	0.72	2	0.96	5	0.072	30	0.16	30
390	Other industries	0.28	6	0.47	8	0.087	21	0.18	29
3211	Spinning	-0.05	20	-0.09	33	0.149	1	0.38	11
3411	Pulp, paper	-0.07	21	0.15	24	0.065	33	0.6	2
3511	Basic excluding fertilizers	-0.19	25	0.25	16	0.083	23	0.43	6
3513	Synthetic resins	0.03	13	0.16	23	0.093	13	0.4	9
3522	Drugs	2.43	1	1.49	1	0.055	35	0.16	30
3825	Office and computing	0.54	4	1.06	3	0.083	23	0.14	33
3832	Radio	0.7	3	1.04	4	0.076	28	0.14	33
3841	Ship	0.38	5	0.46	9	0.101	7	0.28	18
3843	Motor vehicle	0.06	9	0.39	12	0.112	3	0.28	18

Notes: Dependence on External Finance II is based on Kroszner et al. (2007). Dependence on External Finance is based on Rajan, Zingales (1998). Trade credit dependence is based on Fisman, Love (2003). Tangibility is taken from Kroszner et al. (2007).

Table 3: Rank correlations between financial measures

	External Finance II	External Finance	Trade Credit	Tangibility
External Finance II	1			
External Finance	0.814	1		
Trade Credit	-0.1052	-0.1675	1	
Tangibility	-0.1108	-0.2525	0.2081	1

Notes: The table reports the rank correlations between four different financial measures. Dependence on External Finance II is based on Kroszner et al. (2007). Dependence on External Finance is based on Rajan, Zingales (1998). Trade credit dependence is based on Fisman, Love (2003). Tangibility is taken from Kroszner et al. (2007).

Table 4: Summary statistics

Sample Statistics

	Mean		Median		Standard Dev.		Observations	
	Normal	Crisis	Normal	Crisis	Normal	Crisis	Normal	Crisis
Exports Growth	9.57	-1.21	9.88	0.99	13.7	17.05	7113	1247

Dependence on External Finance II

	Mean		Median		Standard Dev.		Observations	
	Normal	Crisis	Normal	Crisis	Normal	Crisis	Normal	Crisis
High Dependence	10.12	-4.16	10.21	-2.57	12.65	16.82	207	37
Low Dependence	8.9	-0.84	9.55	3.79	11.64	15.32	216	40

Dependence on External Finance

	Mean		Median		Standard Dev.		Observations	
	Normal	Crisis	Normal	Crisis	Normal	Crisis	Normal	Crisis
High Dependence	10.12	-4.16	10.21	-2.57	12.65	16.82	207	37
Low Dependence	9.67	-1.16	9.85	0.44	15.05	0.19	384	68

Dependence on Trade Credit

	Mean		Median		Standard Dev.		Observations	
	Normal	Crisis	Normal	Crisis	Normal	Crisis	Normal	Crisis
High Dependence	10.18	-2.41	10.36	1.05	14.4	18.67	198	37
Low Dependence	11.78	1.58	11.38	5.34	11.42	1.58	209	43

Tangibility

	Mean		Median		Standard Dev.		Observations	
	Normal	Crisis	Normal	Crisis	Normal	Crisis	Normal	Crisis
High Dependence	14.85	8.0	16.80	7.9	13.77	16.67	253	57
Low Dependence	9.94	0.9	10.34	3.4	12.17	14.6	450	65

Notes: An industry with high dependence refers to an industry in the top 20th percentile for that particular measure. An industry with low dependence refers to an industry in the bottom 20th percentile for that particular measure. Dependence on External Finance II is based on Kroszner et al. (2007). Dependence on External Finance is based on Rajan, Zingales (1998). Trade credit dependence is based on Fisman, Love (2003). Tangibility is taken from Kroszner et al. (2007).

