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CONTENTS

Abstract

Global trade contracted quickly and severely during the global crisis. This paper, using a unique dataset of French firms, matching together export data with firm-level credit constraints, shows that most of the 2008-2009 trade collapse is accounted by the unprecedented demand shock and by product characteristics. While all firms have been evenly affected by the crisis, large firms did so mainly through the intensive margin and by reducing the portfolio of products offered in each destination served. Smaller exporters instead have been forced to reduce the range of destinations served or to stop exporting altogether. Credit constraints, on their part, emerged as an aggravating factor for firms active in sectors of high financial dependence. Nonetheless, as the share of credit constrained firms is small and their number did not increase much during the crisis, the overall impact of credit constraints on trade remains limited.

Keywords: financial crisis, credit constraints, international trade, firms' heterogeneity, intensive and extensive margins.

JEL Classification:F02, F10, G01

Non-technical summary

Global trade contracted quickly and severely during the global crisis. Beyond the fall in demand and a limited resurgence of protectionism, two main reasons have been given as to why trade fell so sharply, so quickly and so much out of proportion with the fall in demand: first, a composition effect; second, financing difficulties and shortage of liquidity linked to the intensification of the financial crisis.

This paper, using a unique dataset of French firms, matching together firm, product and destination specific export data with firm-level credit constraints, addresses the following question: did firm characteristics prevail over other determinants including demand and product characteristics in the 2008-2009 trade collapse? More specifically, what channel was quantitatively more important? Have firms that differ in size, financial health and sources of external finance, been differently affected? Did they adjust differently at the intensive and extensive margin? Since many firms are multi-product and do export to many markets, these two dimensions are also explicitly addressed when discussing extensive margin adjustments.

Careful statistical and econometric analysis indicates that demand, as well as product and firm characteristics all played an important role in shaping the trade contraction. By exploiting econometrically the unique features of our dataset we can further quantify the relative contribution of the various determinants. In so doing, we are able to settle the on-going debate on the relative role of demand, composition and financing conditions in the 2008-2009 crisis.

We find that, in the aggregate, most of the trade collapse is accounted by the unprecedented demand shock and by product characteristics. Yet, different types of firms where affected differently. The impact for large firms was mainly through the intensive margin and via a reduction of the portfolio of products offered in each destination served. Smaller exporters instead have been forced to reduce the range of destinations served or to stop exporting altogether.

Credit constraints, on their part, emerged as an important aggravating factor for firms operating in sectors of high financial dependence. About 20% of the contraction in exports of financially constrained firms was explained by their status of being financially constrained. This effect seems to be entirely driven by developments in sectors of high financial dependence. Nonetheless, as the weight of financially constrained firms is small relative to the universe of French exporters, and since their number did not increase much during the crisis, the impact of credit constraints on overall trade remains limited.

One important implication of the results from our quantification exercise is that, in the context of the 2008-2009 crisis, financial constraints cannot help accounting for the portion of aggregate trade contraction that traditional macro and trade models have not been able to explain.

In our analysis, we controlled for the most important concurrent factors and dimensions of the trade collapse, including composition effects, specificities of value chain production and exchange rate changes. We also controlled for firm ownership, consolidating data by group. Finally, we developed methods to work with high frequency data, also discussing the potential biases arising from their use and comparing results to those with annual data where applicable.

1 Introduction

Trade in the last quarter of 2008 and in the first quarter of 2009 contracted in an exceptionally sudden, severe and globally synchronized fashion. This great trade collapse was unparalleled in its suddenness: the decline of world trade totaled 29% in just four months, from September 2008 to January 2009. It was also seemingly out of line with the decline of world GDP, which only contracted by less than 3% over the same period.

Beyond the fall in demand and a limited resurgence of protectionism (Baldwin and Evenett, 2009; Bussière et al., 2010), two main reasons have been given as to why trade fell so sharply, so quickly and so much out of proportion with the fall in demand: first, a composition effect; second, financing difficulties and shortage of liquidity linked to the intensification of the financial crisis.

Starting with the composition effect, merchandize trade tends to be the hardest hit by demand shocks, because it is mainly made of durable goods and other postponable production (Benassy-Quéré et al., 2009; Eaton et al., 2009; O'Rourke, 2009). Adding to this, recent fiscal stimulus packages have been mostly oriented towards non-tradeables such as construction and infrastructure.[1] Hence, composition may contribute to explain the disproportionate contraction of trade relative to GDP. It has indeed been shown to have played an important role in the US case (Levchenko et al., 2009). In addition, not all sectors did evenly rely on global supply chains, whereby goods are traded several times before reaching the consumer (Tanaka, 2009; Yi, 2009). The growing importance of internationally fragmented production may therefore also contribute to explain the unusually high discrepancy between the drop in overall activity and the contraction in trade. Moreover, the quick communication among firms can explain why inventory adjustments were so sudden (Alessandria et al., 2010) and why the downsizing of trade was so synchronized and homogeneous worldwide (Baldwin, 2009). Nevertheless, simulations aimed at identifying the contribution of the demand channel and that take into account international input-output relationships have hardly reproduced the magnitude of the slump in world exports, suggesting that additional factors might have played a role (Benassy-Quéré et al., 2009).

Given the financial origin of the crisis, financial constraints and liquidity shortages have been called into cause as possible additional determinants. Recent literature shows that financial constraints can have a considerable negative legacy on export performance. For example, the decrease in financing might have caused one-third of the 1993 Japanese export collapse after the banking crisis (Amiti and Weinstein, 2009). Furthermore, cross-country evidence from

[1] an exception is represented by the fiscal incentives for the domestic purchase of new cars.

23 past banking crises suggests that export growth is particularly slow in sectors reliant on external finance (Iacovone and Zavacka, 2009). Using cross-country cross-industry US import data, Chor and Manova (2010) show that the deterioration of money market rates played a role in the recent trade collapse. Finally, bottlenecks idiosyncratic to trade credit and financing can also hinder trade (Auboin, 2009). The view that trade credit has played a role in the recent trade crisis is however challenged in the case of US imports and exports (Levchenko et al., 2009) as well as by the findings of the IMF/BAFT surveys. According to the latter, the general availability of trade finance was maintained over the course of the crisis, although the cost of trade credit increased and a potentially long lasting shift towards structured trade finance took place (G20, 2010).

All in all, findings on the trade-dampening effects of financial constraints are not antithetic to those of papers highlighting the prominence of demand shocks, such as Eaton et al. (2009). The different views, however, are not yet fully reconciled in the literature. Our paper contributes to this debate by assessing, at the firm level, the relative importance of the channels through which the trade collapse materialized. It quantifies jointly the effects of demand, composition and financial constraints. This is possible thanks to a unique database that combines firm trade data, broken down by product and destination, with direct information on firm-level credit constraints and balance sheet data. To the best of our knowledge, this is the first paper that addresses these issues using consistent and exhaustive information on individual firms' exports and financial constraints before and throughout a trade crisis. Another important and necessary innovation of the paper is to use monthly data, which on the one hand allow a more precise assessment of the deployment of the trade crisis and, on the other hand, imply novel methodological challenges.

In conclusion, the key question addressed in our paper is the following: did firm characteristics prevail over demand dynamics and product characteristics in the 2008-2009 crisis? More specifically, what channel was quantitatively more important? Have firms that differ in size, financial health and sources of external finance, been differently affected? Did they adjust differently at the intensive and extensive margin? Since many firms are multi-product and do export to many markets, these two dimensions are also explicitly addressed when discussing extensive margin adjustments.

The rest of the paper is organized as follows. Section 2 shortly reviews the insights from the theory on the channels for the crisis impact on individual firms. The following sections confront these predictions with the evidence from the 2008-2009 trade crisis, based on a dataset of individual exporters located in France. More specifically, Section 3 presents the adjustment of the margins of trade to the shock, the sectoral, geographical, product and price dimension

of the trade collapse and the distribution of the losses across firms. Section 4 investigates econometrically at the firm level the relative importance of the different channels of the trade collapse. Finally, Section 5 concludes and draws the implications of our results.

2 Crisis impact on individual firms - insights from the theory

Demand and supply channels are both likely to account for the deployment of a trade crisis following a large scale financial crisis.

To start with, a financial crisis has a direct negative effect on exports by hindering a firm's financing decisions. Finance is particularly important for trade for at least three reasons. First, exporting entails important fixed costs, including the cost of learning about export market profitability, foreign distribution networks, regulatory compliance, etc. In models of firm heterogeneity, credit is necessary to cover the sunk cost needed to enter a market (Melitz and Ottaviano, 2007). Second, exporting is a more risky activity than dealing with domestic transactions only. Amiti and Weinstein (2009) discuss how delays and uncertainty on exports make firms engaged in international trade more in need of working capital financing. Third, exporting involves longer lags between production and delivery, with a median shipment time of 2-3 months. Hence well functioning credit lines are often needed by exporters to maintain a healthy cash flow.

Standard models of firm heterogeneity (Melitz, 2003; Melitz and Ottaviano, 2007; Eaton and Kortum, 2002; Bernard et al., 2003), assume the existence of perfectly functioning capital markets in which prospective entrants borrow from consumers who hold perfectly diversified portfolios of entrants' stocks. The introduction of financial frictions in these models is likely to imply that the entry cost, marginal cost and cut-off conditions become all more restrictive. While both the intensive and the extensive margins of trade are likely to be affected by credit restrictions, Berman (2009) suggests empirically that financing conditions mainly act through the extensive margin.

The interaction between credit constraints and firm heterogeneity also sharpens the firm selection effect: churning and the associated reallocation of market shares from the least productive (and hence smaller) firms to the most productive exporters is higher than in normal circumstances (Manova, 2008). The impact of churning is furthermore likely to be asymmetric, with smaller and less productive firms more affected by credit restrictions as a result of their size or lack of sufficient collateral and/or credit guarantees (Greenaway et al., 2007; Muuls, 2008). Firms operating in sectors exhibiting structurally higher financial dependence should

also be more sensitive to a deterioration of credit conditions (Rajan and Zingales, 1998).

Beyond the direct impact on financing conditions, financial crises affect the real economy also through indirect channels. Claessens et al. (2009) show that recessions are usually associated with credit contractions, house price declines, and equity price declines. The recent crisis entailed all these features and posted a worldwide recession. Economic theory suggests that in an environment of generally adverse economic conditions and depressed demand, average sales and profit margins tend to diminish. Tougher competition forces the average firm to cut production costs and margins. In models of firm heterogeneity, the least performing firms shrink or exit the market altogether. Firms that are larger and more diversified (both in terms of products offered and destinations served) resist better, by contracting profit margins and reorganizing.

The sunk costs paid ex-ante by firms to enter foreign markets or to expand the product range and the fact that entering and exiting takes more time than changing the scale of operations of already active firms (Melitz and Ottaviano, 2007), suggests that in the face of an exogenous shock and faced with uncertainty as to its duration, firms are likely to prefer adjusting at the intensive margin before reorganizing or downsizing the scale of their operations. The largest and most productive firms are likely to cope best with adversity, due to their larger profit margins and because they do not risking to fall short of the break-even point.

If profit-margins are not sufficient to cushion the demand contraction, large firms (that are multi product and multi market) have the possibility to re-focus on their most profitable markets and products, which is however costly.[2] According to Mayer et al. (2010) firms first adjust by reducing the product range and then by turning to a downsizing in terms of destinations reached. Given this background and the dominance of large firms in shaping aggregate trade developments, the theory would suggest that in the aggregate firms respond to a demand shock primarily through the intensive margin, recurring subsequently and in the following order to the product, country and firm extensive margin.

All in all, we expect that the intensive margin has absorbed most of the 2008-2009 trade collapse first-round effects, reflecting export developments of large firms and, for some products, the inventory and production adjustments of large firms. Incidentally, empirical evidence on the 1997 Asian crisis supports the intuition that a large part of the adjustment acts through the intensive margin. Bernard et al. (2009) investigate the impact of the Asian crisis on individual US exporters and find that most of the decline in US exports took place through the intensive

[2]In theory, firms start by serving the most profitable markets first and export up to the marginal market where entry costs are only just covered by local sales. In the trade literature, this is referred to as the *pecking order of trade.*

margin.[3]

Still there is room for adjustments at the extensive margin. They are likely to materialize mainly in terms of a reduction in entry rates (new products, new destinations, new firms).[4] Moreover, given the dominance of large firms on aggregate exports it is likely that we will observe a precise ranking in the contributions of the different types of extensive margins: products first, export destinations second, and finally firms. The policy implications of such a scenario are clear. While the recovery of actual trade might be quick, the trade dampening episode may have a high toll on the exports growth potential for years to come. The long-lasting, detrimental effects on exports may further be particularly important in those sectors with higher external financial dependence.

