Trade Crisis? What Trade Crisis?*

Kristian Behrens† Gregory Corcos‡ Giordano Mion§

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Abstract

We provide an analysis of the 2008-2009 trade collapse using microdata from a small open economy, Belgium. First, we find that changes in firm-country-product exports and imports occurred mostly at the intensive margin: the number of firms, the average number of destination and origin markets per firm, and the average number of products per market changed only very little. Second, econometric analysis reveals some composition effects in the intensive margin fall along firm, product and country characteristics. The most important factor explaining changes in exports is the destination country's growth rate of GDP. Had growth rates in 2008–2009 been the same as in 2007–2008, Belgian exports would have fallen by about 57% less than what we observe. Trade in consumer durables and capital goods fell more severely than trade in other product categories, which explains another 22% of the observed fall. Financial variables and involvement in global value chains have some explanatory power on the exports and imports fall respectively, but appear to have affected domestic operations in equal proportion. More generally, exports-to-turnover and imports-to-intermediates ratios at the firm level did neither systematically decrease nor reveal strong firm- or sector-specific patterns. Overall, our results point to a demand-side explanation: the fall in trade was mostly driven by the fall in economic activity. It is not a trade crisis — just a trade collapse.

Keywords: trade crisis; trade collapse; margins of trade; firm-level analysis; Belgium.

JEL Classification: F01; F10; F14.

*The title of this paper is freely borrowed from Lindsey Brink's March 7, 1990, *Wall Street Journal* article (page A18, eastern edition). Both articles, though dealing with a different set of issues, argue that trade is often said to be in a crisis even when closer scrutiny of the situation or the data suggests that there is no specific 'trade crisis'.

†Canada Research Chair, Département des Sciences Économiques, Université du Québec à Montréal (UQAM), Canada; CIRPÉE, Canada; and CEPR, London, UK. E-mail: behrens.kristian@uqam.ca

‡Department of Economics, Norwegian School of Economics and Business Administration (NHH), Norway. E-mail: gregory.corcos@nhh.no

§Department of Geography and Environment, London School of Economics (LSE), UK; National Bank of Belgium (NBB), Belgium; CEP, London, UK; and CEPR, London, UK. E-mail: g.mion@lse.ac.uk

1 Introduction

World trade in manufactures fell by about 30% in nominal terms between the first quarter of 2008 and the second quarter of 2009 (WTO, 2009). While some countries experienced sharp sectoral drops in their exports or imports during the past, the current trade collapse is remarkably wide-ranging across industries and highly synchronized across OECD countries (Araújo and Martins, 2009). It also substantially exceeds the fall in world GDP. Though it is well known that trade is generally more responsive than GDP to macroeconomic shocks, even when accounting for the long-term increase in the income elasticity of trade (Freund, 2009), computable general equilibrium models and international real business cycle models significantly under-predict both the magnitude and the speed of the current collapse (e.g., Benassy-Quéré *et al.*, 2009; Levchenko *et al.*, 2009).

Why was the fall in trade not commensurate with the recession? Many conjectures focus on the supply side of trade: a dramatic trade credit crunch (Auboin, 2009; Chor and Manova, 2010); the widespread disruption of global value chains (Yi, 2009);[1] or protectionism raising its ugly head again (Evenett, 2009; Jacks *et al.*, 2009). All these conjectures point at a trade crisis — a crisis of the activity of trading across national boundaries *per se*. Alternatively, other conjectures focus on the demand side of trade: a disproportionate fall in the demand for tradable goods in most OECD countries (Eaton *et al.*, 2010); or inventory adjustment (Alessandria et al. 2010) and the postponement of durable goods purchases. In principle, all these conjectures may play a role. Only empirical analysis can allow us to discriminate between them.

The main contribution of this paper is to provide a detailed microeconometric investigation of the determinants of the trade collapse for a small open economy: Belgium. Matching Belgian data on the universe of firm-country-product exports and imports with balance sheet information (and excluding entrepot trade) we perform three empirical exercises. First, we decompose the trade collapse along the extensive and the intensive margins as in Bernard *et al.* (2009). Intensive margin changes are defined as changes in average trade values per firm-market-product, while the extensive margin refers to changes in the number of firms, destinations and products. Second, we use our microdata to econometrically investigate the determinants of the fall in trade in order to discriminate between the aforementioned conjectures. More precisely, we look at variations in the changes in trade flows between the first semesters of 2008 and 2009 along firm, country, and product characteristics. In other words, we identify the main drivers of the trade collapse through compositional effects. Finally, we examine changes in exports-to-turnover and imports-to-intermediates ratios across firms.

[1] As pointed out by Freund (2009), among others, a fall in final demand in a world with fragmented production chains should have a proportional impact on intermediate trade (disregarding input substitution or price changes). Increasing fragmentation may explain the long-term rise of the trade elasticity with respect to GDP, but not its short-term rise during macroeconomic crises. Evidence of the *disruption* of global value chains during recessions is required to explain higher short-term trade elasticities. To the best of our knowledge such evidence is missing to date.

Compositional effects in changes in these ratios would offer crucial evidence pointing to the main drivers of the 'trade crisis'. To the best of our knowledge no other study has until has analyzed the trade collapse using firm-level data on trade *and* domestic operations.

Our key findings can be summarized as follows. First, we find that virtually all of the trade collapse occurred at the *intensive* margin. In other words, firm exit and the dropping of products and markets played only a limited role relative to price adjustments and output scaling in explaining changes in trade values. Furthermore, entry and exit dynamics during the crisis were not substantially different from those observed in a 'normal year'. This echoes findings by Bernard *et al.* (2009) on the 1997 Asian crisis, but is nonetheless remarkable given the magnitude of the current trade collapse. Fears that the global economy could face a major and potentially very long and costly trade crisis seem misplaced. We also find quite interesting patterns in entrants' and stayers' export values, that would deserve investigation using truly dynamic export models.

Second, we isolate firm-, country- and product-specific components of the trade collapse by regressing changes in trade values on observable firm, product and country characteristics using a multi-level clustering approach. The single most important factor explaining changes in exports is the destination country's growth rate of GDP. Had growth rates in 2008S1–2009S1 counterfactually been the same as in 2007S1–2008S1, Belgian exports would have fallen by about 57% less than what we observe. This result is quantitatively very close to that of Eaton *et al.* (2010), despite a very different dataset and methodology. Another finding is that trade in consumer durables and capital goods fell more severely than trade in other product categories. Had the fall in demand across product categories been counterfactually identical, Belgian exports would have fallen by about 22% less than what we observe. The last finding to emerge from our analysis is that compositional effects across firms are modest. The Belgian credit crunch[2] seems to have affected exporters somewhat: differences in indebtedness and debt maturity can explain up to 31% of the firm-level fall in exports. Similarly involvement in global value chains can explain about 17% of the fall in imports. Last, we find a minor effect of inventory adjustment on imports, and only in the distribution sector.

Finally, to assess whether international trade has been hit more strongly than production and domestic activity, we regress exports-to-turnover and imports-to-intermediates ratios on firm characteristics and industry dummies. Our econometric analysis reveals that there is almost no pattern across firms. In particular, financial variables have no explanatory power. These results confirm that foreign operations were not significantly differently affected than domestic operations — though exporters indeed suffered from restricted access

[2]According to the Central Corporate Credit Register of the National Bank of Belgium (NBB), authorized and used credit lines in the Belgian manufacturing sector decreased by 4.40% and 3.11% respectively between June 2008 and June 2009. Furthermore lending through letters of credit, typically used in international transactions, decreased by 5.18% over the same period.

to credit, their domestic and foreign sales were equally affected. Similarly involvement in global value chain did not have any significant effect on imports-to-intermediates ratios. Supply-side conjectures have therefore considerably less explanatory power when comparing foreign to domestic operations.

Overall our results suggest that a general fall in demand for tradables, especially for consumer durables and capital goods, is mainly responsible for the recent trade collapse. Since trade and domestic activity were affected in roughly similar ways, talk of a 'trade crisis' appears to be inappropriate.

Related literature. Firstly, our paper is quite naturally closely related to ongoing empirical investigations of the trade collapse. Baldwin (2009), which includes a large survey of empirical studies of the trade collapse, concludes in favor of demand-side explanations. Most studies rely on aggregate data or descriptives, although some decompose the margins of US and French trade, with results similar to ours. Closer to our work, Bricongne *et al.* (2009) provide a careful examination of monthly French firm-level exports. They find a dominant role for the intensive margin, with little difference across exporter size classes but a more severe fall in sectors that depend more on external finance. They do not, however, systematically exploit balance sheet data to link export changes to firm-level characteristics. Levchenko *et al.* (2009) examine the variation in US exports and imports across 6-digit industries. They find some support for the 'fragmentation explanation' and some role for durable goods, but no evidence of a trade credit effect or of inventory adjustments. They also find that industries experiencing larger reductions in domestic output had a larger fall in trade. Chor and Manova (2010) find significant composition effects in US imports using variation over time, interbank interest rates (across origin countries) and financial characteristics (across sectors). However due to data limitations they evaluate financial characteristics at the industry level (potentially mis-measuring attributes of the subset of exporting firms) and industrial production indices at the country level. Finally, Eaton *et al.* (2010) calibrate the Eaton-Kortum model on bilateral trade data for 30 countries. They find that a global demand shock, especially for durables, can explain most of the trade fall. Interestingly they find orders of magnitude of demand shocks that are very comparable to ours. We view our results as complementary to theirs. They also examine several explanations, but using the structure of a trade model while abstracting from cross-industry and cross-firm patterns, while we do the opposite. They also find some role for implicit bilateral trade frictions, as proxied by Head and Ries (2001) indices, in countries such as China and Japan.

Secondly, our work is related to studies of changes in trade patterns during major macroeconomic crises. Bernard *et al.* (2009) investigate the contributions of the different margins of trade to changes in US exports to, and imports from, several Asian countries during the 1997 financial crisis. They find that most of the adjustments occurred at the intensive margin, thus favoring a quick subsequent recovery. Amiti and Weinstein

(2009) find that shocks to the health of exporters' main banks (related to Japan's real estate crisis in the 1990's) explain up to half of changes in firm-level exports, controlling for industry-time fixed effects. They do not find any effect of bank health on domestic sales. Iacovone and Zavacka (2009) use a difference-in-difference approach to show that past financial crises caused a greater decrease in exports among firms that depended to a larger extent on trade credit. Berman and Martin (2009) show in a gravity framework that countries that use trade finance have larger bilateral export declines in times of financial or currency crises. Alessandria *et al.* (2010) calibrate a model of inventory adjustment using data on the US car industry and aggregate US data. Their model generates a fall in trade in excess of 33% of the fall in output, in line with the data.

The remainder of the paper is organized as follows. Section 2 outlines some broad facts about the current collapse and its impact on Belgium. Section 3 decomposes the trade collapse along various margins and along various country, product, and firm dimensions. Section 4 presents an econometric model to disentangle the contribution of firm, product and country characteristics to the observed changes in the intensive margin. Section 5 examines composition effects in exports-to-turnover and imports-to-intermediate purchases ratios. Section 6 discusses what can be learned from our exercise. Details concerning data sources, as well as the description and construction of variables, are relegated to Appendix A. Tables and Figures referred to in the main text are found in AppendixC. Details on robustness checks are provided in Appendix D.