Table 5: Difference-in-Difference estimates

Export Growth – External Finance II

	Crisis	Normal	*Diff in Diff*
High Dep	-4.16	10.12	-14.28
Low Dep	-0.84	8.9	-9.74
	-3.32	1.22	**- 4.54**

Export Growth – External Finance

	Crisis	Normal	*Diff in Diff*
High Dep	-4.16	10.12	-14.28
Low Dep	-1.16	9.67	-10.83
	-3.32	1.22	**- 3.45**

Export Growth – Trade Credit

	Crisis	Normal	*Diff in Diff*
High Dep	-2.41	10.18	-12.59
Low Dep	1.58	11.78	-10.2
	-3.32	1.22	**- 2.39**

Export Growth – Tangibility

	Crisis	Normal	*Diff in Diff*
High Dep	8.0	14.85	-6.85
Low Dep	0.9	9.9	-9.0
	-3.32	1.22	**2.15**

Notes: An industry with high dependence refers to an industry in the top 20th percentile for that particular measure. An industry with low dependence refers to an industry in the bottom 20th percentile for that particular measure. Values in cells represent average growth rates. Dependence on External Finance II is based on Kroszner et al. (2007). Dependence on External Finance is based on Rajan, Zingales (1998). Trade credit dependence is based on Fisman, Love (2003). Tangibility is taken from Kroszner et al. (2007).

Table 6: Baseline regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trade share	-0.819***	-0.820***	-0.821***	-0.820***	-0.819***	-0.819***	-0.816***	-0.815***	-0.815***	-0.810***
	(0.226)	(0.227)	(0.226)	(0.226)	(0.227)	(0.227)	(0.240)	(0.240)	(0.240)	(0.238)
EXTFIN2*Crisis	-0.0258***				-0.0277***		-0.0252**			
	(0.00775)				(0.00781)		(0.00922)			
EXTFIN*Crisis		-0.0252*				-0.0286**		-0.0247*		
		(0.0124)				(0.0127)		(0.0137)		
TCRED*Crisis			-0.432*		-0.624**	-0.616**			-0.418*	
			(0.213)		(0.243)	(0.253)			(0.210)	
TANG*Crisis				0.0421	0.0490	0.0422				0.0438
				(0.0258)	(0.0293)	(0.0272)				(0.0290)
EXTFIN2*FD							0.0316			
							(0.0229)			
EXTFIN*FD								0.0197		
								(0.0252)		
TCRED*FD									0.0307	
									(0.222)	
TANG*FD										-0.0456
										(0.0976)
Constant	0.191***	0.193***	0.153***	0.177***	0.163***	0.171***	0.195***	0.191***	0.183***	0.223***
	(0.0164)	(0.0164)	(0.0165)	(0.0164)	(0.0156)	(0.0175)	(0.0141)	(0.0210)	(0.0329)	(0.0428)
Observations	6929	6929	6929	6929	6929	6929	6870	6870	6870	6870
R^2	0.615	0.615	0.615	0.615	0.615	0.615	0.622	0.622	0.622	0.622

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the log difference of gross exports. EXTFIN2 is the external finance measure based on Kroszner et al. (2007). EXTFIN is the external finance measure based on the measure obtained from Rajan & Zingales (1998). TCRED is the trade credit measure calculated by Fisman & Love (2003). TANG is tangibility taken from Kroszner et al. (2007). The crisis dummy equals to one in the year of the crisis and in the year after the crisis. Trade share is the share of industry exports in total exports lagged three periods. Financial development is computed as private credit in GDP and obtained from Demirguc-Kunt et al. (2012). Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.