3 Crisis impact on individual firms - the facts

To address these issues, we exploit a dataset of individual exporters located in France.[5] Using such data has two main advantages: first, it enables the investigation of the dynamics of the distribution of exporters based on the whole universe of exporters;[6] second, it allows observing their individual contributions to the value or diversity of exports in the sector to which they belong.

Monthly exports by destination and product category as provided by the French Customs are observed for the period January 2000 to April 2009. Our elementary unit of observation is the value exported each month by a French resident in each Combined Nomenclature 8-digit (CN-8 hereafter) sector to each export destination.[7]

3.1 Distribution of French exporters

We start by characterizing the distribution of French exporters. France is broadly similar to other countries, in that exporting is limited to a very select club of "champions", flanked by a large number of marginal competitors exporting on an irregular basis (Mayer and Ottaviano, 2007).

[3]Similarly, during the 1987-92 US export boom, most of the adjustment took place at the intensive margin (Bernard and Jensen, 2004).

[4]Since most of the sunk costs have normally been paid in advance, the impact of the crisis on entries remains an empirical issue.

[5]While we consider all exporters located in France, whatever the nationality of their ownership is, in the rest of the text we may at times loosely refer to our dataset as "French exporters".

[6]While we use all the information collected by the French Customs, the data are subject to censoring of the very small exporters: see Appendix A.1.1 for further details.

[7]The detailed description of our dataset is available in Appendix A.1.

To illustrate this in the French case, consider the largest exporters (1%) in each sector, defined following the 2-digit Harmonized System (HS-2 hereafter) classification. Accordingly, we use the criterion of total value of a firm's exports relative to the exports of all other firms exporting in the same sectors. We find that the top 1% exporters represent 63% of total French exports. The next four percentiles represent 24% of total exports. The smallest exporters (80%) represent only 3% of the total value. In a nutshell, some 1,000 individual exporters account for two-thirds of the total exports of the 5th largest world exporter.

The second characteristic, directly linked to the very large presence of small exporters in the distribution is the churning (numerous entries and exits). Since not every firm exports every month, we look at annual export activity. Some 20,000 exporters enter each year, and as many exit. Thus, over a period of ten years it is possible to observe some 300,000 different exporters, with a maximum of 100,000 each year and an average of 50,000 each month. What are the dynamics related to these switchers? Only 35% of the entries correspond to firms that are observable in the following year's statistics. But three years after entry, 20% of the entrants have survived. Hence the survival rate increases very quickly after a very low start in the first year.

3.2 A first glance at the 2008-2009 collapse

Turning back to the recent crisis, the data on French exporters during the turmoil, which cover the period up to April 2009, seem to confirm the intuition from the theory that initially total trade responds to a shock by adjusting the intensive margin. The number of exporters has been only slightly reduced by the crisis, while the value of total trade has sunk significantly. A first glance at the data (Figure 1) points to a steep decline in the value of total exports from September 2008 onwards. The number of French exporters, which has been on a decreasing trend since the year 2000, appears to have further contracted during the crisis, from 50,458 units in October 2008 to 46,616 units in April 2009. While seasonality and the number of working days may bias the results somewhat, all in all about 3,800 firms stopped exporting, corresponding to 7 percent of the average number of monthly exporters over the ten-years period considered.[8] In conclusion, the comparison of the data series relative to total export values versus those relative to the number of exporters suggests that the great bulk of the adjustment has been on the intensive rather than on the extensive margin.

However, the visual inspection of Figure 1 has two limits. First, it only shows the net

[8]This figure may be overestimated since the value exported by some firms may have fallen below the reporting thresholds during the crisis. See Appendix A.1 for more information on the threshold applying to export reporting obligations.

impact of entries. This is a problem because credit constraints are likely to primarily affect entries (see Section 2). Hence we should be looking at entries and exits separately. Second, as most firms sell many products to many markets, the product and destination dimension need to be separated. We therefore proceed to apply a decomposition into trade margins.

[Figure 1 about here.]

3.3 Decomposition of trade margins

Usually decompositions of trade margins are computed using annual flows as changes in the value of the flows present continuously throughout the considered period. In this paper we use monthly data. The time dimension of the trade collapse, which started in France in September 2008 and ended around April 2009, makes the use of high frequency data necessary. Annual data would miss the key dynamics of the episode (Eaton et al., 2009). However two difficulties arise when using monthly data. Firstly, one needs to control for seasonality and different patterns of working days (see appendix A.1.1). Secondly, the number of entries and exits appears larger than with lower frequencies, with the discrepancy increasing in the level of data disaggregation (highest for individual products exported to individual destinations).[9]

To get around such problems, we rely on the so-called *mid-point growth rates* (Davis and Haltiwanger, 1992; Buono et al., 2008). With this method, elementary monthly trade flows in a sector or product category can be classified into four types: created (positive extensive margin), destroyed (negative extensive margin), increased (positive intensive margin), and decreased (negative intensive margin). The difference between created and destroyed flows gives the net extensive margin while the net intensive margin is computed from the difference between increased and decreased flows. This method provides an alternative - and incidentally more precise - assessment of the extensive margin. When summing up the margins, it allows to correctly approximate the observed aggregate growth rates of exports: unlike other methods, it controls for composition effects, thereby allowing to avoid biases whereby the exit of small firms mechanically and erroneously translates into an increase in the intensive margin and in the average number of products per firm.[10]

The mid point growth rate is computed on elementary flows here defined as follows: monthly export flows by a French firm to a given destination of each CN-8 digit product (the most granular piece of information available in the French Customs data). For a firm i exporting a value x to a country c of product k at month t, the mid-point growth rate is defined as follows:

[9] See Table 11 in Appendix A.2 for a comparison of margins' shares in the growth of trade in 2007 using monthly, quadrimestrial and annual data.

[10] For instance, the average number of products per firm keeps increasing during the crisis.

$$g_{ickt} = \frac{x_{ickt} - x_{ick(t-12)}}{\frac{1}{2}\left(x_{ickt} + x_{ick(t-12)}\right)} \tag{1}$$

Similarly, the weight attributed to each flow g_{ickt} is given by the relative share of the flow in total exports, where *total* refers to the exports by the overall population of French exporters:

$$s_{ickt} = \frac{x_{ickt} + x_{ick(t-12)}}{\left(\sum_c \sum_i \sum_k x_{ickt} + \sum_c \sum_i \sum_k x_{ick(t-12)}\right)} \tag{2}$$

Finally, the year-on-year growth rate of the total value of French exports is given by summing - across all exporters i, products k, and countries of destination c - each individual flow g_{ickt} weighted by s_{ickt}.[11]

$$G_t = \sum_c \sum_i \sum_k s_{ickt} * g_{ickt} \tag{3}$$

Provided that elementary trade flows can each month be classified into four subsets (created - disappeared - increased - decreased), G_t can also be computed by aggregating separately flows corresponding to the above mentioned four contributions: extensive positive (entry), extensive negative (exit), intensive positive (increase in existing flows), intensive negative (reduction in existing flows).[12] This methodology allows to measure the contribution of the extensive and intensive margins in the growth of French exports over time. The net margins are given by the sum of the positive and negative contributions.

[Figure 2 about here.]

We use the mid-point growth rate method to compute the decomposition into extensive and intensive margin using monthly firm level export data per destination and CN-8 digit product category averaged over (a) the immediate pre-crisis period (2006-2007) and (b) the period of the crisis (from September 2008 to April 2009). According to our definition, a new flow can be a new exporting firm, or a new destination served by an incumbent exporter, or a new product by an incumbent exporter to a destination which he already serves with other products. Margins are computed, as weighted averages of the individual firms contributions to the intensive and extensive margin. A word of caution is in order. While with monthly data the number of entries and exits increases, the *net* intensive margin is only marginally affected.

[11] G represents a good approximation of the log change in total exports.

[12] Indeed all flows corresponding to an entry will post a value of +2 while all flows corresponding to exits a value of -2. Finally all changes in the size of existing flows will post a value comprised between -2 and 0, if the flows have decreased over time, and a value comprised between 0 and +2, if the flows have instead increased over time.

We start by considering the contribution of total *net* margins. The overall evidence on net margins illustrated in Figure 2 suggests that the trade adjustment during the crisis took place mainly at the intensive margin, with this effect possibly also underestimated. Using higher frequency data leads to an upward bias on the share of the extensive margin. At any rate, the through of the net intensive margin was in February 2009 and reached -20 percentage points.[13]

The contribution of the net extensive margin for firms, products and destinations appears to be of second order importance. Yet, theory suggests that financial constraints are likely to affect primarily entries: they hinder financing for new activities (i.e. expansion of product range, entry into new markets and start of exporting activity). We observe in the rightmost column of Table 1 and Table 2 that the contribution of firm new entries to the overall mid-point growth rates was 21% lower during the crisis than in the period 2006-2007. The adjustment of entries at the product level was even larger (-53%). By contrast, the adjustment in terms of new markets served was relatively low (-5%). In conclusion, it appears that firms have tended to hold patterns of expansion to new countries unchanged, possibly because the entry costs had already been paid.[14]

The uneven results along the margins motivate an investigation of the impact of the crisis for firms of different size. Margins are computed as weighted averages of the contributions of the firms' intensive and extensive margins, for each group of firms ranked by size of their sectoral exports, i.e. for the smallest 80% exporters, for the 80-95% percentile, for the 95-99% percentile and for the largest 1% exporters. In order to construct each group of firms, we rank these latter by HS-2 digit sector of activity, according to the total value of exports relative to the exports of all other firms exporting in the same sector, in a given month. Hence the monthly composition of the quantiles in a given sector actually varies. An individual firm can belong to different quantiles in different sectors owing to the fact that it can export in more than one HS 2-digit Chapter. [15]

[13]The predominance of the intensive margin is confirmed by subsequent studies. See in particular Behrens et al. (2010) on Belgian firms.

[14]Interestingly, large part of the action took place on the exit side. Leaving aside the top 1% exporters, for which changes may not be significant when it comes to firm exits, we record a 17% increase in the negative extensive firm margin. Regarding destination countries, the contribution of exits increased by 19%. Finally, the churning of products was reduced: a 40% reduction in the contribution of product exists partially compensated the above mentioned drop in product entries.

[15]This approach does not consist in ranking all firms having exported at least once during the preceding 12 months in a given sector, as opposed to the status of operator on a yearly basis used by the French customs. Note that any other definition of quantiles aiming at keeping their population constant would miss at least the entry decisions. Our definition is consistent with the choice of performing an analysis of the whole universe of French exporters. Incidentally, a firm may appear several times in the database, if it exports CN8-digit products belonging to more than one HS2-digit sector. However, each time, only its exports relative to the relevant sector are taken into account.

[Table 1 about here.]

Turning to the results of our decomposition, the largest 1% exporters explains by and large the aggregate numbers both before and during the crisis (see Table 2 and Table 1, respectively). This reflects the highly skewed distribution of exports described in Section 3.1. During the trade collapse, 75% of the intensive margin loss was absorbed by the largest 1% exporters. By contrast, this group accounted for a mere 23% of the extensive margin. Large exporters absorbed the shock mostly through the intensive margin (92% of their loss is accounted by this channel). Their contribution to the extensive margin was mainly at the product level. Meanwhile, smaller exporters recorded more important losses along the extensive margin than along the intensive margin. For example, for the bottom 80% exporters, 76% of the total losses in exports came from the extensive margin, of which 53 percentage points was due to the firm extensive margin and an additional 20 percentage points to the destination extensive margin. Adjustments during the crisis contrast with relatively more proportionate contributions of each margin during the previous period of export expansion.

Taken together, these results support insights from Section 2. Large firms have absorbed the largest part of the 2008-2009 trade collapse. They mainly did so through the intensive margin and by reducing the renewal of their product portfolio. Nonetheless, small players have also been hurt by the crisis and often forced to exit as they could not adjust otherwise.

[Table 2 about here.]

3.4 Evidence for financially constrained firms

Did financial constraints represent a source of heterogeneity in exporters adjustment to the crisis? We apply the same decomposition as in Table 2 to the subset of financially constrained firms.

Financially constrained firms are identified by making use of a unique database which has been previously used by Aghion et al. (2010). Since 1992, French banks have a legal obligation to report within four business days to the *Systeme Interbancaire de Telecompensation* any accident whereby a firm fails to pay its creditors. These defaults on credits are called *Payment Incidents*. The Banque de France centralizes this information and makes it readily available through a weekly paper or via Internet to all commercial banks and other credit institutions. The Banque de France allows free access to the full history of incidents of payments over the preceding 12 months. This service has the sole purpose of providing information to banks and other credit institutions about their customers, in order for them to adapt their credit supply

to this information. Payment incidents can be regarded as a generator of credit constraints; having experienced a payment incident during the previous year has a negative and significant impact on the amount of new bank loans: both the probability of contracting a new loan and the size of future loans are negatively affected by having had a payment incident (Aghion et al., 2010). Further details about the variable are provided in Appendix A.1.3.