2 The collapse of Belgian production and trade: an aggregate snapshot

We dissect the fall in trade using data from a small open economy, Belgium. Using Belgian data has several advantages. First, given its small size, international shocks are reasonably exogenous to Belgium. Second, changes in Belgian GDP and trade were remarkably synchronized with those of other European Union (EU) countries, thus suggesting that the Belgian experience may apply more broadly. Last, very high export and import shares of sales and purchases, respectively, make the 'super trader' Belgium an ideal laboratory to study the impacts of the crisis on vertical specialization and global value chains.[3] Using Belgian data has, however, the drawback of including a large amount of re-exports. Indeed, Belgium (in particular Antwerp) is a key port of entry to and exit from the EU. Many 'Belgian' firms thus trade exclusively with non-resident partners. We deal with this potential problem in two ways. First, we exploit the information gathered by the National Bank of Belgium (NBB) since 2001 and systematically exclude trade by firms being identified

[3]According to the World Bank WDI database, Belgian merchandise imports and exports amounted jointly to 187% of Belgian GDP in 2007.

as non-resident.[4] Second, we control for a firm's industry in our regressions. Doing so should largely capture the remaining re-exports which are concentrated on wholesalers' and retailers' foreign trade.

We first provide an aggregate snapshot of the Belgian trade collapse. Figure 1 shows that a dramatic decrease of imports and exports is visible in the data from November 2008 onwards, with monthly merchandise exports and imports falling by about 10% relative to their value a year before. The situation deteriorates until January 2009, when it stabilizes at a steady lower level until the end of our data coverage period (June 2009). Furthermore the Figure reveals seasonal fluctuations. For these reasons we will focus throughout the paper on a comparison between the first semesters of 2008 and 2009 (henceforth, 2008S1 and 2009S1). Exports and imports of goods by Belgian residents fell by 26.23% and 27.77%, respectively, between these two periods.

Insert Figure 1 about here.

Differences across product categories. An important finding from previous studies using aggregate data (e.g., Baldwin, 2009) is that the trade collapse has not been uniform across products. Belgium is no exception: as shown in Table 1, we observe large differences in export and import changes across broad product categories, despite the absence of special fiscal stimulus packages during the period we consider.[5] Trade in intermediates and consumer durables fell much more dramatically than trade in other categories, energy being an exception. These aggregate statistics seem to lend credence to explanations based on the disruption of global value chains or the postponement of durable goods and equipment purchases.

Insert Table 1 about here.

Table 2 provides a finer breakdown of the trade collapse across 2-digit Prodcom-2008 codes.[6] As can be seen from the figures, trade in nearly all broad product categories fell, though in a very heterogeneous way. As for exports, 'Other mining and quarrying' and 'Manufacture of basic metals' suffered the largest drops of nearly 50%, while a few other categories like 'Printing and reproduction of recorded media', 'Manufacture of basic pharmaceutical products and preparations' and 'Manufacture of other transport equipment' saw their exports increase during the period. A similar pattern also holds for imports.

[4]Non-resident firms are the main re-exporters. They are identified by the Belgian customs using information from VAT declarations. Firms with a Belgian VAT identifier that have a foreign legal address and firms offering fiscal representation services to foreign firms are considered by default as non-resident. Non-residents must report how much they trade with residents (domestic trade) and non-residents (re-exports) in VAT declarations. They are classified as 'pure' non-residents if they are not involved in any trade transactions with residents, and as 'mixed' non-residents otherwise (which is the default category, firms must apply to get pure non-resident status). Non-resident firms are not compelled to file balance sheets. Non-resident foreign trade accounted for about 26% of Belgian exports and 22% of Belgian imports in 2008. The figures for 2009 are 28% and 25%, respectively.

[5]See Appendix A for more information about product grouping using the EU Main Industrial Groupings classification.

[6]The Prodcom classification, and in particular the 2008 version, is an hybrid product/activity classification used in the EU as a bridge between the main traded product classification (the CN8 nomenclature) and the main activity classification (NACE).

Insert Table 2 about here.

Foreign and domestic operations. In line with developments in other OECD countries, Belgian trade fell much more than GDP. Across all goods, the fall of about 26% in exports and 28% in imports must be contrasted with a 'modest' 3.25% fall in nominal GDP over the same period. However, since it involves essentially manufactured goods, trade is not value added so that the fall in trade should be compared with the fall in manufacturing production value. Restricting the analysis to those goods for which data on production is available from the Prodcom dataset, the fall of about 25% in exports and 24% in imports closely mimics the roughly 25% fall in manufacturing production value over the same period.[7] Hence, in the aggregate the fall in trade was commensurate with the fall in manufacturing production, as can be further seen from Figure 2.

Insert Figure 2 about here.

Restricting ourselves again to goods for which data on production is available, Figure 2 reports monthly changes in the export-to-production and import-to-production ratios from January 2005 to June 2009. The figure confirms the absence of a strong differential trend between production and trade for Belgium: if anything, it points to an increase (rather than a decrease) of these measures. At the 2-digit product level, Table 2 further compares those same two ratios using data for 2008S1 and 2009S1. Inspection of the table reveals that the aggregate results depicted in Figure 2 also hold within broad product categories.

Geographical structure of the trade collapse. Table 3 breaks down changes in total Belgian exports plus imports with its top-100 trading partners between 2008S1 and 2009S1. On the one hand, trade with the Netherlands (Belgium's most important trading partner) fell by 31.83%. Trade with other major EU partners (Germany, France, UK, Italy) as well as with Japan, Korea and the US fell by roughly similar magnitudes. On the other hand, trade with China and Hong Kong, the GDP of which kept growing during the period, was much less affected. While there does not seem to be any clear geographical structure in trade flow changes, GDP growth could be a promising dimension to explore.[8]

Insert Table 3 about here.

[7] See Appendix A for further details on the Prodcom dataset. Based on that dataset, manufacturing production volumes fell by 18%, while manufacturing production value fell by 25%. These statistics are consistent with the small changes in overall exports-to-production and imports-to-production ratios presented in Table 2. Observe also that the overall change in prices and quantities is roughly comparable to the one of aggregate trade presented in Section 3 below.

[8] The suspiciously large growth of trade with Ireland might be related to abusive transfer pricing given that that Ireland's corporate tax rate is substantially lower than Belgium's.

Summary of the aggregate snapshot. Belgian exports and imports fell faster than GDP but roughly commensurate with manufacturing production value. The fall in trade showed substantial variation across product categories, with particularly strong drops in 'Consumer durables' and 'Capital goods'. To some extent, it also varied across origin and destination markets: trade with EU partners, Japan and the US was more affected than trade with China and Hong Kong.

Aggregate descriptive evidence at the product, sector or country level is useful to gauge the magnitude of the trade collapse but is insufficient to provide a compelling explanation for its cause(s). Firms are the basic units that trade products across countries, and aggregate data may lead to misleading conclusions by masking compositional effects. Table 2 suggests, for example, that exports have decreased more for some product categories than for others, but this may be due to particular problems faced by firms selling these products or the markets in which they are traded instead of the goods' attributes themselves. Broad product groups, which contain hundreds of products, might also hide substantial heterogeneity within categories.

To deal with these problems, we therefore now take the analysis to finer levels of disaggregation. In Section 3 we first decompose the contribution of the different margins of trade to the trade collapse, using exports and imports at the firm-product-country level. The key findings from this analysis will guide us in specifying an econometric model in Section 4 to separately identify the magnitude and significance of firm-, country- and product-level determinants of the fall in trade. Section 5 then compares domestic and foreign operations to assess whether the trade collapse is driven by a generalized fall in demand for manufacturing goods, or whether the 'smoking gun' must be sought elsewhere.

3 The margins of the trade collapse

To gauge each margin's contribution to the Belgian trade collapse, we perform a decomposition of changes in exports and imports along the lines suggested by Bernard *et al.* (2009).

3.1 The extensive and intensive margins

Belgian exports X in a given time period can be decomposed as $X = f\,\overline{c}\,\overline{g}\,\overline{x}$, where f, $\overline{c}$ and $\overline{g}$ denote the the number of exporters, the average number of countries each exporter sells to, and the average number of products each exporter ships to each country, respectively; and where $\overline{x} \equiv X/(f\,\overline{c}\,\overline{g})$ are average sales per exporter-country-product. Defining $\Delta X \equiv X'/X$, where X' refers to exports in another period, and applying this Δ transformation to the other variables, we may decompose the change in Belgian exports between 2008S1

and 2009S1 as follows:

$$\Delta X = \Delta f \, \Delta \overline{c} \, \Delta \overline{g} \, \Delta \overline{x}, \tag{1}$$

Changes in the first three terms of expression (1) are referred to as changes in the *extensive margin* of trade, while changes in the last term are referred to as changes in the *intensive margin*.[9] Information about physical quantities exported allows us to further decompose changes in the intensive margin into changes in average quantities ($\overline{q}$) and in average prices ($\overline{p}$): $\Delta \overline{x} \equiv \Delta \overline{q} \Delta \overline{p}$. We provide more detailed information about how this latter decomposition is implemented in Appendix A. The change in imports, ΔM, can be decomposed in the same way.

Insert Table 4 about here.

As mentioned earlier Belgian exports for all firm-country-product combinations fell by about 26% between 2008S1 and 2009S1. Table 4 reveals that despite that huge fall, the number of exporters and the number of products shipped on average by each exporter to each country increased by 0.96% and by 0.16%, respectively. The average number of countries served by Belgian exporters dropped by -1.92%. Changes at the extensive margin hence decreased Belgian exports by $(1.0096 \times 0.9808 \times 1.0016 - 1) \times 100\% = -0.82\%$. As can be seen from Column 6 in Table 4, changes at the extensive margin are dwarfed by changes at the intensive margin. Indeed, the average value of exports per firm-country-product fell by 25.63% between 2008S1 and 2009S1. Thus, as can be seen from the last line, the intensive margin contributes to more than 97% of the observed change in exports, whereas the contribution of the extensive margin is less than 3%.[10]

One distinct advantage of our dataset is that it provides information on either quantities or weights of shipments for each firm-country-product observation. This allows us, as mentioned before, to decompose the change in export values more finely into quantity and price changes.[11] As can be seen from the last two columns of Table 4, changes in the intensive margin are mainly driven by changes in quantities shipped. On average, Belgian exports by firm-country-product decreased in terms of quantities by 20%. Average unit prices also fell, but 'only' by 7.04%. A first conclusion thus emerges: *the collapse of Belgian exports is overwhelmingly driven by a fall in sales per firm-country-product, itself driven to a large extent by a sharp fall in quantities*

[9] We have no information on the number of trading partners or shipments for each exporter per country-product combination. Thus, our intensive margin $\Delta \overline{x}$ still contains 'extensive margin' components that we cannot isolate.

[10] Combining the two margins of trade, the total change in Belgian exports is given by $(1.0096 \times 0.9808 \times 1.0016 \times 0.7437 - 1) \times 100\% = -26.23\%$. Letting EM and IM denote the extensive and the intensive margins, this total change can be expressed as $\Delta X = \Delta \text{IM} \times \Delta \text{EM}$. Using logarithms, we compute the relative contribution of the intensive and the extensive margins to the total change in trade as $\ln(\Delta \text{IM})/\ln(\Delta X)$ and $\ln(\Delta \text{EM})/\ln(\Delta X)$, respectively.

[11] For the finer decomposition using changes in quantities and in prices, the total change in exports is decomposed as $(1.0096 \times 0.9808 \times 1.0016 \times 0.8 \times 0.9296 - 1) \times 100\% = -26.23\%$, where the last two terms in the decomposition are the changes in the average quantity and the average price, respectively.

exported and some decrease in unit prices.

Insert Table 5 about here.