Table 7: Asymmetrical industrial shocks

Large Industries

	(1)	(2)	(3)
Trade share	-0.723***	-0.722***	-0.708**
	(0.128)	(0.128)	(0.254)
EXTFIN2*Crisis	-0.0140		
	(0.0175)		
EXTFIN*Crisis		-0.0372	
		(0.0300)	
TCRED*Crisis			-0.334*
			(0.172)
Constant	0.168***	0.187***	0.220***
	(0.0257)	(0.0255)	(0.0127)
Observations	3446	3446	3446
R^2	0.640	0.640	0.638

Small Industries

	(1)	(2)	(3)
Trade share	-17.66***	-17.69***	-17.68***
	(2.601)	(2.601)	(5.273)
EXTFIN2*Crisis	-0.0405		
	(0.0465)		
EXTFIN*Crisis		0.00507	
		(0.0482)	
TCRED*Crisis			-0.876**
			(0.322)
Constant	0.410***	0.322***	0.0823***
	(0.129)	(0.119)	(0.0232)
Observations	3483	3483	3483
R^2	0.608	0.608	0.607

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The upper panel presents baseline regressions for industries with a trade share value larger than the median. The lower panel presents the baseline regressions for industries with a trade share value lower than the median. The dependent variable is the log difference of gross exports. EXTFIN2 is the external finance measure based on Kroszner et al. (2007). EXTFIN is the external finance measure based on the measure obtained from Rajan & Zingales (1998). TCRED is the trade credit measure calculated by Fisman & Love (2003). TANG is tangibility taken from Kroszner et al. (2007). The crisis dummy equals to one in the year of the crisis and in the year after the crisis. Trade share is the share of industry exports in total exports lagged three periods. Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.

Table 8: Are the proxies measuring something else?

External Finance II

	(1)	(2)	(3)	(4)	(5)
Trade share	-0.819***	-0.883***	-0.882***	-0.883***	-0.883***
	(0.227)	(0.220)	(0.220)	(0.220)	(0.220)
EXTFIN2*Crisis	-0.0258***	-0.0586***	-0.0458***	-0.0442***	-0.0437***
	(0.00775)	(0.0203)	(0.0134)	(0.0125)	(0.0132)
Durables*Crisis	0.000623				
	(0.00940)				
R&D*Crisis		0.369			
		(0.299)			
Cap/lab*Crisis			0.000183*		
			(0.0000954)		
Herfindahl*Crisis				-0.000509	
				(0.00744)	
Intermediates*Crisis					-0.00937
					(0.0318)
Constant	0.175***	0.178***	0.187***	0.166***	0.188***
	(0.0163)	(0.0145)	(0.0161)	(0.0182)	(0.0154)
Observations	6929	6723	6723	6723	6723
R^2	0.615	0.619	0.619	0.619	0.619

External Finance

	(1)	(2)	(3)	(4)	(5)
Trade share	-0.819***	-0.883***	-0.883***	-0.883***	-0.883***
	(0.227)	(0.220)	(0.220)	(0.220)	(0.220)
EXTFIN*Crisis	-0.0253*	-0.0229	-0.0199	-0.0197	-0.0235
	(0.0127)	(0.0323)	(0.0138)	(0.0146)	(0.0147)
Durables*Crisis	0.000977				
	(0.00972)				
R&D*Crisis		0.0280			
		(0.478)			
Cap/lab*Crisis			0.000130		
			(0.0000937)		
Herfindahl*Crisis				0.00312	
				(0.00789)	
Intermediates*Crisis					-0.0218
					(0.0332)
Constant	0.189***	0.184***	0.189***	0.198***	0.174***
	(0.0147)	(0.0161)	(0.0146)	(0.0168)	(0.0164)
Observations	6929	6723	6723	6723	6723
R^2	0.615	0.619	0.619	0.619	0.619

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the log difference of gross exports. EXTFIN2 is the external finance measure based on Kroszner et al. (2007). EXTFIN is the external finance measure based on the measure obtained from Rajan, Zingales (1998). The share of intermediate goods required and the Herfindahl index are taken from Cowan & Neut (2007). Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.

Table 8 (continued): Are the proxies measuring something else?