Table 3 reports the number and share of exporters that had at least one payment incident over the preceding 12 months. Their number is relatively stable over the period: on average, 2855 exporters experience at least one incident of payment between January 2008 and April 2009. The figures are respectively 2943 during the crisis period (September 2008 to April 2009) and 2766 between January and August 2008 (vs. 3003 in 2007). The share of monthly exporters hit by incidents of paiement however slightly increases. It was equal to 6.4% of total French exporters during the period January-April 2009, compared to 5.5% and 6.1% over the same period of 2008 and 2007 respectively. We expect that the impact of being financially constrained to fall mainly on those firms that belong to sectors that rely heavily on external finance. We will check econometrically in Section 4 the accuracy of this conjecture.

[Table 3 about here.]

[Table 4 about here.]

Table 4 presents the results of the decomposition in margins for the sub-sample of financially constrained French exporters as defined above. The increase in the negative contribution of the intensive margin, compared to the whole sample of French exporters, is limited (-14.9% instead of -12.7%). By constrast, at the extensive margin, the negative contribution is very high: i.e. -18.1% at the extensive margin compared to -3.4% at the intensive margin. The difference is explained mostly by firm and destination-country exits.

3.5 Further characterizations of the trade collapse: the sectoral, geographic and price dimension

In order to fully characterize the channels through which the trade collapse took place, we investigate if sectoral and geographical specialization as well as price changes over the crisis period were important determinants of the patterns observed in Section 3. We also check if findings differ for firms of different size.

Starting with the role of different geographic and sectoral specialization across firms, we adopt a shift-share decomposition. Traditionally, shift-share decompositions are computed

algebrically. One important drawback of algebric methods, however, is the dependence of the results on the ordering of the effects: computing first geographical effects and then sectoral effects and doing the inverse yield different results. To overcome this problem and to evaluate the statistical significance of results, we use an econometric method that allows to capture the estimated parameters associated with sectoral and geographical fixed effects. This is an adaptation of the weighted variance analysis (ANOVA) that was initially developed by studies in regional economics to give a statistical base to the geographical structural analysis of Jayet (1993) and that has been more recently applied to international trade by Cheptea et al. (2005). Thanks to this methodology, our results are independent from the order of decomposition. Moreover, the we are able to compute standard errors, which allow to evaluate the significance of the results. Specifically, we regress the elementary growth rates (mid-point growth rates in our case) – weighted by means of the variable s_{ikt} defined above, i.e. exports at time t plus exports at time *t-12* divided by the sum of total exports (all exporters, sectors and destinations) at times t and *t-12* – for each period t on a set of three dummies variables: *countries*, *sectors* and *size-groups*. Marginal averages (i.e. the marginal impact of a given sector or destination or size) are computed from the estimated fixed effects and confronted with the unconditional estimations.[16]

We illustrate the method by taking as example the mid-point growth rate for the top 1% exporters in April 2009 (see Table 5). In the unconditional computation this was equal to –30.2%. However, large exporters are largely represented in the car industry or may be exporting to markets heavily hit by the crisis. In April 2009, the contribution of the sectoral composition of exports was –1.1% and the contribution of the geographical composition of their exports accounted for another –0.2%. Thus, we must correct the apparent mid-point growth rate and subtract these two effects to obtain –29.0%. To wrap up, the year-on-year contraction recorded for the largest exporters in April 2009 would have been equal to –29.0%, had their export structure been similar to the cross-destination and cross-sector average French exporter at that date.

Overall, Table 5 indicates that large and small exporters have been similarly affected by the crisis, if one corrects for the different geographical and sectoral orientation of exports. One notable exception is represented by the month of February 2009, when the largest exporters have been the most severely harmed. Meanwhile, the uncorrected growth rates of exports

[16]The estimated fixed effects are computed as deviations from the world sample average by means of a normalisation of the results. We use initial trade volumes as weights to redefine the effects. Technically, the simple average of estimated effects is subtracted from each effect, including the omitted ones. Notice that this method generates identical results regardless of the effects omitted in the estimation procedure. This normalisation has solely the purpose of simplifying the interpretation of the results and it does not alter the final result in any way.

exhibit large differences between small and large exporters, with the large exporters being more severely hit over the entire duration of the crisis. These results, which are also confirmed by multivariate regression analysis, suggest that small firms concentrate in destinations or sectors which were relatively less affected by the trade collapse, and this cushioned their losses.

A difference between large and small exporters however exists. It concerns the timing of the events: the conditional figures suggest that the smallest exporters have been hit much earlier (already starting in August 2008) than larger exporters, whose exports started downsizing in the last quarter of 2008.

[Table 5 about here.]

We can use the above estimated fixed effects to check if some particular destinations and products were driving the results. Furthermore, we can decompose the fixed effects into price and quantity contributions.

Starting with the sectoral dimension, we classify the HS-2 digit chapters into broad sectors of activity, namely in intermediate goods, consumption goods, automobile, other transport, other equipment, plus a residual grouping (see details in Appendix A.1.3). If we rank sectors by harm based on the coefficient of the fixed effects, we find that 11 out of the 15 most damaged sectors are classified as intermediate goods (see Table 6). The products of the only consumption goods sector that shows up in this "top-15 ", i.e. those going under the heading "carpets and other textile floor coverings", are mainly used as inputs in the construction sector. Consumption goods on the other hand dominate the ranking of the least affected sectors. These are sectors whose coefficients are positive over the period of the trade collapse. Incidentally, some intermediates are also among the least affected sectors. They however tend to be used as inputs in the production of non-durable consumer goods. When aggregating sectors across broad categories, we find that more than one third of the overall deterioration is attributable to intermediate goods. While this may be partially explained by nominal changes linked to the burst of the commodity price bubble (see below for further discussion), "other equipment goods" and the car industry contribute to the overall trade developments with about one fourth and one fifth respectively.

[Table 6 about here.]

The inspection of the geographical dimension of the trade collapse confirms that the geographical composition of exports played a minor role in the trade collapse, as clearly emerging from the unusual synchronicity of the trade collapse at the global level. Overall, the distribution of country-specific fixed effects is less dispersed than the distribution of sectoral fixed effects.

The destinations towards which exports contracted most include mainly European destinations, the United States and some important members of *Factory Asia* (see Table 7). Meanwhile, no clear pattern seems to emerge from the list of the least affected destinations. Even a breakdown of destinations by financial development and remoteness does not reveal any noteworthy difference across countries.

[Table 7 about here.]

We conclude Section 3 with a decomposition of the value flows into quantities and unit values. This gives an idea of the role played by price adjustments in that period. We follow common practice and use changes in unit values as proxies for changes in prices, despite the many well-known shortcomings (Schott, 2004).[17] Accordingly, we compute average price changes, for total exports and vis-à-vis individual trade partners, by means of weighted averages of the elementary price changes.

We decompose each elementary flow i as follows:

$$dln(value)_{i,t/t-12} = dln(quantity)_{i,t/t-12} + dln(\frac{value}{quantity})_{i,t/t-12} \quad (4)$$

We then aggregate elementary changes as one would do for a Tornqvist price index, using the following formula:

$$\sum_i w_{it}\ dln(value)_{i,t/t-12} = \sum_i w_{it}\ dln(quantity)_{i,t/t-12}] + \sum_i w_{it}\ dln(\frac{value}{quantity})_{i,t/t-12} \quad (5)$$

where the weight factor w_{it} is given by half the share of a flow over the total value of French exports in the two reference periods, i.e.

$$w_{it} = \frac{1}{2}\left(\frac{value_{i,t}}{\sum_i value_{i,t}} + \frac{value_{i,t-12}}{\sum_i value_{i,t-12}}\right) \quad (6)$$

With the above method, we can decompose both changes in total exports and changes in exports directed to specific destinations. A statistical shift-share analysis can be applied

[17] Unit value indices are not price indices since their changes may be due to price and (compositional) quantity changes. Bias in unit value indices are attributed to changes in the mix of goods exported and to the poor quality of recorded data on quantities. However in our case the problem of confounding quality changes with price development is leading to less severe bias than normally reported since we use very highly disaggregated trade flows at the firm-destination-product level.

separately to quantities and unit-values changes as it has been applied to values. [18]

Our results indicate that the contraction in exports of a number of commodities was mainly the outcome of changes in unit values.[19] This notwithstanding, in aggregate, the contraction of the volumes exported accounts for most of the collapse, with only a minor impact for price changes.[20] Table 8 shows the most affected and least affected sectors in terms of quantity exported. Among the fifteen most affected sectors, only three are consumer goods (footwear; tapestries; and one luxury good: furskin). All other sectors include intermediate or durable goods.

[Table 8 about here.]

The breakdown of unit value changes by destination reveals other interesting facts.[21] It reflects by and large foreign exchange development, suggesting that pricing to market strategies have played a role. We find a 58% correlation between prices changes (effects from the shift-share analysis) and exchange rate changes (bilateral exchange rate relative to French effective exchange rate).[22] The euro depreciation against a number of foreign currencies gave French exporters the possibility to increase prices in euro in the corresponding destinations without loss in competitiveness. In particular, French export prices increased substantially toward Japan, as the Yen appreciated vis-à-vis the euro. Symmetrically, prices had to be reduced towards those countries whose currency depreciated vis-à-vis the uro, including Great Britain, Poland and Turkey. Finally, a remarkable price stability was observed towards other euro area countries.

In conclusion, both product and firm-specific features mattered during the trade collapse. Exploiting econometrically our dataset that matches individual firm exports with information on financial constraints and pre-crisis balance sheet data, will allow us to quantify the relative contribution of the various determinants. In so doing, we can provide a useful input into the still unsettled debate on the relative role of demand, composition and financing conditions in the 2008-2009 crisis.

[18] Important caveats to our analysis are the following: it is based exclusively on the intensive margin (continuous flows) and we exclude all elementary flows without quantity reported (intra-EU trade flows for firms exporting overall less than 460,000 euro per year to the other 26 members of the Union). We believe that both restrictions do not bias the turf of the data: we have shown in section 3.3 that the intensive margin dominates the dynamics of trade during the crisis, and the threshold for intra-EU trade reporting is sufficiently low to be of second order importance.

[19] The sectors whose contraction was driven by prices changes include copper, lead, nickel, zinc, pulp of wood, other vegetables textile fibers.

[20] Overall the price index for French exports was 1.4% higher in April 2009 than in April 2008. It was nearly unchanged compared to April 2007 (-0.1% between April 2007 and April 2008). The mean annual growth rate during the crisis period (from September 2008 to April 2009) was 3.3%.

[21] Prices of mineral fuel and oil (HS 27) fell but this sector remains outside the most and least harmed sector lists when quantities are considered instead of values.

[22] We consider here the 50 French top destinations.

4 The role of financial constraints in the export engine failure

The analysis in Section 3 clearly indicated that demand, as well as product and firm characteristics played an important role in shaping the trade contraction. Such an outcome is consistent with a story where the trade collapse was due to an important fall in demand worldwide, compounded by composition and value chain effects, two elements that contribute explaining the sectoral heterogeneity. On top of this and on account of the financial origin of the crisis, it is likely that financial constraints also played a role. This would indeed explain the differential impact along the margins of adjustment and for firms of different size, reach in terms of export markets and product portfolio.

4.1 Specification

Our baseline equation is intended to account for all the above mentioned factors. It estimates exports growth over the period 2008M1 to 2009M4 by means of OLS, with the choice of the subperiod being constrained by computational capacity limits.[23]

$$g_{ickt} = \alpha * d\ln(import)_{ckt} + \beta * PI_{it} + \gamma * PI_{it} * crisis + u_{ct} + v_{kt} + \varepsilon \qquad (7)$$

Our dependent variable, the mid-point growth rate of firms' exports has three additional dimensions: time t, HS2 sector k and destination c. It is computed on flows in value.[24]

A first determinant of the change in exports is the demand for imports in the sector and destination market each firms exports to. We compute this demand as sectoral 'net' imports in each destination market, where French exports are subtracted from the total imports of

[23] Using 12 month overlapping growth rates introduces serial correlation in the residuals along two dimensions: value of exports by each firm and number of export flows. It is however unclear how to deal with these two sources of seasonality jointly. In particular, it is not clear how to deal with seasonality in the number of export flows, since known techniques would involve creating/deleting flows artificially. Morevover, due to the high number of observations and fixed effects used, standard procedures cannot be used to compute robust standard errors. However, the main source of likely heteroscedasticity - i.e. the correlation between the variance of the growth rate and the size of exporters - is dealt with using weighted OLS.