Table 5 performs the same decomposition for total Belgian imports, which fell by about 28% across all firm-country-product combinations between 2008S1 and 2009S1. Observe that the overall picture is very similar to that of exports, although there is even slightly less change at the extensive margin. There seems to be some 'downsizing' in terms of the average number of countries and the average number of products per country each firm imports, but this is almost completely offset by more firms importing. As can be seen from the last two columns and the last line in Table 5, the intensive margin accounts again for almost all the change in imports and most of it is driven by a sharp decrease in quantities. A second conclusion thus emerges: *the collapse of Belgian imports is overwhelmingly driven by a fall in imports per firm-country-product, itself driven to a large extent by a sharp fall in quantities imported and some decrease in unit prices.*

To gauge whether the trade collapse, visible in Tables 4 and 5, roughly affects all firms, sectors, and trading partners equally, we also repeat the above decompositions by splitting our sample more finely along various dimensions.

Insert Table 6 about here.

For example Table 6 presents results for different product categories. The overall decomposition of margins, while not identical, remains qualitatively very similar. In particular, the intensive margin remains dominant whereas changes at the extensive margin are small. In the same spirit we split our sample in subgroups of origin and destination countries, firm size and productivity, nationality of ownership, and debt structure. Results, which are qualitatively very similar, are relegated to Appendix B.

To summarize, the most striking and robust feature to emerge from our data is that the 'full extensive margin' (i.e., the number of firms times the number of countries per firm times the number of products per country-firm) is extremely stable, both for imports and exports. This result continues to hold true when we decompose the sample into various subgroups as shown in Appendix B. Put differently, *almost all of the action takes place at the intensive margin, with virtually no change occurring at the extensive margin.* This finding firstly highlights the extreme flexibility of firms, of their input suppliers, and of their clients. Secondly, negligible changes at the extensive margin, even in the wake of a major shock, suggest that sunk costs are an extremely important component of trade costs. If trade costs were recoverable (either variable or fixed) we should have seen a massive contraction at the extensive margin with firms exiting markets and severing

trade relations to cut losses. Thirdly, our findings also suggest that trade should pick up again rapidly as the recession fades and as the macroeconomic environment returns to normal.[12]

3.2 Firm dynamics and the trade collapse

Table 11 shows that about 98% of both 2008S1 and 2009S1 exports were accounted for by 'stayers' — firms that were exporting in both semesters. The remaining share in 2008 was due to 'exiters' — firms that exported in 2008S1 but not in 2009S1. The remaining share in 2009S1 was accounted for by 'entrants' — firms that exported in 2009S1 but not in 2008S1. Table 11 further reveals that the 2007S1–2008S1 patterns were very similar, thus suggesting that 2008S1–2009S1 *was not exceptional in terms of firm dynamics*. Despite slightly more exit from and slightly less entry into foreign trade, and a smaller export share of entrants during the crisis, the overall pattern is not very different from the one in 2007S1–2008S1. In particular, there is still a large turnover and little net entry despite the crisis. Finally, the observed patterns also broadly hold for imports.

Insert Table 11 about here.

The absence of massive exit from foreign trade during a major crisis is striking. This finding gives further support to dynamic trade models with sunk entry costs (e.g., Das *et al.*, 2007). The fact that almost all firms remain active traders during a period where trade contracts by 25% can be explained by the option value of staying in the presence of these sunk entry costs. Of course, an alternative explanation could be that firms expected a short crisis.

Insert Table 12 about here.

Table 12 summarizes a related margin decomposition where we compare trade of the 2008S1 and 2009S1 cohorts of stayers, entrants and exiters. In the case of exports, it reveals some interesting facts that can be related to recent models of export dynamics. Comparing across cohorts, 2009S1 entrants and exiters fared much worse than the previous cohort (a 77% decrease in export values). Meanwhile, 2009S1 stayers fared worse than the previous cohort, partly including the same firms, but less dramatically so (about 27% decrease in export values). This finding is at odds with Melitz-type models, where a common demand shock should affect entrants and stayers identically. Part of the explanation involves compositional effects through differences in entrants' number of products and countries served. Table 12 shows clearly that *entrants are much more*

[12] In April 2010, Belgian monthly imports and exports were already back to their April 2008 level.

strongly affected at the extensive margin than stayers. Nonetheless the magnitude of the gap between entrants and stayers suggests that something else is at work. Overall a more sophisticated dynamic trade model is necessary to explain why entry remained stable but 2009S1 entrants exported much less than the previous cohort and than stayers (as can be seen from Tables 11 and 12). In fact this finding could help to discriminate between the various mechanisms suggested by the recent literature.[13] We leave this task for future research as it goes beyond the scope of this paper.

In the case of imports, we find that entry remained stable but more exit occurred. There were considerably more exiters than in the previous cohort, but the increase was offset by an equally considerable fall in average imports. Average imports of exiters fell by about as much as those of stayers. Overall, the rise in the number of importers during the trade collapse was dwarfed by the fall in the intensive margin, as noted earlier, but it would deserve further investigation.

While our descriptive exercises already highlight several important insights, they are not suited to identify the magnitudes, significance and contribution of the different determinants of the trade fall. We therefore next turn to econometric analysis, taking full advantage of our firm-country-product trade data and balance sheet data.

4 Firm-, country-, and product-level characteristics: the determinants of the trade collapse

The previous Section showed that the bulk of the fall in Belgian trade occurred at the intensive margin. Therefore we can safely analyze the determinants of the trade collapse by focusing solely on the intensive margin, i.e. firm-country-product transaction values. As further seen in the previous section, 98% of 2008S1 and 2009S1 exports were accounted for by stayers. Given the overwhelming contribution of stayers to export and import values, we can explore the determinants of the fall in trade by restricting the analysis to these firms.[14]

In this Section we aim to quantify the contribution of the various conjectures put forth in the literature, by looking at the composition of the fall in trade along the firm, product and country dimensions. If, say,

[13] Recent work on firm-level export dynamics builds on several mechanisms to explain export dynamics at the intensive and extensive margins: serially correlated permanent shocks to TFP, credit or capacity constraints, uncertainty about demand or costs, search and learning dynamics, reputation-building, endogenous R&D investment or quality upgrading.

[14] Observe that such an analysis would be flawed in the presence of large changes at the extensive margin. Had the number of exporting firms drastically fallen, we would have needed to analyze the determinants of export participation before and after the collapse (by using, for example, a probit approach). The stability of the extensive margin across firm, products and markets allows us to neglect these determinants in the analysis as they are of second-order importance.

highly leveraged firms experienced a greater fall in trade (conditional on other firm characteristics as well as on the characteristics of their products and destination markets) we can infer that restricted access to credit played a role in explaining the trade collapse. Furthermore, we can then try to gauge its magnitude on the observed fall in trade.

4.1 An econometric model of changes in trade values

The primary data for our regression analysis consists in export and import values by firm-country-product in 2008S1 and 2009S1, for stayers only. We aggregate data to the HS4 product level (more than 1,000 product categories) and consider only 'continuing transactions', i.e. firm-country-product trade triples that record positive values in both semesters. The aim is to provide econometric results that can make sense of aggregate changes in trade. Focusing on continuing transactions avoids giving too much weight to low-value transactions (most discontinuous transactions are low value) while allowing for meaningful multi-level clustering of the standard errors. [15]

We describe the econometric model we use for exports, the model for imports being identical. Using data on continuous transactions only, we regress the change in log export values $\Delta X_{icp} \equiv \log X_{icp}^{2009} - \log X_{icp}^{2008}$ on firm, country and product characteristics that proxy for the various conjectures put forward to explain the trade collapse. Formally, the estimating equation is given by:

$$\Delta X_{icp} = \alpha + W_i\beta + \eta_s + Z_c\gamma + S_p\zeta + \epsilon_{icp} \tag{2}$$

where ϵ_{icp}, is a residual term having the standard properties for the consistency of OLS, η_s is a sector fixed effect (two digit NACE classification rev 1.1)[16], and W_i, Z_c and S_p denote firm, country, and product characteristics, respectively. In the case of firm covariates, we use lagged information from 2007 balance sheets to avoid endogeneity of firm characteristics (such as productivity, employment, and financial structure) with respect to the trade collapse. Having data varying along three dimensions we follow the procedure of Cameron *et al.* (2006) and apply multi-level clustering to obtain more reliable standard errors.

[15] By definition, continuing transactions are a subset of stayers' transactions. They account for the lion's share of trade values in both 2008S1 and 2009S1. More precisely, there were 272,216 continuing transactions out of the 433,529 (430,000) export transactions in 2008S1 (2009S1), thus corresponding to 62.79% (63.31%) of the number of total transactions and to 93.66% (91.83%) of total transaction values. The observed fall in the value of continuing export transactions between 2008S1 and 2009S1 is 27.48%, which is quite close to the 26.23% decrease recorded for all export transactions. As for imports, there were 331,981 continuing transactions out of the 560,258 (559,530) transactions in 2008S1 (2009S1), thus corresponding to 59.26% (59.33%) of the number of total transactions and to 92.83% (90.47%) of total transaction values. The observed fall in the value of continuing import transactions between 2008S1 and 2009S1 is 29.57%, which again closely matches the 27.77% decrease recorded for all import transactions.

[16] The NACE rev 1.1 is the main industry classification in the European Community. It draws extensively on the ISIC rev 3.

Equation (2) constitutes an econometric model of change in trade values that is likely to remain valid outside the trade collapse period. When considering changes in trade between two 'normal' semesters one would expect that, for example, the productivity of a firm and/or the GDP growth of the destination country, the latter proxing for changes in aggregate demand, would matter in explaining changes in trade values. To identify what is peculiar to the 2008S1–2009S1 trade collapse we compare estimates obtained from (2) in a 'normal' period with those obtained during the collapse. To this end, we also estimate (2) using changes in trade values of continuing transactions between 2007S1 and 2008S1.[17]

Insert Table 13 about here.

Table 13 summarizes the list of covariates we use in (2). All firm characteristics prefixed by *D-* are binary variables, taking value 1 if a particular characteristic is above the sectoral median across all trading firms and 0 otherwise. Doing so allows us to maximize the number of firms we can include in the analysis while reducing the risk of bias due to measurement error and potential outliers. It also provides us, as in the case of standardized regression coefficients, with a relevant metric to compare the contribution of the different firm characteristics to changes in trade values. Last but not least, the binary specification is able to broadly account for non-linear effects of the covariates. As a robustness check, we also ran the same regressions with all variables in continuous form and provide standardized coefficients. The results, reported in Appendix D, are qualitatively identical. In what follows, we thus present the results using the binary variables.

4.2 Results

Table 14 reports coefficients and standard errors obtained by estimating (2) by OLS for 2008S1–2009S1 (left panel, 'Into the collapse') and for 2007S1–2008S1 (right panel, 'Before the collapse'). Considering the former period, we have 204,598 (out of 272,216) continuing export transactions for which all data on firm, country, and product characteristics is available. These transactions represent 69.50% of 2008S1 export values and 68.41% of 2009S1 export values. The fall in export values between 2008S1 and 2009S1 corresponding to these transactions is 27.21%, which is very close to the 27.48% export decrease for all continuing transactions. Overall, the data covers 6,959 firms, 170 countries, and 1,075 HS4 products. As for imports, we have 255,035 (out of 331,981) continuing import transactions for which all the data is available. These transactions represent 70.47% of 2008S1 import values and 67.62% of 2009S1 import values. The fall in import values between 2008S1

[17]To ensure consistency data used to construct firm-level variables and NACE dummies come from 2006 balance sheet and trade data. GDP growth and exchange rate variables are lagged by one year relative to the 2008S1-2009S1 regressions.

and 2009S1 corresponding to these continuing transactions is 30.66%, in line with the 29.57% import decrease for all continuing transactions. Overall, the data covers 13,545 firms, 148 countries, and 1,099 HS4 products.