Trade Credit

	(1)	(2)	(3)	(4)	(5)
Trade share	-0.821***	-0.882***	-0.883***	-0.883***	-0.883***
	(0.227)	(0.220)	(0.220)	(0.220)	(0.220)
TCRED*Crisis	-0.452**	-0.717***	-0.659**	-0.704**	-0.786***
	(0.202)	(0.225)	(0.260)	(0.259)	(0.251)
Durables*Crisis	-0.00440				
	(0.00899)				
R&D*Crisis		-0.339			
		(0.197)			
Cap/lab*Crisis			0.000170		
			(0.000104)		
Herfindahl*Crisis				0.0100	
				(0.00772)	
Intermediates*Crisis					0.0336
					(0.0343)
Constant	0.177***	0.168***	0.181***	0.176***	0.174***
	(0.0138)	(0.0144)	(0.0143)	(0.0155)	(0.0144)
Observations	6929	6723	6723	6723	6723
R^2	0.615	0.619	0.619	0.619	0.619

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the log difference of gross exports. TCRED is the measure of trade credit taken from Fisman & Love (2003). The share of intermediate goods required and the Herfindahl index are taken from Cowan & Neut (2007). Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.

Table 9: Depth of the Crisis

Large Output loss

	(1)	(2)	(3)
Trade share	-0.933***	-0.931***	-0.934***
	(0.288)	(0.289)	(0.288)
EXTFIN2*Crisis	-0.0389***		
	(0.0123)		
EXTFIN*Crisis		-0.0446**	
		(0.0184)	
TCRED*Crisis			-0.707**
			(0.321)
Constant	0.0451***	0.0894***	0.0742***
	(0.00995)	(0.0136)	(0.0122)
Observations	3662	3662	3662
R^2	0.595	0.595	0.595

Small output loss

	(1)	(2)	(3)
Trade share	-0.332	-0.333	-0.333
	(0.440)	(0.440)	(0.440)
EXTFIN2*Crisis	-0.0103*		
	(0.00576)		
EXTFIN*Crisis		-0.00335	
		(0.00932)	
TCRED*Crisis			-0.594**
			(0.131)
Constant	0.143***	0.127***	0.116***
	(0.0258)	(0.0236)	(0.0286)
Observations	3267	3267	3267
R^2	0.710	0.710	0.710

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The upper panel presents baseline regressions for industries in countries with an output loss larger than the median. The lower panel presents baseline regressions for industries in countries with an output loss lower than the median. The dependent variable is the log difference of gross exports. EXTFIN2 is the external finance measure based on Kroszner et al. (2007). EXTFIN is the external finance measure based on the measure obtained from Rajan, Zingales (1998). TCRED is the trade credit measure calculated by Fisman & Love (2003). TANG is tangibility taken from Kroszner et al. (2007). The crisis dummy equals to one in the year of the crisis and in the year after the crisis. Trade share is the share of industry exports in total exports lagged three periods. Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.

Table 10: Impact of financial development

	(1)	(2)	(3)	(4)
Trade Share	-0.813***	-0.809***	-0.813***	-0.812***
	(0.239)	(0.261)	(0.239)	(0.240)
EXTFIN2*Crisis	-0.0263**			
	(0.00954)			
EXTFIN2*Crisis*FD	0.00166			
	(0.0151)			
EXTFIN*Crisis		-0.0578		
		(0.0346)		
EXTFIN*Crisis*FD		0.00729		
		(0.0232)		
TCRED*Crisis			-0.987**	
			(0.430)	
TCRED*Crisis*FD			0.346	
			(0.229)	
TANG*Crisis				-0.0201
				(0.102)
TANG*Crisis*FD				0.0392
				(0.0608)
Observations	6870	6870	6870	6870
R^2	0.622	0.622	0.622	0.622

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is the log difference of gross exports. EXTFIN2 is the external finance measure based on Kroszner et al. (2007). EXTFIN is the external finance measure based on the measure obtained from Rajan, Zingales (1998). TCRED is the trade credit measure calculated by Fisman & Love (2003). TANG is tangibility taken from Kroszner et al. (2007). The crisis dummy equals to one in the year of the crisis and in the year after the crisis. Trade share is the share of industry exports in total exports lagged three periods. Financial development is computed as private credit in GDP and obtained from Demirguc-Kunt et al. (2012). Standard errors are clustered by country. All regressions include the country-year, industry-year and country-industry fixed effects, coefficients not reported.