[24] In Section 3, the mid-point growth rate was calculated for each firms at the product level (CN-8 digit): the most granular piece of information available in the French customs database. In our econometric analysis, however, we aggregate the product dimension of the data in sectors. Thus, we cumulate all products exported within a sector at the firm level, by destination. Consolidating, at the firm-level, the additional information on the product dimension into a sectoral information helps evaluating results. While eliminating noise from the data and making the dataset more manageable, this categorization takes into account that the current crisis appears to have had a distinctive sectoral dimension.

the destination. This procedure allows to avoid endogeneity problems. Data provided by the International Trade Centre (ITC) record monthly imports up to 2009M4 for a subset of only 52 countries, which however represent about 84% of the value of French exports (see Appendix A.1.2 for further details). Given these figures, this variable is well suited to control for the 2008-2009 well-documented contraction in global demand and, to some extent, reflect the extremely skewed sectoral dimension of the crisis.

A second determinant to be addressed is the overall impact of the crisis, notwithstanding the demand and sectoral issues referred to above. Indeed, the general climate of uncertainty and its impact on business confidence, shortage of liquidity and a more restrictive access to the financing of business activities in some regions of the world may have exacerbated contraction of both activity and trade, beyond demand developments. To control for this we create a dummy variable taking value 1 from 2008M9 onwards.

Beyond the well established determinants of export performance, this paper aims at investigating the impact of financial constraints. Our time-varying variable of credit constraints *Payment Incidents (PI* thereafter) is defined in Section 3. It is coded as a dummy variable equal to 1 if a firm experienced at least one payment incident over the preceding 12 months.

Country-time and HS2-time fixed effects act as sectoral deflators, controlling for any time-varying country and sectoral determinant, including the exchange rate and any sectors specific shock as well as, to some extent, for composition effects or for sectoral differences in internationally fragmented production.

4.2 Results

The results of the baseline specification are reported in Columns (1) to (4) of Table 9. Having experienced a payment incident over the previous 12 months has a negative impact on the firm exports in normal times (-26%). During the period of the crisis, the negative impact was heightened by 2 percentage points. These figures are to be assessed against the background of a 17% year-on-year drop in firms' exports on average during the crisis. Results are relatively stable across estimations and also robust to the inclusion of different control variables.

The literature on the link between financial dependence and firms performance indicates that there is a sectoral dimension to the financial dependence of a firm: by and large, the production function determines the type of financial needs dominant in a sector (Rajan and Zingales, 1998). On this account, it is likely that in good times a well developed financial sector can be the source of a comparative advantage in financially constrained sectors. By contrast, during the turmoil, this advantage can be expected to reverse due to credit shortage.

To control for the sectoral dimension, we construct an index of financial dependence for HS-2 digit industries akin to Rajan and Zingales (1998). Accordingly, our index of external financial dependence is equal to one minus the ratio of the mean of internal financing over the mean gross fixed capital formation over the period 2003-2007 for each firm in the dataset. Data are taken from the *FiBEn* database constructed by the Banque de France, which contains information on both flow and stock accounting variables of a large sample of French firms and is based on fiscal documents, balance sheets and P&L statements (see Appendix A.1.3 for further details). We obtain the aggregation at the HS-2 digit sector by computing the median value across firms. As the technological needs of sectors are slow to evolve, we can assume their time-invariance over the period of estimation. Meanwhile, the inclusion of sector-time fixed effects (on a monthly basis) allows us to control for sectoral volatility over the cycle. An innovation of our paper with respect to the previous related literature is that we calculate our indices of financial dependence based on a dataset of firms included in our data-sample. We use this indicator to carry out separately regressions for sectors whose index of external financial dependence is below the median and for sectors whose index is above the median. Results of the regression on sectors below the median are reported in column (3) of Table 9 and those for sectors above the median in column (4). The additional negative effect of the crisis seems to be fully driven by developments in the sectors dependent on external finance.

[Table 9 about here.]

4.3 Robustness checks

Even if payment incidents have been found to be a clear generator of credit constraints, this measure is not immune from potential endogeneity problems. A negative export performance and the fact of having experienced a payment incident may result from omitted variables. For example a firm may decide that an activity is not worth pursuing and, as a result it may reduce both output (and therefore exports) and its diligence towards its creditors in that activity. To deal with the potential endogeneity problem, we therefore enrich the baseline equation to control for a range of classical firm-level determinants of export performance, including size (net assets), productivity (value added per employee), and a set of three variables providing a measure of the financial dependence of the firm. Namely, dependence on external finance (internal financing over gross fixed capital formation), cost of debt (financial charges over value added) and leverage ratio (debt over own funds). All the RHS firm-level variables, with the exception of the *Payment Incidents* variable, are taken from the *FiBEn* database. In appendix to the paper (Table 12) we report the average value per HS2 sector for each of the financial

variables used in the estimation, including the incidents of payment measure.

We first control in column (5) for firm heterogeneity in size (net assets) and productivity (value added per employee). In column (6), we also include dependence on external finance (internal financing over gross fixed capital formation), cost of debt (financial charges over value added) and leverage ratio (debt over own funds). The inclusion of these additional firm level controls does reduce the magnitude of the coefficient on payment incident, but not the additional significant impact that we find during the crisis.

Results in Column (8) refer to another type of robustness test: data are consolidated by ownership, so that all France-based firms belonging to the same proprietary group are clustered together. More precisely the trade flows by all France-based subsidiaries are consolidated in one observation and the the *Payment Incidents* variable is averaged using exports as weights.

Columns (5) and (6) of Table 9 include net assets, a proxy for firm differences across size. Interestingly, firms of different size seem to be differently constrained by credit restrictions. Estimations weighted by the size of a firm's exports suggest a weaker effect of the *PI* variable in normal times, but higher during the crisis (column (7)). A possible reason is that larger firms are less affected by incidents of payment in normal times, when bank credit is not constrained while small firms are always constrained, irrelevant of what the banks' loans policy is.

4.4 Quantification

Having shown that both supply and demand factors mattered, in the last step of our analysis we quantify the weight of financial constraints on aggregate exports and for the subset of financially constrained firms. In Section 4.3 we observed that financially constrained exporters (exporters having faced a payment incident in the previous 12 months) face a non-trivial cost in terms of exports, which was heightened during the trade crisis. This effect is totally explained by developments in sectors of high dependence on external finance. Yet, developments in demand are a main driver of export developments. Hence, it remains unclear how our estimates translate into the aggregate patterns.

In order to shed light on these issues, we compute the predicted midpoint growth rate twice, once including and once excluding the additional financial constraints during the crisis to financially constrained firms. Financial constraints are quantified using the resulting coefficient for PI in equation 7. We first do so for the subset of financially constrained firms in Figure 3 and then for the whole universe of French exporters (Figure 4). Even if other determinants of export performance dominate (namely, demand and exports composition), credit constraints during the crisis significantly worsened exports for financially constrained firms: during the

crisis period, about 20% of the drop in exports of financially constrained firms was explained by the variable "Payment incidents". Still, in aggregate the impact was trivial.

The contrast between these two results sheds light on the opposite views in the literature: we find clear micro-economic evidence that financial constraints did play a role, in particular in sectors relying heavily on external finance and for financially constrained firms, but given the limited share of the latter on the universe of French exporters, the overall impact of financial constraints so defined remains limited. Our findings are in the same ballpark of Eaton et al. (2009) and show how these can be reconciled with findings showing an important role for credit constraints, as in Chor and Manova (2010) and Amiti and Weinstein (2009). In particular, our results on the significance of financial constraint for financially constrained firms (20% of the predicted mid-point growth rate) are qualitatively similar to those found by Amiti and Weinstein (2009) for Japanese firms in the 1990's. Amiti and Weinstein find a 33% contribution, but in absence of a concurrent major contraction in demand worldwide. One important implication of the results from our quantification exercise is that, in the context of the 2008-2009 crisis, financial constraints cannot help accounting for the portion of aggregate trade contraction that traditional macro and trade models have not been able to explain.

[Figure 3 about here.]

[Figure 4 about here.]

5 Conclusion

Our paper addressed the following questions: did firm characteristics prevail over other determinants including demand and product characteristics in the 2008-2009 trade collapse? Using a unique dataset of French firms matching export data and financial constraints, we find that both products and firm characteristics mattered. Most of the 2008-2009 trade collapse is accounted by the unprecedented demand shock and by product characteristics. While all firms have been evenly affected by the crisis, the impact for large firms was mainly through the intensive margin and via reduction of the portfolio of products offered in each destination served. Smaller exporters instead have been forced to reduce the range of destinations served or to stop exporting altogether. Credit constraints, on their part, emerged as an aggravating factor. Credit constrained firms were defined as those firms having faced an incident of payment over the 12 previous months. Even if other determinants of export performance dominate (namely, demand and exports composition), credit constraints during the crisis significantly worsened exports for financially constrained firms: during the crisis period, about 20% of the drop in

exports of financially constrained firms was explained by payment incidents. Nonetheless, as the share of these firms is small and their number did not increase much during the crisis the overall impact of credit constraints on trade remains limited.

One important implication of the results from our quantification exercise is that, in the context of the 2008-2009 crisis, financial constraints cannot help accounting for the portion of *aggregate* trade contraction that traditional macro and trade models have not been able to explain.

Many dimensions of the episode of trade collapse have been controlled for in our analysis. We accounted and controlled for concurrent important factors, including composition effects, specificities of value chain production and exchange rate changes by the inclusion in our estimations of import demand at the sectoral level on destination markets, sector and country fixed effects and by carrying out relevant decompositions of the margins of adjustment. We also controlled for firm ownership, consolidating data by group. We developed methods to work with high frequency data, also discussing the potential biases arising from their use and comparing results to those with annual data where applicable. We provided direct evidence on firms' financial constraints and their variation over the crisis period.

Still there are avenues for further work using firm level data. Firstly, matching techniques could inform us on what distinguish firms that thrived in adversity from the rest of the sample. This topic, however, would deserve a dedicated analysis. Secondly, the magnification effect of value chains (referred to in many papers) would deserve an in-depth stand-alone analysis. This however cannot be carried out in the context of this paper as we do not have input-output tables at the level of the firm, but only at the sectoral level. Thirdly, addressing whether domestic sales have been less affected than exports would shed light on the specificities of the export activity. Again, this is not possible with our data: we have only access to annual balance sheet data and in any case not yet available for 2009.

References

Aghion, P., P. Askenazy, N. Berman, G. Cette, and L. Eymard (2010). Credit constraints and the cyclicality of r&d investment: Evidence from france. *Journal of the European Economic Association n.a.*, n.a. Forthcoming.

Alessandria, G., J. Kaboski, and V. Midrigan (2010). The great trade collapse of 2008-09: An inventory adjustment. mimeo.

Amiti, M. and D. Weinstein (2009). Exports and financial shocks. Working Paper 15556, National Bureau of Economic Research.

Auboin, M. (2009). Trade finance: G20 and follow-up. VoxEU.org, 5 June 2009.

Baldwin, R. (2009). *The great trade collapse: what caused it and what does it mean.* London: Centre for Economic Policy Research and VoxEu.org.

Baldwin, R. and S. Evenett (2009). *The collapse of global trade, murky protectionism, and the crisis: Recommendations for the G20.* London: Centre for Economic Policy Research and VoxEu.org.

Behrens, K., G. Corcos, and G. Mion (2010). Trade crisis? what trade crisis? mimeo.

Benassy-Quéré, A., Y. Decreux, L. Fontagné, and D. Khoudour-Casteras (2009). Economic crisis and global supply chains. Working Paper 15, CEPII.

Berman, N. (2009). Financial crises and international trade: The long way to recovery. Technical report.

Bernard, A., B. Jensen, S. Redding, and P. Schott (2009). The margins of u.s. trade (long version). Working Paper 14662, National Bureau of Economic Research.

Bernard, A. B., J. Eaton, J. B. Jensen, and S. Kortum (2003, September). Plants and productivity in international trade. *American Economic Review 93*(4), 1268–1290.

Bernard, A. B. and J. B. Jensen (2004). Entry, expansion, and intensity in the us export boom, 1987-1992. *Review of International Economics 12*(4), 662–675.

Buono, I., H. Fadinger, and S. Berger (2008). The micro dynamics of exporting: Evidence from french firms. MPRA Paper 12940, University Library of Munich, Germany.

Bussière, M., E. Perez, R. Straub, and D. Taglioni (2010). Protectionist responses to the crisis: Global trends and implications. Occasional Paper 110, European Central Bank.