One may a priori worry about potential biases that arise because we have to drop a number of continuing transactions for which data is missing. However, balance sheet data are missing mainly for Belgian affiliates of foreign groups that do no exist as a separate legal entity in Belgium. Such firms are not required to report unconsolidated accounts even if they are technically considered as residents by Belgian customs.[18] Including these firms in the analysis would have been desirable, but a positive aspect of dropping them is that they are likely to engage in substantial amounts of re-exports. Altogether our focus on Belgian residents only, the exclusion of the above-mentioned firms, and the inclusion of industry fixed effects represent a very conservative way of dealing with the issue of re-exports.

Insert Table 14 about here.

Firm characteristics. In general Table 14 shows that firm-level characteristics are rarely significant, that most coefficients are very small, and that the model's explanatory power is very weak. Table 15 also shows that there is no evident problem of colinearity among our firm-level variables. Our results thus suggest that: (i) the trade collapse has been quite symmetric across firms within a given industry; (ii) some of the supply-side explanations of the trade collapse clearly play at best a second-order role. For example consider a firm's reliance on external finance, following the measure proposed by Rajan and Zingales (1998), $D_{ext\_fin\_dep}$. The -0.0291 coefficient in the second column of Table 14, though highly significant, means that imports of firms with above-median reliance on external finance fell by 2.91 percentage points more during the crisis than those of below-median firms. The magnitude is rather small relative to the overall fall in imports of 27.77%, and comparable to that of the coefficient of -0.0256 in a 'normal' period such as 2007S1–2008S1. Given the estimated standard errors, we cannot reject the hypothesis that the 'crisis coefficient' is not significantly different from the coefficient in a 'normal' period.

Insert Table 15 about here.

We now discuss results for each group of covariates. Large or productive firms' exports grew no faster than other firms' exports, unlike in the previous year. This confirms our margin decomposition of Section 3, with the additional insight that neither firm, nor country or product composition effects are to blame.

Involvement in global value-added chains (as measured by D_{interm_share}, $D_{share\_exp\_sales}$, $D_{share\_imp\_interm}$, and $D_{value\_add\_chain}$) did not seem to matter more for exports in 2008S1–2009S1 than in 2007S1–2008S1.

[18] In addition, some small firms are not compelled to file balance sheets. See Appendix A for further details on both subjects.

This casts doubt on the hypothesis of a disruption of global value chains (Yi, 2009). Observe further that $D_{share\_imp\_interm}$ is not significant for export growth into the collapse, while it was negative and significant before, the opposite of what the hypothesis actually would suggest. The import growth regression delivers a more complex message. On the one hand, $D_{share\_imp\_interm}$ and $D_{value\_add\_chain}$ have negative and significant coefficients, as the hypothesis would suggest, but the coefficients were almost identical in the 2007S1-2008S1 regression! They may therefore capture a longer-term trend in imports of intermediate-intensive firms. On the other hand, D_{interm_share} and $D_{share\_exp\_sales}$ have negative and significant coefficients in 2008S1-2009S1 but not 2007S1-2008S1, and of a low magnitude: above-median firms' import growth differed by 6 percentage points in total. To further assess this magnitude, we predict counterfactual import growth in the absence of involvement in global value chains, i.e., when D_{interm_share} and $D_{share\_exp\_sales}$ equal zero, all else equal. We find that 17.29% of the overall import fall would not have occurred in this counterfactual world. Finally, foreign ownership and multinational status dummies are not significant. Summarizing, we find little evidence of a disruption of global value chains causing the trade collapse. Differences in the intensity of intermediate imports or exports do not account for the export fall, and account for at most 17.29% of the import fall. Differences in multinational status have strictly no explanatory power.

Variables proxying for firms' financial structure ($D_{ext\_fin\_dep}$, $D_{share\_debts\_o\_liab}$, $D_{share\_debts\_due\_after\_one}$, $D_{share\_fin\_debt}$) appear to play some role in 2008S1–2009S1 export changes. Firms with shorter debt maturity and a larger fraction of financial (as opposed to commercial) debt experienced a substantially larger fall of exports into the trade collapse. By contrast, the coefficients are not significant in the 2007S1–2008S1 regressions. Our findings thus lend some support to the trade credit crunch hypothesis (Auboin, 2009; Chor and Manova, 2010). How large is that effect? Firms with above-median debt maturity experienced a 5.6 percentage point higher export growth, whereas firms with above-median financial debts saw their exports shrink by about 4.6 percentage points more. Both values must be compared with the 26.23% total fall in export values. To further assess the magnitude, we predict the counterfactual export growth in the absence of negative financial effects, i.e., when $D_{share\_debts\_due\_after\_one}$ equals one and $D_{share\_fin\_debt}$ equals zero, all else equal. We find that about one-third (31.33%) of the 2008S1-2009S1 fall in exports can be attributed to finance. It is worth noting, however, that financial variables do not seem to affect changes in import values at all. Furthermore, almost no financial variable is significant in the regressions with continuous variables presented as a robustness check in Appendix D.[19]

The coefficient for D_{share_stock}, proxying for inventory capacity, is not significant for imports in both

[19] As in most related work, our variables only imperfectly capture access to credit in general and trade finance in particular.

regressions. This contrasts with the inventory adjustment explanation (Alessandria *et al.*, 2010): we would have expected imports of firms with greater inventory capacity to contract more, all else equal. In fact only the coefficient in the 2008S1–2009S1 export growth regression is significant, and with a positive sign! Firms with higher inventory-to-sales ratios contracted exports by *less*, which might reflect differences in access to working capital rather than inventory strategies. Still, it may be argued that inventory adjustments occur primarily among distributors. Therefore we also run the same regressions on a subsample comprising firms from the distribution sector only (NACE industries 50, 51 and 52), which represented 40.25% of Belgian imports in 2008S1.[20] We find that imports of distributors with above-median inventory-sales ratios fell by 2.75 percentage points more than other distributors in 2008S1-2009S1. This coefficient can account for 10.82% of the import fall of the distribution sector, using the counterfactual technique mentioned earlier. However we find no effects of stocks in the earlier period, or in the export growth regressions. Overall we conclude that although inventory adjustment accounted for some of the import fall in an important sector, it played a minor role in the trade collapse.

Country characteristics. We view GDP growth as the key variable to gauge the contribution of a demand shock to the collapse of exports. Two results stand out from our analysis. First, the coefficient differs widely between 2007S1–2008S1 and 2008S1–2009S1. In a 'normal year', the coefficient of log export change with respect to the trading partners' percentage GDP growth is around one percent (0.0138). This means that a 1% increase in the aggregate demand of a given country, as proxied by its percentage GDP growth, translates into a 1.38% increase in export values to that destination. To the extent that such an increase in exports reflects a proportional change in the demand for tradable goods, our coefficient is broadly consistent with standard cross-section/cross-country gravity models in which the coefficient for the GDP of the export destination is close to unity. However, during the trade collapse, the responsiveness of changes in log export values with respect to percentage GDP changes of the importing countries increased significantly (0.0253), thus suggesting that the global recession induced a disproportionate fall in the demand for tradable goods. Using our model to evaluate the counterfactual situation in which GDP growth rates for 2008S1–2009S1 are replaced with the rates prevailing in 2007S1–2008S1, all else equal, delivers the result that the export drop would have been 57.14% less. We may thus conclude that about 60% of the export collapse can be attributed to a generalized fall in the demand for tradable goods. These results are very similar to those of Eaton *et al.* (2010), though both approaches use very different data and methodologies.

Turning to imports, the interpretation of the GDP growth coefficient, which now refers to the exporting

[20]Regression tables are omitted to save space but are available upon request.

country, is more difficult. In any case, as can be seen from Table 14, these coefficients are not significant in both 2008S1-2009S1 and 2007S1–2008S1. We can nevertheless gauge the counterfactual impact of Belgian GDP growth on imports. Using the GDP growth coefficient estimated for exports and using data on Belgian GDP growth for the two periods, we find that 47.30% of the import drop can be attributed to a fall in demand for tradable goods in Belgium. Hence, almost half of the fall in imports is due to the demand shock.

The coefficients of the two dummies for trade with non-EU countries in and outside of the OECD are both positive, sizeable, and significant (in 3 of the 4 cases) in the crisis period. In stark contrast, the same coefficients in the period before the collapse are negative and significant. This means that exports and imports with non-EU countries grew less in 2007S1–2008S1 than with EU partners (the reference category). This pattern was reversed in 2008S1–2009S1: trade with countries outside of the EU helped to mitigate the trade collapse. However, given that trade with such countries represents only about 23% of Belgian exports and 25% of imports, the positive effect has been largely offset by the collapse of trade with EU partners. The fact that non-EU trade, especially imports, fell less than EU trade suggests indirectly that protectionist measures played only a minor role in explaining the trade collapse.

As for fluctuations in exchange rates, the magnitude of the coefficients indicates that they have affected exports more strongly during the trade collapse period as compared to 2007S1–2008S1. Still, the reverse holds for import growth where exchange rates had no significant impact on 2008S1–2009S1 while being negative and significant in the previous period. However, despite the size of the coefficients, the implied magnitudes for changes in export values are small. Using the estimated model to evaluate the counterfactual situation in which no exchange rate change would have occurred during 2008S1–2009S1, i.e. $exch\_rate\_change$=0, reveals that fluctuations of the euro can be blamed for only a very little share (5.44%) of the total drop in Belgian exports. The coefficient of $exch\_rate\_change$ in the imports growth regression is not significant.

Product characteristics. The reference group for product dummies is consumer non-durables. Therefore, the foregoing discussions and the magnitudes of the fall in demand apply solely to this category of goods. However, in line with the margin decomposition provided in Section 3, product dummies for the categories intermediates, capital goods, and consumer durables are all negative and strongly significant in the 2008S1–2009S1 period, thereby indicating that these goods experienced a larger fall in trade. By contrast, in the 2007S1-2008S1 period these categories did not display a significantly higher or lower export or import growth when compared to consumer non-durables.

What are the causes of such different behavior? The answer is likely to be a differential fall in demand. To provide evidence of this we estimated the 2008S1–2009S1 export growth model separately for each of the

broad product categories.[21] Our estimates of the $growth\_rate\_GDP$ coefficient are in line with the ultimate conclusion of Baldwin (2009) that 'postponable goods' have been particularly hit by the negative demand shock affecting tradable goods. More precisely, the coefficient when restricting the estimation to intermediates goods (0.0254) is higher than that when restricting estimations to consumer non-durables (0.0234). Even higher coefficients (0.0284 and 0.0412) are obtained in capital goods and consumer durables regressions, respectively.

Evaluating a counterfactual scenario in which the fall in trade would have been the same across product categories and equal to the one of the reference group 'consumer non-durables', i.e. setting product dummies coefficients equals to zero in the 2008S1–2009S1 export and import growth equations, delivers the following results: 22.36% of the export collapse is due to a more severe shock affecting postponable goods, the equivalent figure for imports being 27.15%. Finally, the coefficients of the Rauch (1999) measure of product differentiation ($frac_{lib\_diff}$) before and into the trade collapse suggest that more differentiated goods experienced a smaller fall in trade, though the implied magnitude is rather small.

Summary of findings. In the case of exports, our results point to a generalized fall in demand in tradables, especially consumer durables and capital goods. Evidence for this is provided by an unusually large GDP growth coefficient, sizeable product dummies, and widely different GDP growth coefficients in regressions for separate product categories. Restricted access to finance seems to play a role in the fall in exports, albeit of a smaller magnitude. We find no strong evidence for the disruption of global value chains or for inventory adjustment. In the case of imports, a fall in Belgian demand seems to be the main explanation. We find some limited role for involvement in global value chains (about 6 percentage points out of the 27 percentage point fall in imports), but again little role for trade finance and no role for inventory adjustments.