Cheptea, A., G. Gaulier, and S. Zignago (2005). World trade competitiveness: A disaggregated view by shift-share analysis. Working Paper 23, CEPII.

Chor, D. and K. Manova (2010). On the cliff and back? credit conditions and international trade during the global financial crisis. Technical report, NBER Working Paper 16174.

Claessens, S., M. A. Kose, and M. E. Terrones (2009, October). What happens during recessions, crunches and busts? *Economic Policy 24*, 653–700.

Davis, S. J. and J. C. Haltiwanger (1992). Gross job creation, gross job destruction, and employment reallocation. *Quarterly Journal of Economics 107*(3), 819–863.

Eaton, J. and S. Kortum (2002, September). Technology, geography, and trade. *Econometrica 70*(5), 1741–1779.

Eaton, J., S. Kortum, B. Neiman, and J. Romalis (2009). Trade and the global recession. mimeo.

G20 (2010). G20 trade finance experts group april report: Canada-korea chair's recommendations for finance ministers. Technical report, G20.

Greenaway, D., A. Guariglia, and R. Kneller (2007). Financial factors and exporting decisions. *Journal of International Economics 73*(2), 377–395.

Iacovone, L. and V. Zavacka (2009). Banking crises and exports: Lessons from the past. Policy Research Working Paper Series 5016, The World Bank.

Jayet, H. (1993). *Analyse spatiale quantitative: une introduction*. Paris: Economica.

Levchenko, A., L. Lewis, and L. Tesar (2009). The collapse of international trade during the 2008-2009 crisis: In search of the smoking gun. Working paper 952, Research Seminar in International Economics, University of Michigan.

Manova, K. (2008). Credit constraints, heterogeneous firms and international trade. *NBER Working Paper*, 14531.

Mayer, T., M. Melitz, and G. Ottaviano (2010). Market size, competition and the product mix of exporters. mimeo.

Mayer, T. and G. Ottaviano (2007). The happy few: the internationalisation of european firms. Technical report, Bruegel Blueprint.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica 71*, 6. 1695-1725.

Melitz, M. and G. Ottaviano (2007). Market size, trade, and productivity. *Review of Economic Studies 75(1)*(01), 295–316.

Muuls, M. (2008). Exporters and credit constraints. a firm level approach. Research series 2008-09-22, National Bank of Belgium.

O'Rourke, K. (2009). Collapsing trade in barbie world. The Irish Economy.

Rajan, R. and L. Zingales (1998). Financial dependence and growth. *American Economic Review 88*(3), 559–86.

Schott, P. (2004). Across-product versus within-product specialization in international trade. *Quarterly Journal of Economics 119*, 2. 647-678.

Tanaka, K. (2009). Trade collapse and vertical foreign direct investment. VoxEU.org, 7th May.

Yi, K.-M. (2009). The collapse of global trade: the role of vertical specialization. In R. Baldwin and S. Evenett (Eds.), *The collapse of global trade, murky protectionism, and the crisis: Recommendations for the G20*, Chapter 9, pp. 45–48. Centre for Economic Policy Research and VoxEu.org.

A Appendix

A.1 Data description

A.1.1 Firm level export data

We rely on individual firms exports recorded on a monthly basis by the French customs. The period covered is 2000M1 to 2009M4. We exclude from the data the items belonging to HS2 Chapter 97 ('Works of art, collectors' pieces and antiques'), 98 ('Special Classification Provisions'), and 99 ('Special Transaction Trade') as well as monetary gold. Each exporter is identified by a unique officially assigned identification number (SIREN). Each exporter ships its products in one or more product categories defined at the Combined Nomenclature 8-digit level, comprising some 10,000 different categories. Each category of product exported by a given firm can be shipped to more than one market. Accordingly, the most granular piece of information available in the French customs database is the value exported each month by a French resident firm in a CN8 category to each destination country. From a simple statistical point of view, the resulting four-dimensional data point is defined as elementary flow. On average, 629000 elementary flows were recorded monthly over the period from 2005M1 to 2009M4. Changes in trade flows over time may originate from changes in any of the following: number of exporters, number of products, destination markets served and value shipped per each elementary flow. In our analysis, we use the above level of detail in Section 3. By contrast, in the econometric analysis of Section 4, we aggregate the product dimension of the data in HS 2-digit sectors. Thus, our dependent variable comprises export flows, where each data point corresponds to the value of exports of all exported products categorized under CN 8-digit categories belonging to the same HS 2-digit sector by each French exporter to each destination country. In other words, we cumulate all products exported within a sector at the firm level, by destination.[25] Consolidating, at the firm-level, the additional information on the product dimension into a sectoral information helps evaluating results. While eliminating noise from the data and making the dataset more manageable, this categorization takes into account that the current crisis appears to have had a distinctive sectoral dimension, as stylized facts from aggregate data suggest (effect strongest on durable goods, financial dependence of firms clearly following a sectoral dimension, etc.).

One issue to bear in mind is that our dataset is subject to some limitations linked to data-censoring. While we use all the information collected by the French Customs, the exports reporting obligation applies only if a firm exports above a legal threshold. More specifically, two different size thresholds

[25] Incidentally, a firm may appear several times in the database, if it exports CN8 products belonging to more than one HS2 sector. It should be noted however that, each time, only its exports relative to the relevant sector are taken into account.

apply, one for extra-EU trade and one for intra-EU trade. For exports to non-EU countries, firms have the obligation to declare their exports if the the yearly cumulated value of their exports is 1,000 euro or more. For exports to other EU member state, the declaration is compulsory if the yearly cumulated value of exports to the other 26 EU Member states taken together is larger than 150,000 euro. These size thresholds may bias negatively the extensive margin, since small firms are more subject to extensive margin adjustments (see findings in Section 3.3) Using monthly data, however, it is unclear how this issue could be effectively tackled. Moreover we are interested in changes over time, and not in absolute figures. Hence we consider this issue of second order importance.

Finally, it should be noted that there is considerable seasonality in our dataset and the number of working days is also an important determinant of monthly exports. We deseasonalize the data by applying the coefficient of adjustment used by the French customs to broad categories of products, and focus on year-on-year variations, whereby month m of year t is compared to the same month of year t-1.[26]

A.1.2 Sectoral import data

In order to control for developments in global demand, we use monthly sectoral data at the two-digit level of the Harmonized System for 52 countries, as provided by the ITC (UNCTAD-WTO, Geneva). The tagging by HS2 allows to categorize goods into 97 different sectors (As discussed in the main text of the paper we exclude sectors HS98 and HS99 from our dataset).

A.1.3 Financial data

We draw financial data from a variety of official and commercial sources:

Payment Incidents Since 1992, French banks have a legal obligation to report within four business days to the *Systeme Interbancaire de Telecompensation* any accident whereby a firm fails to pay its creditors. These defaults on credits are called *Payment Incidents*. The Banque de France centralizes this information and makes it readily available through a weekly paper or via Internet to all commercial banks and other credit institutions. The Banque de France allows free access to the full history of incidents of payments over the preceding 12 months. This service has the sole purpose of providing information to banks and other credit institutions about their customers, in order for them to adapt their credit supply to this information. The categories of payment incidents recorded in the database include: (1) the inability of clients to pay, e.g. due to insufficient funds, or requests for extensions

[26]See the website of the French Customs for a further detail on the above mentioned coefficients of adjustment (http://www.douane.gouv.fr/)

of payment delays, as well as (2) payment incidents due to technical reasons (mainly missing details on bank account or the issuer) or due to contestation of claim. We consider only the first source of payment incident, related to the inability of the firm to pay its trade creditors.

FiBEn FiBEn ("fichier bancaire des enterprises") is a firm level database collected by the Banque de France from firms, banks and registry of commercial courts. It contains accounting and financial data on all French companies with a turnover of at least 75,000 euros per year or with credit outstanding of at least 38,000 euros (see http://www.banque-france.fr/gb/instit/services/page2.htm). Annual accounting data are available for about 200,000 firms. These include almost 50% of exporters recorded by the French customs database over the period 2007M1-2009M4 and about 80% of the firms with 20 to 500 employees. Descriptive statistics are presented in Table 10. Moreover, Table 12 reports for each of the 96 HS2-digit sectors, the average incidents of payments as well as the median values for a range of key financial measures, including: (1) External financial dependence over the period 2003/2007, measured as (Investment - Internal financing / Investment); Log net assets; value added per employee; the internal financing over investment ratio; the financial charges/value added ratio; and, the leverage ratio.

[Table 10 about here.]

Sectoral indices of external financial dependence Our variables of financial dependence and the measure of Incidents of payments averaged at the sectoral (HS-2) level, and the classification into broad sectors of activities, are reported in Table 12. External financial dependence equals gross fixed capital formation minus Internal financing (Cash flow - Dividend payments) over Gross fixed capital formation. We use the mean of Internal financing and Gross fixed capital formation over 2003-2007. We restrict our sample to firms that report data for at least 3 years over the period. We allocate each firm to its main HS2 sector and take the median value at the sector (HS2) level, keeping only sector in which more than 30 firms reports in FIBEn.

A.2 Mid-point growth rates: monthly, quadrimestrial and yearly data

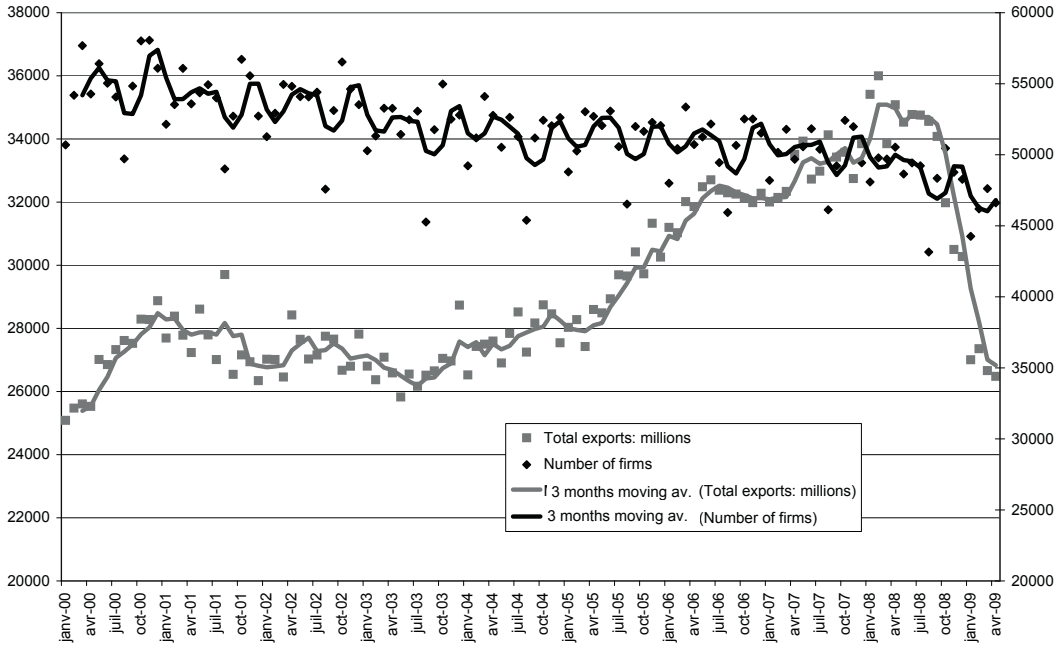
Table 11 reports the simple averages of the contributions of the intensive and extensive margin to the growth of French trade over the period 2006-2007 and during the crisis (September 2008 - April 2009) using monthly, quadrimestrial and annual data.

[Table 11 about here.]

[Table 12 about here.]

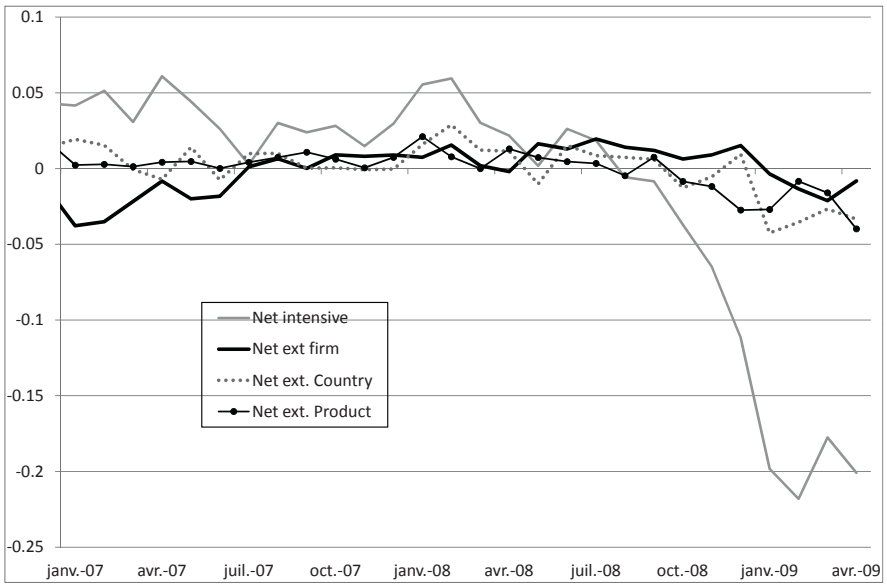
[Table 13 about here.]

Figure 1: Total value of French exports and total number of French exporters, January 2000-April 2009



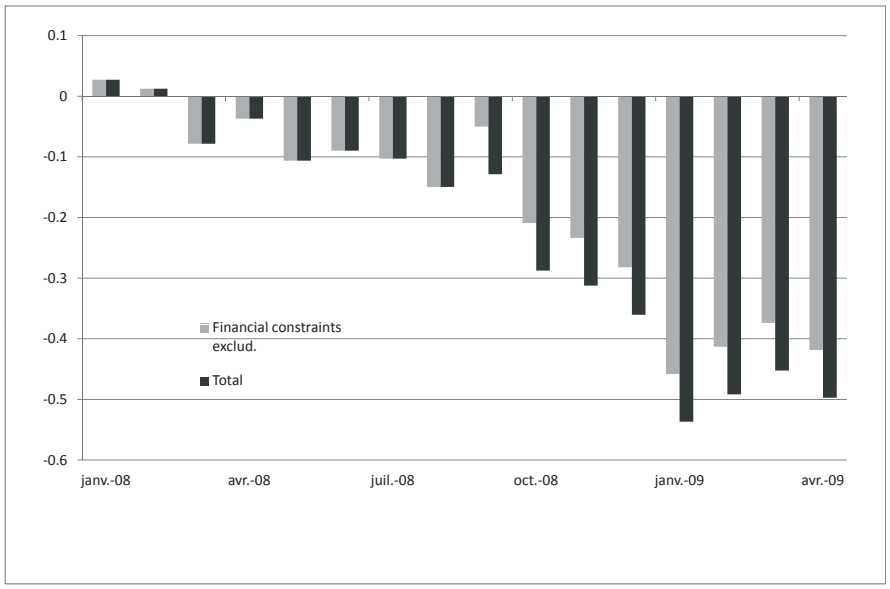
Source: French customs data, own calculations.
Note: Chapters 97, 98 and 99 of the HS2 are dropped. 3-months moving averages. Left scale: euros.

Figure 2: Net margins' contributions to mid-point growth rates, French monthly exports (percent), January 2007-April 2009



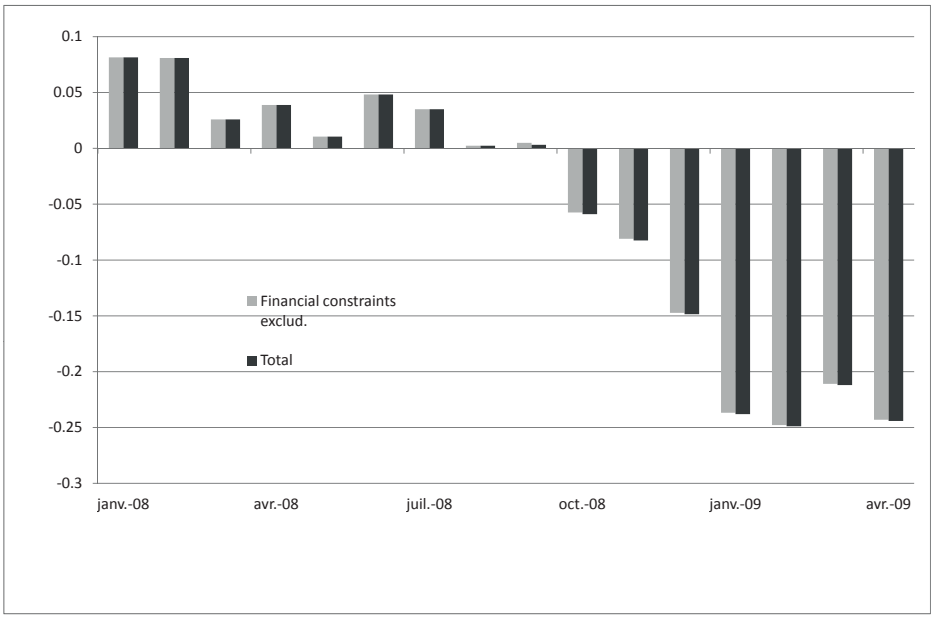
Source: French customs data, own calculations.
Note: The net intensive margin is computed as the sum of positive and negative intensive margin contributions while the net extensive margin is computed as the sum of entries and exits. Further details are provided in section 3.3.

Figure 3: Predicted midpoint growth rate for financially constrained firms



Note: computed from specification (7) in Table 9. The grey bars "Financial constrains exclud. show the predicted mid-point growth rates were financial constraints (PI coefficient) equal to zero. The black bars "Total" show the predicted mid-point growth rates given the actual financial constraints.

Figure 4: Predicted midpoint growth rate for all French exporters



Note: computed from specification (7) in Table 9. The grey bars "Financial constrains exclud. show the predicted mid-point growth rates were financial constraints (PI coefficient) equal to zero. The black bars "Total" show the predicted mid-point growth rates given the actual financial constraints.

Table 1: Contributions to mid-point growth rates, average 2006-2007, French monthly exports (percent)

Percentiles	**0-80**	**80-95**	**95-99**	**99-100**	**Total**
Firm entry	1.2%	1.4%	1.6%	1.8%	6.0%
Firm exit	-1.1%	-1.3%	-1.2%	-2.3%	-5.9%
Net firm	**0.0%**	**0.1%**	**0.4%**	**-0.4%**	**0.1%**
Country entry	0.6%	2.2%	3.4%	5.2%	11.4%
Country exit	-0.6%	-2.0%	-3.1%	-4.8%	-10.5%
Net Country	**0.0%**	**0.2%**	**0.3%**	**0.4%**	**0.9%**
Product entry	0.4%	1.8%	4.3%	11.7%	18.1%
Product exit	-0.3%	-1.7%	-3.9%	-10.8%	-16.7%
Net Product	**0.0%**	**0.1%**	**0.3%**	**0.9%**	**1.3%**
Net extensive margin	**0.1%**	**0.4%**	**1.0%**	**0.9%**	**2.3%**
Intensive positive	0.3%	2.0%	4.8%	12.9%	20.1%
Intensive negative	-0.3%	-1.7%	-3.9%	-10.3%	-16.2%
Net intensive margin	**0.0%**	**0.3%**	**1.0%**	**2.6%**	**3.9%**
Total	**0.1%**	**0.7%**	**1.9%**	**3.5%**	**6.2%**

Source: French customs data, own calculations.
Note: Chapters 97, 98 and 99 of the HS2 are excluded from the analysis. Margins are calculated as weighted averages of the individual firms contributions to the intensive and extensive margins. Exporters are ranked and assigned to each quantile group based on the value of their exports within a sector. The first column comprises exporters in the 0-80 percentiles, the second column exporters in the 80-95 percentiles, the third column exporters in the 95-99 percentiles and the fourth column the largest 1% exporters.

Table 2: Contributions to mid-point growth rates, average September 2008-April 2009, French monthly exports (percent)

Percentiles	**0-80**	**80-95**	**95-99**	**99-100**	**Total**
Firm entry	1.0%	1.2%	1.2%	1.2%	4.7%
Firm exit	-1.3%	-1.5%	-1.4%	-0.6%	-4.7%
Net firm	**-0.2%**	**-0.3%**	**-0.2%**	**0.6%**	**0.0%**
Country entry	0.5%	2.0%	2.9%	5.3%	10.8%
Country exit	-0.6%	-2.4%	-3.9%	-5.6%	-12.5%
Net Country	**-0.1%**	**-0.4%**	**-1.0%**	**-0.3%**	**-1.8%**
Product entry	0.3%	1.2%	2.3%	4.8%	8.5%
Product exit	-0.3%	-1.3%	-2.7%	-5.8%	-10.1%
Net Product	**0.0%**	**-0.1%**	**-0.4%**	**-1.1%**	**-1.6%**
Net extensive margin	**-0.3%**	**-0.8%**	**-1.5%**	**-0.8%**	**-3.4%**
Intensive positive	0.3%	1.8%	4.3%	11.1%	17.5%
Intensive negative	-0.4%	-2.5%	-6.6%	-20.7%	-30.2%
Net intensive margin	**-0.1%**	**-0.7%**	**-2.3%**	**-9.6%**	**-12.7%**
Total	**-0.4%**	**-1.5%**	**-3.9%**	**-10.4%**	**-16.2%**

Source: French customs data, own calculations.
Note: Chapters 97, 98 and 99 of the HS2 are excluded from the analysis. Margins are calculated as weighted averages of the individual firms contributions to the intensive and extensive margins. Exporters are ranked and assigned to each quantile group based on the value of their exports within a sector.The first column comprises exporters in the 0-80 percentiles, the second column exporters in the 80-95 percentiles, the third column exporters in the 95-99 percentiles and the fourth column the largest 1% exporters.

Table 3: Number and share of exporters having had an incident of payment over the preceding 12 months, January 2007 - April 2009

	month											
year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2007	2839	3016	3219	3111	3165	3164	2998	2727	2884	3010	3020	2889
	5.9%	6.0%	6.2%	6.3%	6.3%	6.1%	6.0%	5.9%	5.9%	5.7%	5.8%	5.8%
2008	2493	2753	2785	2878	2778	2869	2911	2662	2780	3046	3033	2952
	5.2%	5.5%	5.6%	5.7%	5.7%	5.8%	5.9%	6.2%	5.8%	6.0%	6.2%	6.1%
2009	2673	2853	2980	3231								
	6.0%	6.2%	6.3%	6.9%								

Source: Banque de France and own calculations.
Note: Since 1992, French banks have a legal obligation to report within four business days to the *Systeme Interbancaire de Telecompensation* any accident whereby a firm fails to pay its creditors. These defaults on credits are called *Payment Incidents* The Banque de France centralizes this information and makes it readily available through a weekly paper or via Internet to all commercial banks and other credit institutions. The Banque de France allows free access to the full history of incidents of payments over the preceding 12 months.

Table 4: Credit constrained exporters: Contributions to mid-point growth rates, average September 2008-April 2009, sub-sample of credit constrained French exporters (percent)

Percentiles	**0-80**	**80-95**	**95-99**	**99-100**	**Total**
Firm entry	1.9%	1.7%	0.9%	0.9%	5.3%
Firm exit	-3.8%	-4.0%	-3.8%	-0.6%	-12.1%
Net firm	**-1.9%**	**-2.3%**	**-2.9%**	**0.3%**	**-6.8%**
Country entry	1.0%	3.2%	3.8%	3.1%	11.1%
Country exit	-1.3%	-4.8%	-5.3%	-7.3%	-18.6%
Net Country	**-0.3%**	**-1.5%**	**-1.5%**	**-4.2%**	**-7.5%**
Product entry	0.5%	1.8%	1.9%	5.7%	9.9%
Product exit	-0.6%	-2.3%	-3.0%	-7.9%	-13.7%
Net Product	**0.0%**	**-0.5%**	**-1.1%**	**-2.2%**	**-3.8%**
Net extensive margin	**-2.2%**	**-4.4%**	**-5.4%**	**-6.1%**	**-18.1%**
Intensive positive	0.5%	2.4%	4.4%	7.2%	14.5%
Intensive negative	-0.7%	-3.7%	-9.4%	-15.6%	-29.4%
Net intensive margin	**-0.2%**	**-1.3%**	**-5.0%**	**-8.4%**	**-14.9%**
Total	**-2.5%**	**-5.6%**	**-10.5%**	**-14.5%**	**-33.0%**

Source: French customs data, own calculations.
Note: Chapters 97, 98 and 99 of the HS2 are excluded from the analysis. Margins are calculated as weighted averages of the individual firms contributions to the intensive and extensive margins. Exporters are ranked and assigned to each quantile group based on the value of their exports within a sector. The first column comprises exporters in the 0-80 percentiles, the second column exporters in the 80-95 percentiles, the third column exporters in the 95-99 percentiles and the fourth column the largest 1% exporters.