5 Trade crisis or trade collapse?

So far, we have uncovered strong evidence that a fall in tradeable goods demand (particularly strong for 'postponable goods') has been the major cause of the trade collapse. There is also some evidence that financial constraints contributed to that fall, though to a lesser extent. Observe that these findings do not *per se* imply that there has been a trade crisis, i.e., a situation in which international trade suffered more than domestic trade. To investigate this question, we now examine changes in exports-to-turnover and imports-to-intermediates ratios at the firm level.[22] If international trade *per se* is in a crisis, both ratios should have

[21] Regression tables are omitted to save space but are available upon request.

[22] Observe that exports-to-turnover ratios are monotonically related to exports-to-domestic-sales ratios. We thus use the former in what follows since we have no information on domestic sales.

fallen during the period we consider.

As shown earlier by Table 2 and Figure 2, there is no systematic fall in exports-to-production and imports-to-production ratios, both in the whole economy and across broad product categories. In fact, those ratios even increased in some product categories, *thus implying that domestic production contracted in some cases more than trade*. This descriptive evidence already casts some doubts on the existence of a 'trade crisis' in Belgium. Nevertheless, there might still be compositional effects across firms and industries, and those can provide valuable information on the channel(s) through which the fall in demand affected Belgian exports and imports. We therefore now revisit this issue using a more detailed micro-econometric analysis of the export-to-turnover and imports-to-intermediates ratios.

In what follows we exploit data on firm turnover and intermediates purchases for 2008S1 and 2009S1.[23] The data comes from monthly and quarterly VAT declarations.[24] We construct the log of the firm-level ratio of exports-to-turnover in the first semester of 2008 as follows:

$$\phi_{i,X}^{2008} = \log\left(\frac{X_i^{2008}}{Turn_i^{2008}}\right) \tag{3}$$

where $Turn_i^{2008}$ denotes firm i's turnover and X_i^{2008} stands for exports aggregated at the firm-level. Analogously, we define the log of the firm-level ratio of imports-to-purchased intermediates in the first semester of 2008 as follows:

$$\phi_{i,I}^{2008} = \log\left(\frac{I_i^{2008}}{Inte_i^{2008}}\right) \tag{4}$$

where $Inte_i^{2008}$ denotes firm i's total purchases of intermediates and I_i^{2008} represents imports aggregated at the firm-level. For 2009, $\phi_{i,X}^{2009}$ and $\phi_{i,I}^{2009}$ are defined in the same way using 2009 first-semester data. The sample of firms covered by the analysis is given by those stayers for which both information on balance sheets and VAT declarations are available, i.e 8,360 firms among the 12,964 export stayers and 14,388 firms among the 23,782 import stayers. VAT declarations are virtually exhaustive so that the binding data constraint is the availability of balance sheet information. The data cover 73.07% (73.61%) of 2008S1 (2009S1) exports and 71.33% (70.20%) of 2008S1 (2009S1) imports by stayers. As explained before, most firms that have to be dropped are Belgian affiliates belonging to foreign groups that are considered as residents by Belgian customs

[23] Ideally we would like to examine whether firms' exports and imports fall by more than the value of their production (as opposed to turnover and purchased intermediates, which potentially include re-exporting or other commercial activities). At the time of writing, however, the required firm-level production data is not available. Even when that data becomes available it will only cover the sample of large firms used by the Belgian National Institute of Statistics to provide aggregate production figures (Prodcom survey). We therefore examine ratios of exports to *turnover* and imports to *intermediates purchases* to maximize the number of firms we can include in our analysis.

[24] The frequency at which declarations have to be filed depends on the firm's size. See Appendix A.

but do not exist as a separate legal entity. It is likely that a substantial part of the trade done by these firms involves re-exporting and, in that respect, their exclusion from the analysis is more of an asset than a liability. In addition, some small firms do not submit balance sheets and have to be dropped.

Let us first highlight a few descriptives about the constructed ratios. The difference $\phi_{i,X}^{2009} - \phi_{i,X}^{2008}$ has a mean of -0.0290 and a median of -0.0183: the average exports-to-turnover ratio decreased by 2.9%, while the median ratio fell by 1.83% with respect to its initial value. The mean ratio $\left(X_i^{2008}/Turn_i^{2008},\text{ not in log}\right)$ in 2008 was 35.52%, meaning that the 2.9% fall translates into a meagre 1 percentage point reduction ($2.9\% \times 0.3552 = 0.0103$). We can hence already conclude that its decrease has, on average, been negligible — the ratio of exports-to-turnover at the firm level has not been affected by the trade collapse. Observe furthermore that the correlation between $\phi_{i,X}^{2009}$ and $\phi_{i,X}^{2008}$ equals 0.84 for our 8,360 observations, thus suggesting that firm patterns have been very stable during the trade collapse. Results for imports-to-intermediates ratios convey the same message. The mean of $\phi_{i,I}^{2009} - \phi_{i,I}^{2008}$ equals -0.0296, while the median equals -0.0124. The average imports-to-intermediates ratio decreased by 2.96% while the median ratio fell by 1.24%, starting from an average level of 26.16%. Thus, changes in that ratio were negligible too. Last, the correlation between $\phi_{i,I}^{2009}$ and $\phi_{i,I}^{2008}$ is 0.79 for our 14,388 observations.

We regress both $\phi_{i,X}^{2009} - \phi_{i,X}^{2008}$ and $\phi_{i,I}^{2009} - \phi_{i,I}^{2008}$ on the same set of firm-level characteristics used in the previous section and listed in Table 13. We use OLS and provide robust standard errors. To take into account the fact that some covariates would also affect exports-to-production and imports-to-production ratios in a 'normal period', we also report estimations of the same model for 2007–2008. Both sets of results are reported in Table 16. As an additional robustness check, we also ran the same regressions with either no NACE dummies or with firm variables in continuous form. The results are qualitatively identical and the tables are reported in Appendix D.

Insert Table 16 about here.

As can be seen from the left panel of Table 16, most firm-level characteristics are not significant in explaining changes in either exports-to-turnover or imports-to-intermediates ratios for the trade collapse period. In some cases, a significant coefficient in 2008S1–2009S1 corresponds to a coefficient of the same magnitude in 2007S1–2008S1 (for example, $D_{share\_exp\_sales}$ for exports, which is not statistically different across the two periods). This holds despite the fact that, as shown in the previous section and in Table 15, there is no major problem of collinearity among regressors. Inspection of standard errors reveals that financial variables are not significantly different from each other in the two periods. We may thus conclude that *the negative effect of financial variables identified in the analysis of the previous section has affected foreign trade*

and domestic activities equally. In other words, the credit crunch has not disproportionately hurt the activity of trading across national borders *per se*.

There are some effects for firm size and productivity, as well as for some variables capturing the degree of involvement in international trade and value-added chains. However, the signs are sometimes opposite to what one would expect from a 'trade crisis story'. For example, the positive and significant coefficient of foreign-owned firms (for) in the imports-to-intermediates analysis suggests that foreign-owned firms (which are more likely to be part of global production networks) saw their imports-to-intermediates ratios fall less than domestically owned firms. In any case, the implied magnitudes are small. The strongest piece of evidence that we find is that firms which were more involved in global value chains in 2007 ($D_{value\_add\_chain}$) saw their exports and imports fall by more than their turnover or intermediates purchases. Though not significant, the 2007–2008 export coefficient of $D_{value\_add\_chain}$ is half of the magnitude of the one in 2008-2009, thus suggesting that some of these firm variables capture mean-reversion effects. This is, for example, very clear for $D_{share\_exp\_sales}$ in the exports-to-turnover analysis. However, even when considering the full magnitude of the coefficient, a firm with an export-to-turnover ratio of 0.4999 (which is the mean value for firms with $D_{value\_add\_chain} = 1$ in 2008) would see its ratio in 2009 decrease to $49.99\% - 10.06\% \times 0.4999 = 0.4496$ had the trade collapse affected such a firm in the same way as those with $D_{value\_add\_chain} = 0$. This is hardly strong evidence that firms highly involved in global value-added chains have been hit by a major crisis specific to international trade.

As for the (unreported but available upon request) NACE dummies, they are generally insignificant, the reference industry being 'Manufacture of motor vehicles, trailers and semi-trailers'. Only 2 of the 44 (2×22) manufacturing industry dummies has a significant coefficient at the 5% confidence level in the 2008S1–2009S1 exports-to-turnover and imports-to-intermediates regressions. Furthermore, there is no significant evidence that the distribution industry has been affected differently.

The fact that almost all coefficients in the exports-to-turnover and imports-to-intermediates regressions are insignificant and that, even when they are significant, their magnitude is small, leads us logically to conclude that it is not a trade crisis — just a trade collapse caused by a strong decrease in the demand for tradables that has equally affected domestic and foreign operations.

6 What have we learned?

Using detailed trade and balance sheet data, we provide a micro-econometric analysis of the fall in Belgian imports and exports before and during the 2008–2009 trade collapse. A few clear results emerge from our

analysis. First, the overwhelming part of the trade collapse occurred at the intensive margin and is due to a fall in average quantities and unit prices. Entry into foreign markets showed remarkable stability. Interestingly there was no massive exit, hinting at the existence of large sunk costs of entering foreign markets (Roberts and Tybout, 1997): large sunk entry costs create an option value of remaining an exporter or an importer during the crisis. In addition, exporters' resilience suggests that trade will bounce back quickly as the macroeconomic environment returns to normal: in fact Belgian trade recovered its pre-collapse monthly level as early as in April 2010. These results concur with previous analyses of trade during the Asian crisis (Bernard *et al.*, 2009), but are nonetheless remarkable given the magnitude of this trade collapse.

Second, we find overall only little support for supply-side based explanations of the trade collapse. On the one hand, GDP growth of the destination countries is the single most important determinant of exports in our econometric analysis, explaining up to 57% of the fall in exports and 47% of the fall in imports. This applies particularly to the demand for durable goods and capital goods: trade in these categories fell systematically more, with a greater elasticity to GDP. While studies using more aggregated data (Baldwin, 2009) or calibrated simulations (Eaton *et al.*, 2010) reach qualitatively and quantitatively similar conclusions, we are not aware of any other firm-level analysis confirming these results to date. On the other hand, few firm- or product-level characteristics are systematically related to the fall in trade, especially when compared with the fall in domestic operations. For instance, access to credit (as proxied by financial balance sheet variables) can explain about 30% of the fall in exports, but has no explanatory power regarding exports-to-turnover ratios. In other words, financial constraints affected foreign and domestic operations equally. Similarly involvement in global value chains, as measured by the share of imported intermediates or export intensity, explains quantitatively some of the collapse of imports, but has little explanatory power on imports-to intermediate ratios. More generally exports-to-turnover and imports-to-intermediates ratios did not show any strong systematic correlation with other firm characteristics, nor did they follow any general downward trend. If there was a recent increase in trade frictions due to protectionism, it had no sizable effect on Belgian trade.

Of course, more research is needed to investigate the causes of the disproportionate fall in the demand for tradable goods. Candidate explanations involve deferred consumption of durables due to precautionary motives, substitution patterns among consumers with non-homothetic preferences, or a bias towards non-tradables in fiscal stimuli packages. Such investigations, while fundamental to our understanding of the crisis, are beyond the scope of the present paper.

Third, some of our findings raise other questions for future research. For instance, sales of entrants and exiters in 2009S1 are dramatically lower than those of the previous cohorts in 2008S1, while the same is not

true of stayers. This fact is at odds with the Melitz (2003) model and would deserve further investigation in relation to recent dynamic export models. The large increase in the number of importers despite the large fall in imports would also be worthy of investigation.