Table 5: Mid-point growth rate of exports (year-on-year) by group of exporters before and after correction for export composition (geographical and sectoral)

	Before correction				After correction			
Group	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Percentiles	(0-80)	(80-95)	(95-99)	(99-100)	(0-80)	(80-95)	(95-99)	(99-100)
2008-01	5.1	8.5	7.2	11.5	7.8	10.2	7.9	10.8
2008-02	4.7	10.2	11.4	11.6	2.4	9.3	10.5	12.2
2008-03	-4.1	3.4	5.0	4.8	-1.8	4.9	5.6	4.2
2008-04	2.9	4.8	6.2	3.8	2.3	3.7	4.5	4.6
2008-05	-2.9	-0.1	5.3	0.6	-3.3	-0.2	4.5	0.9
2008-06	-4.9	1.4	7.6	6.5	-3.3	1.7	7.2	6.5
2008-07	0.6	1.2	2.9	6.7	2.6	3.0	3.0	6.3
2008-08	-7.4	-1.4	2.0	1.6	-7.2	-1.3	1.1	1.9
2008-09	-2.6	0.7	-0.4	2.9	-3.1	-0.3	-1.4	3.4
2008-10	-7.0	-2.6	-4.5	-5.8	-9.5	-5.0	-6.0	-4.8
2008-11	-13.5	-8.8	-10.7	-5.4	-14.1	-9.3	-10.9	-5.2
2008-12	-11.1	-11.5	-17.9	-9.0	-9.9	-10.4	-14.8	-10.4
2009-01	-20.1	-20.5	-23.2	-30.2	-26.2	-25.9	-25.4	-28.1
2009-02	-21.6	-24.3	-26.1	-28.9	-22.6	-26.1	-26.8	-28.3
2009-03	-16.6	-19.8	-21.1	-26.5	-23.8	-25.7	-23.6	-24.2
2009-04	-21.3	-23.1	-26.2	-30.2	-27.1	-27.4	-26.9	-29.0

Source: French customs data, own calculations.
Note: Group 1 comprises exporters in the 0-80 percentiles, group 2 exporters in the 80-95 percentiles, group 3 exporters in the 95-99 percentiles and group 4 the largest 1% exporters. Exporters are ranked according to the value of their exports within a sector. The first column comprises exporters in the 0-80 percentiles, the second column exporters in the 80-95 percentiles, the third column exporters in the 95-99 percentiles and the fourth column the largest 1% exporters.

Table 6: Most and least harmed sectors during the trade collapse

Most harmed sectors				
ranking	**Sector**	**HS-2 code**	**broad category**	**f.e.***
1	Lead and articles thereof.	78	interm	-0.51
2	Copper and articles thereof.	74	interm	-0.41
3	Ores, slag and ash.	26	interm	-0.29
4	Vehicles o/t railw/tramw roll-stock, pts ; accessories	87	autom	-0.27
5	Zinc and articles thereof.	79	interm	-0.26
6	Nickel and articles thereof.	75	interm	-0.24
7	Arms and ammunition. parts and accessories thereof.	93	other eqt	-0.22
8	Ships, boats and floating structures.	89	other transp	-0.19
9	Other vegetable textile fibres. paper yarn ; woven fab	53	interm	-0.19
10	Carpets and other textile floor coverings.	57	cons	-0.17
11	Iron and steel.	72	interm	-0.16
12	Raw hides and skins (other than furskins) and leather.	41	interm	-0.16
13	Pulp of wood/of other fibrous cellulosic mat. waste etc	47	interm	-0.15
14	Man-made staple fibres.	55	interm	-0.15
15	Man-made filaments.	54	interm	-0.14
Least harmed sectors				
ranking	**Sector**	**HS code**	**broad category**	**f.e.***
81	Prod mill indust. malt. starches. inulin. wheat gluten	11	interm	0.16
82	Headgear and parts thereof.	65	cons	0.16
83	Toys, games ; sports requisites. parts ; access thereof	95	cons	0.16
84	Cocoa and cocoa preparations.	18	cons	0.18
85	Miscellaneous edible preparations.	21	cons	0.20
86	Railw/tramw locom, rolling-stock ; parts thereof. etc	86	other transp	0.20
87	Articles of leather. saddlery/harness. travel goods etc	42	cons	0.20
88	Meat and edible meat offal.	2	cons	0.21
89	Pharmaceutical products.	30	cons	0.23
90	Residues ; waste from the food indust. prepr ani fodder	23	interm	0.25
91	Products of animal origin, nes or included.	5	interm	0.26
92	Prepr feathers ; down. arti flower. articles human hair	67	misc	0.29
93	Live animals.	1	interm	0.30
94	Fertilisers.	31	interm	0.34
95	Coffee, tea, mat– and spices.	9	cons	0.37

Source: French customs data, and own calculations.
Note: (*) normalized fixed effects (weighted average equals 0). HS2-digit sectors.

Table 7: Most and least harmed destinations of French exports during the trade collapse

Most harmed destinations			
ranking	**Country**	**Share in French exports**	**f.e.***
1	Taiwan	0.46%	-0.27
2	Chile	0.15%	-0.21
3	Ukraine	0.23%	-0.16
4	Spain	9.32%	-0.16
5	Argentina	0.23%	-0.12
6	China	2.30%	-0.09
7	Portugal	1.23%	-0.09
8	United Kingdom	8.08%	-0.07
9	Slovenia	0.31%	-0.06
10	United States of America	6.78%	-0.06
11	Poland	1.61%	-0.06
12	Turkey	1.40%	-0.05
13	Denmark	0.72%	-0.04
14	Romania	0.63%	-0.04
15	Czech Republic	0.85%	-0.03
Least harmed destinations			
ranking	**Country**	**Share in French exports**	**f.e.***
35	Thailand	0.25%	0.05
36	Finland	0.52%	0.07
37	Tunisia	0.81%	0.07
38	Brazil	0.78%	0.07
39	Cote d'Ivoire	0.18%	0.07
40	Canada	0.86%	0.08
41	Russian Federation	1.44%	0.08
42	Malaysia	0.36%	0.08
43	Israel	0.30%	0.09
44	Mexico	0.47%	0.09
45	Switzerland	2.81%	0.14
46	Australia	0.7%	0.16
47	Egypt	0.3%	0.16
48	Morocco	0.9%	0.16
49	Nigeria	0.3%	0.18
50	Algeria	1.1%	0.36

Source: French customs data, and own calculations.
Note: (*) normalized fixed effects (weighted average equals 0). Only the 50 most popular destinations of French exports are reported in the Table

Table 8: Most and least harmed sectors: price and quantity decomposition

Most harmed sectors						
Ranking	**Sector**	**HS2 code**	**Broad cat**	**dlv**	**dlq**	**dlp**
1	Furskin and artificial fur. manufactures thereof.	43	cons	-0.30	-0.37	0.06
2	Vehicles o/t railw/tramw roll-stock, pts & accessories	87	autom	-0.36	-0.35	-0.01
3	Lead and articles thereof.	78	interm	-0.84	-0.27	-0.56
4	Ores, slag and ash.	26	interm	-0.31	-0.23	-0.08
5	Machinery & mech appliance. parts, nuclear reactors, boilers	84	other eqt	-0.17	-0.21	0.04
6	Iron and steel.	72	interm	-0.22	-0.20	-0.02
7	Arms and ammunition. parts and accessories thereof.	93	other eqt	-0.29	-0.18	-0.11
8	Railw/tramw locom, rolling-stock & parts thereof. etc	86	other transp	-0.52	-0.17	-0.35
9	Footwear, gaiters and the like. parts of such articles.	64	cons	-0.09	-0.17	0.08
10	Ships, boats and floating structures.	89	other transp	-0.23	-0.16	-0.06
11	Man-made staple fibres.	55	interm	-0.16	-0.16	0.00
12	Tin and articles thereof.	80	interm	-0.15	-0.14	-0.01
13	Special woven fab. tufted tex fab. lace. tapestries etc	58	cons	-0.05	-0.13	0.08
14	Rubber and articles thereof.	40	interm	-0.08	-0.13	0.05
15	Man-made filaments.	54	interm	-0.16	-0.13	-0.03
Least harmed sectors						
Ranking	**Sector**	**HS2 code**	**Broad cat**	**dlv**	**dlq**	**dlp**
81	Coffee, tea, mate and spices.	9	cons	0.23	0.21	0.03
82	Printed books, newspapers, pictures & other product etc	49	cons	0.22	0.21	0.00
83	Meat and edible meat offal.	2	cons	0.23	0.22	0.01
84	Pharmaceutical products.	30	cons	0.27	0.22	0.05
85	Optical, photo, cinema, meas, checking, precision, etc	90	other eqt	0.21	0.22	-0.01
86	Aircraft, spacecraft, and parts thereof.	88	other transp	0.28	0.22	0.06
87	Musical instruments. parts and access of such articles	92	cons	0.19	0.23	-0.04
88	Art of apparel & clothing access, knitted or crocheted.	61	cons	0.21	0.24	-0.03
89	Pulp of wood/of other fibrous cellulosic mat. waste etc	47	interm	-0.12	0.24	-0.36
90	Toys, games & sports requisites. parts & access thereof	95	cons	0.27	0.25	0.02
91	Cereals.	10	interm	0.08	0.25	-0.17
92	Cork and articles of cork.	45	interm	0.27	0.28	-0.01
93	Articles of leather. saddlery/harness. travel goods etc	42	cons	0.31	0.30	0.00
94	Live animals.	1	interm	0.48	0.50	-0.02
95	Umbrellas, walking-sticks, seat-sticks, whips, etc	66	misc	0.37	0.64	-0.27

Source: French customs data, own calculations.
Note: dlv = average change in value between t a and t-12 ; dlq = average change in quantity between t a and t-12; dlp = average change in unit value between t a and t-12. Average effects are computed as discussed in equations 4-6. Normalized fixed effects (weighted average equals 0). Ranking of the sectors based on quantity impact.

Table 9: Microeconomic determinants of the trade collapse

	(1)	(2)	(3) RZ<med.	(4) RZ>med.	(5)	(6)	(7) weighted	(8) Group
dln(import)	0.065	0.065	0.072	0.050	0.061	0.059	0.285	0.067
	0.004	0.004	0.006	0.006	0.005	0.005	0.002	0.004
Incident of payment	-0.269	-0.258	-0.260	-0.253	-0.076	-0.083	-0.097	-0.272
	0.004	0.005	0.007	0.009	0.007	0.007	0.002	0.006
Crisis*Incident of payment		-0.021	0.007	-0.074	-0.043	-0.019	-0.078	-0.033
		0.007	0.009	0.013	0.009	0.010	0.005	0.008
ln(net assets)					-0.002	-0.004		
					0.001	0.001		
Crisis * ln(net assets)					0.001	0.003		
					0.001	0.001		
ln(VA/nbr employees)					0.023	0.024		
					0.002	0.002		
Crisis * ln(VA/nbr employees)					0.002	-0.002		
					0.002	0.002		
Internal financing / investment						0.000		
						0.000		
Crisis * Int.financing / inv.						0.000		
						0.000		
Financial charges / VA						-0.022		
						0.009		
Crisis * Financial charges / VA						0.054		
						0.013		
Leverage ratio						-0.001		
						0.001		
Crisis * Leverage ratio						-0.003		
						0.001		
Obs.	6154401	6154401	4185385	1969016	4593495	4155614	6154401	5509445
R2	0.01	0.01	0.01	0.01	0.01	0.01	0.08	0.01
Nbr. Firms	105310	105310	79538	49452	45822	38888	105310	91759
Time*Sector f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time*Country f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: French customs data, own calculations.
Note: Intercept not reported. All financial variables are computed from FIBEN/Centrale des Bilans, Banque de France. PI: Payment Incident (0/1). Significance levels: *:10% **:5% ***:1%

Table 10: Descriptive Statistics of financial variables

Variable	Obs.	Mean	S.D.	Q1	Median	Q3
Incident of payment	6135735	0.03	0.18	0.00	0.00	0.00
dln(import)	6135735	-0.06	0.23	-0.16	-0.04	0.06
ln(net assets)	5183686	9.70	1.99	8.24	9.46	10.94
ln(VA/nbr employees)	4576938	4.32	0.69	3.93	4.26	4.62
Internal financing / investment	4501875	2.57	16.50	0.00	1.10	3.50
Financial charges / VA	4501875	0.08	0.14	0.01	0.04	0.08
Leverage ratio	4387091	0.75	1.73	0.04	0.24	0.82

Source: FIBEn database, Banque de France, own calculations.