Last, let us point out two caveats of our analysis. As we acknowledged, one dimension of the extensive margin that we cannot control for is the number of trading partners a firm has for each product-market combination. Our prediction that trade will bounce back quickly is conditional on the hypothesis that this margin has not been strongly affected by the current trade collapse. Also, we do not know to what extent our results generalize to other countries. Developing countries might be much more severely affected by the credit crunch and the drying up of trade credit (Berman and Martin, 2009). This would cause a higher trade fall at the extensive margin there, and make a quick recovery less likely. Furthermore, implicit trade barriers might have risen more in some pairs of countries than in others (Jacks *et al.*, 2009; Eaton *et al.*, 2010). More research involving micro-data from other countries is thus certainly called for in the future.

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References

[1] Alessandria, G., J. Kaboski and V. Midrigan (2010), "The Great Trade Collapse of 2008-09: An Inventory Adjustment?" mimeographed.

[2] Amiti, M. and D. Weinstein (2009), "Exports and Financial Shocks", NBER Working Paper #15556, Cambridge, MA.

[3] Araújo, S. and J.O. Martins (2009) The Great Synchronisation: tracking the trade collapse with high-frequency data. In Baldwin, R.E. (ed.), "The Great Trade Collapse: Causes, Consequences and Prospects", CEPR (available online at `http://www.voxeu.org/index.php?q=node/4297`).

[4] Auboin, M. (2009) Restoring Trade Finance: What the G20 Can Do. In: Baldwin, R.E. and S. Evenett (eds.), *The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20*. Center for Economic Policy Research: London, UK.

[5] Baldwin, R.E. (ed.) *The Great Trade Collapse: Causes, Consequences and Prospects*, 2009, CEPR: London, UK (available online at `http://www.voxeu.org/index.php?q=node/4297`).

[6] Benassy-Quéré, A., Y. Decreux, L. Fontagné and D. Khoudour-Casteras (2009) Economic Crisis and Global Supply Chains. CEPII working paper #2009-15.

[7] Berman, N. and Ph. Martin (2009) The Vulnerability of Sub-Saharan Africa to the Financial Crisis: The Case of Trade. Mimeographed.

[8] Bernard, A.B., B.J. Jensen, S.J. Redding and P.K. Schott (2009) The Margins of US Trade, *American Economic Review Papers and Proceedings* 99, 487-493.

[9] Bricongne, J.-C., L. Fontagné, G. Gaulier, D. Taglioni and V. Vicard (2009) Firms and the Global Crisis: French Exports in the Turmoil. Banque de France Working Paper #265.

[10] Cameron, C.A., J.B. Gelbach and D.L. Miller (2006) Robust Inference with Multi-way Clustering. NBER Technical Working Papers #0327, National Bureau of Economic Research, Cambridge, MA.

[11] Chor, D. and K. Manova (2010) Off the Cliff and Back? Credit Conditions and International Trade During the Global Financial Crisis. NBER Working Paper #16174, Cambridge, MA.

[12] Das, S., M. Roberts and J.R. Tybout (2007) Market Entry Costs, Producer Heterogeneity and Export Dynamics, *Econometrica* 75, 837-873.

[13] Eaton, J., M. Eslava, C.J. Krizan, M. Kugler and J. Tybout (2009) A Search and Learning Model of Export Dynamics. Mimeographed.

[14] Eaton, J., S. Kortum and F. Kramarz (2004) Dissecting Trade: Firms, Industries, and Export Destinations, *American Economic Review Papers and Proceedings* 94, 150-154.

[15] Eaton, J., S. Kortum, B. Neiman and J. Romalis (2010) Trade, Geography, and the Global Recession. Mimeographed.

[16] Evenett, S.J. (2009) Crisis-era protectionism one year after the Washington G20 meeting. In Baldwin, R.E. (ed.), "The Great Trade Collapse: Causes, Consequences and Prospects", CEPR (available online at `http://www.voxeu.org/index.php?q=node/4297`).

[17] Freund, C. (2009) The Trade Response to the Global Downturn: Historical Evidence. World Bank Policy Research Paper #5015.

[18] Head, K. and J. Ries (2001) Increasing Returns Versus National Product Differentiation as an Explanation for the Pattern of US-Canada Trade, *American Economic Review* 91, 858-876.

[19] Iacovone, L. and V. Zavacka (2009) Banking Crises and Exports: Lessons from the Past. World Bank Policy Research Paper #5016.

[20] Jacks, D., C. Meissner and D. Novy (2009) Trade Booms, Trade Busts, and Trade Costs. NBER Working Paper #15267.

[21] Levchenko, A., L. Lewis and L. Tesar (2009) The Collapse of International Trade During the 2008-2009 Crisis: In Search of the Smoking Gun. Mimeographed.

[22] Melitz, M. (2003) The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, *Econometrica* 71, 1695-1725.

[23] Rajan, R. and L. Zingales (1998) Financial Dependence and Growth, *American Economic Review* 88, 559–586.

[24] Rauch, J.E. (1999) Networks versus Markets in International Trade, *Journal of International Economics* 48, 7-35.

[25] Roberts, M.J. and J.R. Tybout (1997) The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs, *American Economic Review* 87, 545-64.

[26] World Trade Organization (2009) *International Trade Statistics 2009*. WTO Publications: Geneva, Switzerland.

[27] Yi, K.-M. (2009) The Collapse of Global Trade: the Role of Vertical Specialisation. In: Baldwin, R.E. and S. Evenett (eds.), *The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20*. Center for Economic Policy Research: London, UK.

Appendix material

A Data

Balance sheet data and firm-level variables. Firm-level variables are constructed from 2006 and 2007 balance sheet data from the Business Registry covering the population of firms required to file their (unconsolidated) accounts to the National Bank of Belgium (NBB). The data combine annual accounts with data from the Crossroads Bank on firms' main sector, activity and legal status. Overall, most firms that are registered in Belgium (i.e., that exist as a separate legal entity) and have limited liability are required to file annual accounts.[25] Specifically, all limited-liability firms that are incorporated in Belgium have to report unconsolidated accounts involving balance sheet items and income statements. Belgian firms that are in addition part of a group also have to submit consolidated accounts where they report the joint group's activities in a consolidated way. However, Belgian affiliates of a foreign group which do not exist as a separate legal entity in Belgium are not required to report unconsolidated accounts (they are required to file a consolidated account, but these data do not allow us to obtain firm-level characteristics for the Belgian affiliate). There are two types of annual accounts: full and abbreviated. Firms have to file a full annual account when they exceed at least two of the three following cutoffs: (i) employ at least 50 employees; (ii) have an annual turnover of more than 7.3 million euros; and (iii) report total assets of more than 3.65 million euros.

For the 2008S1-2009S1 (2007S1-2008S1) analysis, we selected those companies that either filed a full or an abbreviated balance sheet in 2007 (2006) while reporting at least one employee. Annualized balance sheets provide us with information on the (full-time equivalent) number of employees, operating profits, equity and liability values, the amount of liabilities due after or within one year, the amount of liabilities held by financial institutions or commercial parties, the values of intermediate stocks, and the NACE rev1.1 5-digit code of the firm. Data on firm turnover, value added, purchased intermediates, and investments in 2006 and 2007 come from mandatory VAT declarations provided by the NBB. Balance sheets also record information on these four variables, but we prefer to use VAT declarations as information is more accurate and virtually covers the universe of Belgian firms. Multinational status and foreign ownership of a firm come from the yearly Survey of Foreign Direct Investments carried out by the NBB. Finally, firm-level imports and exports, which are needed to construct some firm-level controls, refer to the same year of the balance sheet information. Data have been

[25] Exceptions include: sole traders; small companies whose members have unlimited liability; general partnerships; ordinary limited partnerships; cooperative limited liability companies; large companies whose members have unlimited liability, if none of the members is a legal entity; public utilities; agricultural partnerships; hospitals, unless they have taken the form of a trading company with limited liability; health insurance funds; professional associations; schools and higher education institutions.

obtained by aggregating firm-product-country level transaction values in the trade database over the entire year at the firm level.

Trade and production data. Import and export data by firm, product, and country for Belgium is collected by the NBB on a monthly basis. More precisely, the information comes from intra-EU (Intrastat) and extra-EU (Extrastat) trade declarations that cover the universe of trade transactions.[26] Firm and trade data were merged using the VAT number which identifies each firm in Belgium. The data is extremely rich and comparable in quality to the widely known French Customs data used by, e.g., Eaton *et al.* (2004). Imports and exports of each firm are recorded in current euros at the 8-digit CN level[27] by country of origin/destination. Information on either the number of units or the weight in kilograms (or sometimes both) of traded goods is available and is product specific. Weight is the most widely used quantity unit.

In order to construct the quantity index used in Tables 4 to 10 we have use a 'mixed quantity' unit corresponding to kilograms, whenever recorded, and to units for those products recorded in units only. We then compute the average mixed quantity value across all firm-country-product transactions involved in the group considered (example: exports of small firms) separately for 2008 and 2009. We define the average price as the ratio of the average value of trade transactions across all firm-country-products involved in the group considered and the average mixed quantity defined above. As long as the composition of trade is stable across goods recorded in kilograms and in units, our indicators are informative about average changes in prices and quantities traded. To check robustness, we have also computed a quantity and a price index following the same methodology described above while considering only trade registered in kilograms. Results are very similar in terms of price and quantity changes between 2008S1 and 2009S1.

Finally, monthly production data by Prodcom-2008 2-digit codes are provided by the Belgian National Institute of Statistics. Data are based on mandatory declarations by a sample of about 8,000 firms representing the largest manufacturing producers in Belgium. Once anonymized, data are then made available for different levels of aggregation under the Prodcom database brand. Some goods, especially those referring to agriculture and fishery, are not included in the data.

Country and product data. Exchange rate variations between 2008S1 and 2009S1 (as well as between 2007S1 and 2008S1) refer to the change in the nominal interbank exchange rates with respect to the euro

[26] For intra-EU trade, the thresholds above which a legal obligation to declare arises are relatively small. In addition firms often provide information about their trade even when they are below the thresholds. For Extra-EU trade data are exhaustive for trade flows over 1,000 euros or 1,000 kilograms.

[27] The 8-digit Combined Nomenclature (CN) is the main product classification in the European Community. It is an product-based classification that draws extensively on the Harmonized System (HS) nomenclature.

at noon on April 1st, as recorded by the Bank of Canada. We choose April 1st as our midpoint in the first semester of each year (April 2nd in 2007). The average growth rate of GDP between 2008 and 2009 is the average of the two annual growth rates of the GDP at constant prices and comes from the IMF World Economic Outlook database as of October 2009. A mirror definition applies to the average growth rate between 2007 and 2008. The product classification follows the EU's 'Main Industrial Groupings' in official statistics, as described in the European Commission Regulation No 586/2001 (March 26, 2001). This classification separates products into intermediate, capital, consumer durable, consumer non-durable, and energy products. Some HS4 products (mainly agricultural goods) cannot be assigned to one of these categories using the correspondence table provided by the EU; we thus classify them as 'Residual goods'. The product group 'Intermediate, Capital, & Durables' used in the paper refers to the grouping of intermediate, capital goods, and consumer durables. All remaining product categories are subsumed by the 'Other Goods' group. The measure of product differentiation we use is based on the Rauch (1999) classification and corresponds to the share of HS6 codes within an HS4 category that are neither sold on an organized exchange nor referenced priced. We use the 'liberal' classification.

B Additional margin decompositions of the trade collapse

To gauge whether the trade collapse visible in Tables 4 and 5 roughly affects all firms, sectors, and trading partners equally, we split our sample more finely along various dimensions. In particular, we address the following four questions:

(i) Is there a geographic pattern in the trade collapse and its different margins, i.e., are Belgian trade margins behaving differently across 'regions'?

(ii) Are large or small, and more or less productive, firms affected differently?

(iii) Does a firm's ownership status (foreign versus domestically owned) and its multinational status matter?

(iv) Does a firm's debt structure in terms of overall leverage or financial versus commercial debt matter?

A detailed decomposition of changes in exports and imports at the different margins along these dimensions can provide some first insights into the key explanations of the sharp fall in trade during the 2008S1–2009S1 trade collapse. In particular, item (i) provides information about geographic shifts in trade flows, while items (iii)–(v) provide information about reallocation of market shares across firms, the collapse of global value chains, and the importance of access to credit.

In what follows, we present results for exports and imports separately.[28] Table 7 decomposes the margins

[28] We present only the most significant results and briefly comment on others. The full set of results is available as a spreadsheet

of Belgian exports to EU member states, to OECD non-EU countries, and to non-OECD non-EU countries, respectively. As can be seen, total export changes are very similar across the three country groups. The single most important insight is, as in Tables 4 and 5, the overwhelming contribution of the intensive margin to the trade collapse. There is not much change in terms of entry or exit and in terms of the average number of partner countries. Furthermore, while there is some mild evidence of product adding for exports to non-EU countries, the overall impact on exports is rather limited. In all three cases, the fall in the intensive margin amounts to about 25–30% meaning that the small differences in the total export decrease across regions is due to the extensive margin.[29]

Insert Table 7 about here.

Recall that the change in the extensive margin for total Belgian exports in Table 4 amounts to about 2.68% of the total trade fall. As shown by Table 7, this aggregate figure masks some regional variation. Indeed, the extensive margin falls and contributes more (5.62%) for exports to EU member states, whereas it increases for exports to OECD non-EU countries and for exports to non-OECD non-EU countries thereby reducing the trade fall by 11.43% and 0.2% respectively. Bearing in mind that such figures are small, cross-regional differences in the response of the extensive margin might be explained by the fact that arm's length transactions are relatively more common in the EU. Indeed Bernard *et al.* (2009) show, using US data, that the extensive margin reacts more strongly to negative shocks for arm's length than for related-party trade.

Results for imports closely mirror those for exports and are therefore not reported in detail. Imports from EU member states dropped by 28.88%, whereas imports from OECD non-EU countries and for imports from non-OECD non-EU countries dropped by 24.24% and by 24.71%, respectively. The contribution of the intensive margin remains extremely high in all cases, with 90.68%, 131.05% and 131.31%, respectively. The overall positive contribution of the extensive margin of 1.79% given by Table 5 is due to a positive contribution of 9.31% to the drop of imports from EU member states and a negative contribution (i.e. an increase in the extensive margin counterbalancing the fall) of -31.05% for imports from OECD non-EU countries and -31.31% for imports from non-OECD non-EU countries.

Insert Table 8 about here.

from the authors upon request.

[29] In an unreported robustness check (available upon request) we also provide an alternative price-quantity decomposition where we only focus on goods which are reported by weight. Results slightly differ from those reported in the paper. The reasons are that: (i) the total trade of goods that are measured in kilograms has decreased less than the trade of goods measures in units; and (ii) Belgium trades proportionally more goods measured in kilograms with non-EU countries.

Table 8 summarizes the changes in export and import margins for small and for large firms. We define size in terms of employment and small firms as those being below the 2-digit NACE rev1.1 industry median size across all trading firms.[30] Large firms are defined analogously. As can be seen from the top part of Table 8, larger firms see their exports fall relatively more on average, although the differences are modest.[31] The gap is wider in the case of imports: imports of small firms decrease by 12.80%, while imports of large firms decrease by 30.46%. Again, the fall of both exports and imports occurs primarily at the intensive margin. We also decomposed the margins between low and high productivity firms (defined again as firms below or above the industry median across trading firm) with productivity being measured as value added per worker. Results are fairly similar. Low productivity firms saw their exports and imports fall by -16.51% and -17.87%, respectively, whereas the corresponding figures for high productivity firms are -28.56% and -31.29%. It is important to stress that these findings challenge the view that larger and more productive firms are better equipped to overcome adverse market shocks. To the extent that market participation and trade volumes are proxies for 'success' during a crisis, our results suggests that small and less productive firms are relative 'winners'.

Insert Table 9 about here.

Table 9 decomposes the margins of changes in imports across multinational and non-multinational, as well as across foreign owned versus non-foreign owned firms.[32] The difference between the various types of firms occurs essentially at the intensive margin: firms with international ownership structures (multinationals and foreign-owned firms) reduced their import values substantially more, both along the quantity and the price margins. Note that changes in the latter margin could be explained by either the composition of multinational trade, or by changes in how multinationals record related-party transactions (transfer pricing). We have no information on the latter aspect. Results for exports look very similar and are not reported here.

Insert Table 10 about here.

Finally, Table 10 shows that there are no substantial differences in the changes at the various margins for Belgian exporters according to the size and structure of their debt. Although firms with larger debt-to-liabilities ratios or with a larger share of financial (as opposed to commercial) debts experienced slightly larger

[30] Some exporters and importers are lost because of the lack of balance sheet data which is required for figures on employment and other firm characteristics. The same issue applies to Tables 9 and 10. See Appendix A for further details.

[31] Those results are consistent with those of Bricongne *et al.* (2009) for French firms.

[32] A multinational firm is a firm that is registered in Belgium and which owns, either directly or indirectly, more than 10% of the equity of at least one firm registered in another country. A foreign-owned firm is a firm that is registered in Belgium and the equity of which is, either directly or indirectly, owned (partially or in total) by one or more firms registered in another country, with each owing at least 10% of the equity of the Belgian firm.

declines in exports (essentially because of slightly more exit in this case), they seem to be affected in roughly similar ways. Results using the share of long-term debt in firms' overall debt (not reported here) yield a similar picture. We also decomposed the import margins along the debt dimension, with very similar results. For example, low debt-to-liabilities importers contracted on average by 28.43% (against 24.53% for exporters), while high debt-to-liabilities importers contracted on average by 29.89% (against 29.72% for exporters). The decomposition of margins, while not identical, remains qualitatively very similar.

C Baseline Tables and Figures

Table 1: Percentage changes in exports and imports by broad product category (2008S1-2009S1).

Product category	Change in Exports (%)	Change in Imports (%)
Consumer non-durables	-8.48	-4.95
Intermediates	-30.39	-30.94
Capital goods	-23.25	-23.62
Consumer durables	-38.03	-39.17
Energy	-43.50	-44.18
Residual	-24.04	-16.23

Notes: See Appendix A for further details on product categories.

Table 2: % changes in exports, imports, export/production, and import/production ratios by product (2008S1-2009S1).

Prodcom-2008 product name	% Export change	Exp./Prod. ratio 2008S1	Exp./Prod. ratio 2009S1	% Imp. change	Imp./Prod. ratio 2008S1	Imp./Prod. ratio 2009S1
Other mining and quarrying	-48.20	10.16	6.39	-49.23	10.91	6.73
Mfg of food products	-3.61	0.80	0.81	-6.67	0.59	0.58
Mfg of beverages	-21.41	0.71	0.56	-25.78	0.70	0.52
Mfg of tobacco products	-11.78	0.84	0.80	-1.17	0.76	0.82
Mfg of textiles	-26.39	1.01	1.04	-22.09	0.48	0.52
Mfg of wearing apparel	-20.10	16.53	17.50	-7.79	24.37	29.77
Mfg of leather and related products	-19.82	11.39	12.13	-9.91	15.57	18.62
Mfg of wood, products of wood	-31.15	0.72	0.66	-24.76	0.64	0.65
Mfg of paper and paper products	-17.89	0.87	0.84	-14.60	0.86	0.87
Printing and reproduction of recorded media	74.70	0.05	0.10	50.75	0.05	0.09
Mfg of chemicals and chemical products	-30.18	0.97	1.03	-34.49	0.72	0.72
Mfg of basic pharmaceutical products	2.43	1.21	1.22	26.95	0.73	0.91
Mfg of rubber and plastic products	-22.39	1.27	1.21	-20.91	1.10	1.06
Mfg of other non-metallic mineral products	-25.24	0.60	0.54	-22.17	0.41	0.39
Mfg of basic metals	-46.44	0.89	0.92	-45.65	0.58	0.62
Mfg of fabric. metal products,	-20.91	0.52	0.52	-23.65	0.58	0.57
Mfg of computer, electronic and optical products	-17.93	3.38	3.74	-13.29	4.97	5.82
Mfg of electrical equipment	-18.46	1.08	1.11	-17.15	1.31	1.36
Mfg of machinery and equipment n. e. c.	-27.27	1.52	1.52	-30.18	1.65	1.57
Mfg of motor vehicles, trailers and semi-trailers	-32.59	1.08	1.12	-27.09	1.27	1.43
Mfg of other transport equipment	15.21	1.05	1.36	-10.09	1.21	1.22
Mfg of furniture	-18.85	0.73	0.67	-15.49	1.13	1.07
Other manufacturing	-3.75	9.25	10.14	-9.23	9.58	9.90
Repair and installation of machinery	-22.20	0.03	0.03	-3.19	0.07	0.07
Total	-25.15	0.96	0.95	-24.08	1.04	1.02

Notes: See Appendix A for further details. The figures for changes in total exports and imports slightly differ from those provided in the text because the data in the table do not include some product categories, such as agricultural goods, that do not belong to the Prodcom classification.

Table 3: % changes in exports plus imports by country for the top-100 Belgian trading partners.

Country	Rank	% Trade change	Country	Rank	% Trade change	Country	Rank	% Trade change
NL	1	-31.83	AU	35	8.48	CY	69	-35.05
DE	2	-25.16	SA	36	-8.51	EC	70	15.35
FR	3	-25.31	RO	37	-28.39	LV	71	-42.00
GB	4	-27.47	EG	38	-53.49	PE	72	-37.83
IT	5	-26.87	TH	39	-16.16	BY	73	-18.36
US	6	-24.95	QA	40	35.67	LB	74	-1.65
ES	7	-25.68	MX	41	-11.40	CM	75	-4.22
LU	8	-31.10	ID	42	-12.77	GH	76	-18.40
SE	9	-41.33	MA	43	-31.07	CI	77	-2.92
IN	10	-32.49	TW	44	-14.58	SN	78	-49.34
CN	11	0.17	DZ	45	-1.61	SY	79	-16.80
JP	12	-23.78	UA	46	-37.26	SR	80	29.04
RU	13	-48.98	CD	47	-44.41	LY	81	14.89
PL	14	-23.40	VN	48	-31.80	DO	82	-50.12
NO	15	-39.12	AR	49	-36.59	JO	83	19.55
CH	16	-17.45	SG	50	-17.06	LS	84	-20.78
IL	17	-58.66	MY	51	-20.06	KW	85	21.52
TR	18	-33.78	SI	52	-21.13	LK	86	-22.96
CZ	19	-20.87	TN	53	-14.73	IS	87	-26.81
AT	20	-22.34	LT	54	-16.11	NC	88	-23.43
AE	21	-40.51	VE	55	-44.57	KE	89	-16.37
DK	22	-25.31	MH	56	-99.99	ZM	90	-28.98
KR	23	-36.82	IR	57	-22.45	CG	91	-24.93
BR	24	-34.73	PH	58	-31.52	GN	92	-6.82
IE	25	21.50	NZ	59	-2.26	MT	93	-22.05
FI	26	-25.84	NG	60	-32.34	SL	94	-39.26
PT	27	-25.03	AO	61	12.90	MR	95	-66.38
HK	28	-9.84	CL	62	36.79	HN	96	-22.24
CA	29	-21.86	PK	63	-8.21	BF	97	22.24
HU	30	-25.83	CO	64	12.48	KZ	98	-10.38
ZA	31	-25.33	BD	65	8.31	MK	99	-57.05
GR	32	-31.16	EE	66	-32.95	BJ	100	-21.04
BG	33	-46.43	HR	67	-37.08			
SK	34	-23.24	CR	68	-9.35			

Notes: Country codes are ginve in the ISO2 format. Countries are ranked according to their total trade with Belgium in the first semester of 2008.