Table 11: Mid-point growth rates: monthly, quadrimestrial and yearly data, in percent

	2006 - 2007			Sept 2008 - April 2009	
	Month	**Quadrimester**	**Year**	**Month**	**Quadrimester**
Firm entry	6.0%	3.0%	1.7%	4.7%	1.7%
Firm exit	-5.9%	-2.8%	-1.5%	-4.7%	-1.5%
Net firm	**0.1%**	**0.2%**	**0.3%**	**0.0%**	**0.3%**
Country entry	11.4%	7.5%	4.4%	10.8%	7.4%
Country exit	-10.5%	-7.3%	-4.4%	-12.5%	-8.4%
Net Country	**0.9%**	**0.2%**	**0.0%**	**-1.8%**	**-1.0%**
Product entry	18.1%	17.7%	17.1%	8.5%	6.8%
Product exit	-16.7%	-16.0%	-15.4%	-10.1%	-7.7%
Net Product	**1.3%**	**1.7%**	**1.7%**	**-1.6%**	**-0.9%**
Net extensive margin	**2.3%**	**2.0%**	**2.0%**	**-3.4%**	**-1.6%**
Intensive positive	20.1%	20.0%	19.3%	17.5%	16.4%
Intensive negative	-16.2%	-15.8%	-15.1%	-30.2%	-30.9%
Net intensive margin	**3.9%**	**4.2%**	**4.2%**	**-12.7%**	**-14.5%**
Total	**6.2%**	**6.2%**	**6.2%**	**-16.2%**	**-16.1%**

Source: French customs data, own calculations
Note: Chapters 98 and 99 of the HS2 are dropped. Simple averages of contributions calculated for each year, with the exception of last row. Exporters are ranked according to the value of their exports within a sector.

Table 12: External financial dependence and classification by broad sectors of activities

	HS2		EFD	NA	VA/E	IF/I	FC/VA	LR	IP
1	Live animals	interm	0.05	7.57	3.99	0.80	0.04	0.63	0.03
2	Meat and edible meat offal	cons	0.13	8.45	3.99	0.86	0.02	0.35	0.04
3	Fish, crustaceans, molluscs, aquatic invertebrates nes	cons	0.20	7.90	4.06	1.02	0.02	0.35	0.06
4	Dairy products, eggs, honey, edible animal product nes	cons	0.02	8.83	4.06	1.02	0.02	0.36	0.04
5	Products of animal origin, nes	interm	0.11	8.87	4.11	0.94	0.03	0.27	0.03
6	Live trees, plants, bulbs, roots, cut flowers etc	cons	0.02	7.93	3.99	1.00	0.03	0.33	0.06
7	Edible vegetables and certain roots and tubers	cons	0.02	8.00	4.22	0.94	0.02	0.33	0.03
8	Edible fruit, nuts, peel of citrus fruit, melons	cons	0.12	7.91	4.19	1.00	0.02	0.27	0.03
9	Coffee, tea, mate and spices	cons	0.08	8.70	4.19	0.91	0.02	0.33	0.04
10	Cereals	interm	-0.04	8.80	4.20	0.98	0.07	0.65	0.02
11	Milling products, malt, starches, inulin, wheat gluten	interm	0.28	9.16	4.29	1.03	0.04	0.47	0.04
12	Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	cons	-0.09	8.82	4.22	1.02	0.04	0.42	0.03
13	Lac, gums, resins, vegetable saps and extracts nes	interm	-0.04	9.01	4.37	1.15	0.03	0.25	0.02
14	Vegetable plaiting materials, vegetable products nes	interm							
15	Animal,vegetable fats and oils, cleavage products, etc	interm	0.16	8.95	4.19	0.99	0.03	0.29	0.04
16	Meat, fish and seafood food preparations nes	cons	0.07	8.73	3.97	0.98	0.02	0.36	0.05
17	Sugars and sugar confectionery	cons	0.05	9.08	4.19	0.95	0.03	0.31	0.05
18	Cocoa and cocoa preparations	cons	0.07	9.03	4.11	0.95	0.02	0.31	0.05
19	Cereal, flour, starch, milk preparations and products	cons	0.07	8.93	4.04	1.01	0.02	0.40	0.05
20	Vegetable, fruit, nut, etc food preparations	cons	-0.02	8.76	4.11	1.00	0.03	0.38	0.04
21	Miscellaneous edible preparations	cons	0.00	8.97	4.20	0.99	0.02	0.30	0.04
22	Beverages, spirits and vinegar	cons	0.00	8.42	4.32	1.22	0.05	0.46	0.05
23	Residues, wastes of food industry, animal fodder	interm	0.12	9.16	4.25	0.93	0.04	0.39	0.04
24	Tobacco and manufactured tobacco substitutes	cons							
25	Salt, sulphur, earth, stone, plaster, lime and cement	interm	-0.13	9.02	4.29	0.89	0.02	0.26	0.05
26	Ores, slag and ash	interm	0.09	9.51	4.48	0.96	0.03	0.36	0.04
27	Mineral fuels, oils, distillation products, etc	interm	0.17	9.51	4.32	0.97	0.03	0.22	0.03
28	Inorganic chemicals, precious metal compound, isotopes	interm	-0.07	9.64	4.37	0.98	0.03	0.18	0.03
29	Organic chemicals	interm	0.05	9.61	4.39	1.00	0.03	0.18	0.02
30	Pharmaceutical products	cons	0.15	9.64	4.34	1.02	0.03	0.20	0.02
31	Fertilizers	interm	-0.13	9.04	4.32	1.01	0.04	0.30	0.02
32	Tanning, dyeing extracts, tannins, derivs,pigments etc	interm	-0.07	9.34	4.23	0.92	0.03	0.27	0.04
33	Essential oils, perfumes, cosmetics, toileteries	cons	-0.01	8.82	4.25	1.10	0.03	0.28	0.04
34	Soaps, lubricants, waxes, candles, modelling pastes	interm	0.01	9.10	4.25	1.08	0.03	0.25	0.04
35	Albuminoids, modified starches, glues, enzymes	interm	-0.14	9.53	4.23	1.03	0.03	0.26	0.04
36	Explosives, pyrotechnics, matches, pyrophorics, etc	interm							
37	Photographic or cinematographic goods	cons	0.13	9.84	4.32	0.84	0.03	0.22	0.04
38	Miscellaneous chemical products	interm	-0.14	9.22	4.34	1.00	0.03	0.21	0.03
39	Plastics and articles thereof	interm	-0.04	8.83	4.16	1.07	0.03	0.29	0.04
40	Rubber and articles thereof	interm	-0.04	9.10	4.17	1.18	0.03	0.25	0.04
41	Raw hides and skins (other than furskins) and leather	interm	0.47	8.47	3.97	0.93	0.03	0.23	0.07
42	Articles of leather, animal gut, harness, travel goods	cons	-0.24	8.76	4.17	1.10	0.04	0.26	0.04
43	Furskins and artificial fur, manufactures thereof	cons							
44	Wood and articles of wood, wood charcoal	interm	-0.28	8.66	4.11	1.24	0.04	0.39	0.05
45	Cork and articles of cork	interm	-0.38	9.45	4.23	1.27	0.03	0.23	0.04
46	Manufactures of plaiting material, basketwork, etc.	cons							
47	Pulp of wood, fibrous cellulosic material, waste etc	interm	0.13	9.34	4.24	0.92	0.03	0.40	0.04
48	Paper & paperboard, articles of pulp, paper and board	interm	0.06	9.17	4.17	1.00	0.03	0.30	0.03
49	Printed books, newspapers, pictures etc	cons	0.10	8.99	4.23	0.92	0.03	0.24	0.05

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	HS2		EFD	NA	VA/E	IF/I	FC/VA	LR	IP
50	Silk	interm							
51	Wool, animal hair, horsehair yarn and fabric thereof	interm	0.25	8.50	3.99	0.89	0.04	0.14	0.04
52	Cotton	interm	0.23	8.56	4.09	0.89	0.05	0.23	0.05
53	Vegetable textile fibres nes, paper yarn, woven fabric	interm	0.10	8.45	4.03	1.13	0.05	0.23	0.04
54	Manmade filaments	interm	0.09	8.60	4.09	1.01	0.05	0.19	0.05
55	Manmade staple fibres	interm	-0.25	8.48	4.03	0.92	0.05	0.22	0.05
56	Wadding, felt, nonwovens, yarns, twine, cordage, etc	interm	-0.04	8.99	4.13	1.12	0.04	0.27	0.05
57	Carpets and other textile floor coverings	cons	0.21	8.96	4.14	1.10	0.04	0.30	0.07
58	Special woven or tufted fabric, lace, tapestry etc	cons	-0.10	8.60	4.07	1.08	0.04	0.20	0.05
59	Impregnated, coated or laminated textile fabric	cons	0.07	8.92	4.17	1.26	0.04	0.23	0.04
60	Knitted or crocheted fabric	cons	0.09	8.41	4.04	1.06	0.05	0.22	0.04
61	Articles of apparel, accessories, knit or crochet	cons	0.10	8.33	4.14	1.06	0.04	0.24	0.05
62	Articles of apparel, accessories, not knit or crochet	cons	0.06	8.28	4.14	1.11	0.04	0.23	0.05
63	Other made textile articles, sets, worn clothing etc	cons	-0.07	8.76	4.14	1.15	0.04	0.30	0.05
64	Footwear, gaiters and the like, parts thereof	cons	-0.03	8.67	4.11	1.11	0.04	0.24	0.05
65	Headgear and parts thereof	cons	0.03	9.08	4.16	1.13	0.04	0.29	0.04
66	Umbrellas, walking-sticks, seat-sticks, whips, etc	misc							
67	Bird skin, feathers, artificial flowers, human hair	misc							
68	Stone, plaster, cement, asbestos, mica, etc articles	interm	-0.15	8.68	4.16	1.13	0.02	0.28	0.05
69	Ceramic products	cons	-0.10	8.63	4.16	1.15	0.03	0.21	0.06
70	Glass and glassware	interm	-0.17	9.03	4.20	1.15	0.03	0.23	0.04
71	Pearls, precious stones, metals, coins, etc	misc	0.00	8.54	4.20	1.01	0.04	0.22	0.03
72	Iron and steel	interm	-0.47	9.16	4.25	1.13	0.03	0.34	0.04
73	Articles of iron or steel	interm	-0.29	8.77	4.16	1.24	0.03	0.30	0.04
74	Copper and articles thereof	interm	-0.27	9.06	4.23	1.25	0.03	0.29	0.04
75	Nickel and articles thereof	interm							
76	Aluminium and articles thereof	interm	-0.24	8.97	4.20	1.25	0.03	0.31	0.04
78	Lead and articles thereof	interm							
79	Zinc and articles thereof	interm	-0.31	9.11	4.36	1.69	0.02	0.32	0.04
80	Tin and articles thereof	interm							
81	Other base metals, cermets, articles thereof	interm	-0.13	9.51	4.35	0.95	0.03	0.26	0.04
82	Tools, implements, cutlery, etc of base metal	other eqt	-0.04	8.91	4.17	1.10	0.03	0.26	0.04
83	Miscellaneous articles of base metal	misc	-0.15	8.98	4.16	1.19	0.03	0.25	0.04
84	Nuclear reactors, boilers, machinery, etc	other eqt	-0.11	8.49	4.17	1.15	0.02	0.25	0.04
85	Electrical, electronic equipment	other eqt	-0.12	8.73	4.23	1.13	0.02	0.21	0.04
86	Railway, tramway locomotives, rolling stock, equipment	other transp	0.18	9.31	4.19	1.35	0.02	0.33	0.03
87	Vehicles other than railway, tramway	autom	0.00	8.62	4.04	1.09	0.03	0.44	0.05
88	Aircraft, spacecraft, and parts thereof	other transp	0.25	9.12	4.17	1.04	0.03	0.36	0.05
89	Ships, boats and other floating structures	other transp	0.01	8.08	4.06	1.03	0.03	0.36	0.08
90	Optical, photo, technical, medical, etc apparatus	other eqt	-0.14	8.82	4.25	1.11	0.02	0.20	0.03
91	Clocks and watches and parts thereof	cons	-0.02	8.89	4.20	0.99	0.03	0.23	0.04
92	Musical instruments, parts and accessories	cons	-0.55	8.32	4.14	0.90	0.03	0.31	0.05
93	Arms and ammunition, parts and accessories thereof	other eqt	-0.90	8.81	4.19	1.23	0.03	0.27	0.02
94	Furniture, lighting, signs, prefabricated buildings	other eqt	-0.02	8.34	4.11	1.15	0.03	0.30	0.07
95	Toys, games, sports requisites	cons	-0.17	8.66	4.17	1.09	0.04	0.32	0.05
96	Miscellaneous manufactured articles	misc	-0.05	8.98	4.17	1.05	0.04	0.24	0.04

Source: FIBEn, own calculations.
Note: EFD (median): External financial dependence over 2003/2007 (Investment - Internal financing / Investment). NA (median): ln net assets. VA/E (median): Value added / number of employees. IF/I (median): Internal financing / investment. FC/VA (median): Financial charges / value added. LR (median): Leverage ratio. IP (mean): Incident of payments.