Table 4: Changes in the margins of Belgian exports (2008S1–2009S1).

Total exports (all firm-country-product combinations)							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	101.25	18,053	6.62	5.58	151,844	115,277	1.32
2009 S1	74.69	18,227	6.49	5.59	112,925	92,221	1.22
$(\Delta - 1)\%$	-26.23	0.96	-1.92	0.16	-25.63	-20.00	-7.04
Margin's contribution			2.68%		97.32%		

Notes: Total exports are given in billion euros while average sales are given in euros. See Appendix A for further details.

Table 5: Changes in the margins of Belgian imports (2008S1–2009S1).

Total imports (all firm-country-product combinations)							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	106.10	31,497	3.88	7.02	123,681	118,747	1.04
2009 S1	76.64	33,576	3.74	6.78	89,855	98,089	0.92
$(\Delta - 1)\%$	-27.77	6.60	-3.54	-3.32	-27.35	-17.40	-12.05
Margin's contribution			1.79%		98.21%		

Notes: Total imports are given in billion euros while average sales are given in euros. See Appendix A for further details.

Table 6: Changes in the margins of Belgian trade in 'Intermediate, Capital, & Durables' vs 'Other goods' (2008S1–2009S1).

Exports of goods classified as 'Other goods'							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	34.98	8,925	4.40	5.80	153,589	108,005	1.42
2009 S1	27.63	9,022	4.34	5.77	122,267	95,809	1.28
$(\Delta - 1)\%$	-21.03	1.09	-1.35	-0.52	-20.39	-11.29	-10.26
Margin's contribution			3.39%		96.61%		

Exports of goods classified as 'Intermediate, Capital, & Durables'							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	66.27	14,439	5.56	5.47	150,938	119,049	1.27
2009 S1	47.06	14,630	5.41	5.50	108,076	90,359	1.20
$(\Delta - 1)\%$	-28.98	1.32	-2.60	0.50	-28.40	-24.10	-5.66
Margin's contribution			2.40%		97.60%		

Imports of goods classified as 'Other goods'							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	41.94	20,464	2.08	7.69	128,461	148,381	0.87
2009 S1	31.19	21,777	2.03	7.38	95,314	132,022	0.72
$(\Delta - 1)\%$	-25.64	6.42	-1.94	-3.96	-25.80	-11.02	-16.61
Margin's contribution			-0.77%		100.77%		

Imports of goods classified as 'Intermediate, Capital, & Durables'							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	64.16	24,810	3.22	6.66	120,743	100,538	1.20
2009 S1	45.45	26,141	3.11	6.46	86,457	76,965	1.12
$(\Delta - 1)\%$	-29.17	5.36	-3.18	-3.03	-28.40	-23.45	-6.46
Margin's contribution			3.14%		96.86%		

Notes: Total exports (imports) are given in billion euros while average sales are given in euros. See Appendix A for further details.

Table 7: Changes in the margins of Belgian exports across 'regions' (2008S1–2009S1).

Exports to EU member states only							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	77.90	7,544	7.70	8.16	164,348	139,639	1.18
2009 S1	57.60	7,652	7.46	8.16	123,602	112,781	1.10
$(\Delta - 1)\%$	-26.06	1.43	-3.07	0.00	-24.79	-19.23	-6.88
Margin's contribution			5.62%		94.38%		

Exports to OECD non-EU countries							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	9.55	8,457	2.17	3.59	145,205	76,032	1.91
2009 S1	6.90	8,569	2.13	3.74	101,162	49,465	2.05
$(\Delta - 1)\%$	-27.70	1.32	-1.68	4.18	-30.33	-34.94	7.09
Margin's contribution			-11.43%		111.43%		

Exports to non-OECD non-EU countries							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	13.81	10,923	3.94	2.95	108,641	44,719	2.43
2009 S1	10.19	10,997	3.91	2.96	80,105	39,816	2.01
$(\Delta - 1)\%$	-26.22	0.68	-0.93	0.32	-26.27	-10.96	-17.19
Margin's contribution			-0.20%		100.20%		

Notes: Total exports are given in billion euros while average sales are given in euros. See Appendix A for further details.

Table 8: Changes in the margins of Belgian trade for large and small firms (2008S1–2009S1).

Exports by small firms							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	4.80	5,318	4.23	2.75	77,522	95,637	0.81
2009 S1	3.82	5,188	4.28	2.82	61,031	72,719	0.84
$(\Delta - 1)\%$	-20.52%	-2.44%	1.14%	2.31%	-21.27%	-23.96%	3.54%
Margin's contribution			-4.13%		104.13%		

Exports by large firms							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	77.41	7,465	10.4352	6.21	159,929	128,679	1.24
2009 S1	56.24	7,519	10.1366	6.43	114,783	98,515	1.17
$(\Delta - 1)\%$	-27,35%	0.72%	-2.86%	3.46%	-28.23%	-23.44%	-6.25%
Margin's contribution			-3.82%		103.82%		

Imports by small firms							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	5.49	9,342	3.01	4.62	42,230	75,866	0.56
2009 S1	4.79	9,483	3.02	4.59	36,386	68,043	0.53
$(\Delta - 1)\%$	-12.80%	1.51%	0.30%	-0.59%	-13.84%	-10.31%	-3.93%
Margin's contribution			-8.76%		108.76%		

Imports by large firms							
		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008 S1	82.12	11,570	6.30	8.42	133,884	129,900	1.03
2009 S1	57.11	11,642	6.21	8.25	95,778	108,497	0.88
$(\Delta - 1)\%$	-30.46%	0.62%	-1.40%	-2.02%	-28.46%	-16.48%	-14.35%
Margin's contribution			7.79%		92.21%		

Notes: Total exports (imports) are in billion euros while average sales are in euros. See Appendix A for further details.

Table 9: Changes in the margins of imports according to ownership structure (2008S1–2009S1).

Imports by non-multinational firms

		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	53.33	24,941	4.06	6.76	77,934	85,982	0.91
2009 S1	40.88	25,421	4.00	6.62	60,734	72,400	0.84
$(\Delta - 1)\%$	-23.34%	1.92%	-1.40%	-2.12%	-22.07%	-15.80%	-7.45%
Margin's contribution			6.17%		93.83%		

Imports by multinational firms

		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	36.95	702	12.25	10.68	402,288	392,168	1.03
2009 S1	23.42	717	12.03	10.29	263,974	323,630	0.82
$(\Delta - 1)\%$	-36.61%	2.14%	-1.84%	-3.64%	-34.38%	-17.48%	-20.49%
Margin's contribution			7.58%		92.42%		

Imports by non-foreign-owned firms

		Extensive margin			*Intensive margin*		
Period	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	35.71	24,297	3.97	6.51	56,815	70,084	0.81
2009S1	28.60	24,798	3.92	6.35	46,357	62,856	0,74
$(\Delta - 1)\%$	-19.91%	2.06%	-1.45%	-2.41%	-18.41%	-10.31%	-9.03%
Margin's contribution			8.35%		91.65%		

Imports by foreign-owned firms

		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	54.57	1,346	9.82	11.17	369,749	344,253	1.07
2009S1	35.70	1,340	9.83	10.99	246,448	266,920	0.92
$(\Delta - 1)\%$	-34.57%	-0.45%	0.16%	-1.55%	-33.35%	-22.46%	-14.04%
Margin's contribution			4.36%		95.64%		

Notes: Total imports are in billion euros while average sales are in euros. See Appendix A for further details.

Table 10: Changes in the margins of exports according to debt structure (2008S1–2009S1).

Exports by firms with low share of debts over liabilities							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	45.16	7,651	7.57	5.52	141,146	116,985	1.21
2009S1	34.08	7,672	7.47	5.69	104,476	89,788	1.16
$(\Delta - 1)\%$	-24.53%	0.27%	-1.36%	3.08%	-25.98%	-23.25%	-3.56%
Margin's contribution			-6.91%		106.91%		
Exports by firms with high share of debts over liabilities							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	38.76	7,507	6.50	5.02	158,246	134,593	1.18
2009S1	27.24	7,391	6.43	5.06	113,401	105,279	1.08
$(\Delta - 1)\%$	-29.72%	-1.55%	-1.06%	0.68%	-28.34%	-21.78%	-8.39%
Margin's contribution			5.52%		94.48%		
Exports by firms with low share of financial debts							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	39.85	7,580	6.71	5.10	153,370	117,823	1.30
2009S1	30.18	7,527	6.67	5.22	115,226	91,939	1.25
$(\Delta - 1)\%$	-24.25%	-0.70%	-0.72%	2.27%	-24.87%	-21.97%	-3.72%
Margin's contribution			-2.95%		102.95%		
Exports by firms with high share of financial debts							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008S1	44.06	7,521	7.39	5.48	144,628	130,558	1.11
2009S1	31.12	7,467	7.29	5.59	102,356	100,255	1.02
$(\Delta - 1)\%$	-29.36%	-0.72%	-1.44%	2.01%	-29.23%	-23.21%	-7.84%
Margin's contribution			0.53%		99.47%		

Notes: Total exports are in billion euros while average sales are in euros. See Appendix A for further details.

Table 11: The dynamics of exports and imports.

	2008S1–2009S1 trade dynamics					
	Exports			**Imports**		
Firm Type	N of firms	Trade share in		N of firms	Trade share in	
		2009S1	2008S1		2009S1	2008S1
Stayers	12,964	0.98	0.98	23,782	0.98	0.98
Entrants	5,263	0.02	0.00	9,794	0.02	0.00
Exiters	5,089	0.00	0.02	7,715	0.00	0.02
	2007S1–2008S1 trade dynamics					
	Exports			**Imports**		
Firm Type	N of firms	Trade share in		N of firms	Trade share in	
		2008S1	2007S1		2008S1	2007S1
Stayers	12,481	0.92	0.92	21,209	0.92	0.98
Entrants	5,572	0.08	0.00	10,288	0.08	0.00
Exiters	4,662	0.00	0.08	4,543	0.00	0.02

Notes: See Appendix A for further details.

Table 12: Changes in the margins of Belgian exports and imports across cohorts of stayers, entrants and exiters.

Exports of Stayers

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	99.53	12,964	8.58	5.74	155,837
2009S1	72.85	12,964	8.46	5.86	113,256
$(\Delta - 1)\%$	-26.81	0.00	-1.41	2.16	-27.32
Margin's contribution			-2.28%		102.28%

Imports of Stayers

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	104.40	23,782	4.66	7.42	126,907
2009S1	74.74	23,782	4.68	7.27	92,463
$(\Delta - 1)\%$	-28.41	0.00	0.33	-2.07	-27.14
Margin's contribution			5.26%		94.74%

Exports of Entrants

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	8.28	5,572	1.77	3.23	259,363
2009S1	1.83	5,263	1.64	2.11	101,183
$(\Delta - 1)\%$	-77.83	-5.55	-7.67	-34.84	-60.99
Margin's contribution			37.52%		62.48%

Imports of Entrants

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	8.08	10,288	1.61	3.61	134,753
2009S1	1.90	9,794	1.48	3.09	42,590
$(\Delta - 1)\%$	-76.49	-4.80	-8.45	-14.64	-68.39
Margin's contribution			20.43%		79.57%

Exports of Exiters

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	7.58	4,662	1.65	2.90	339,290
2009S1	1.72	5,089	1.61	3.43	61,090
$(\Delta - 1)\%$	-77.36	9.16	-2.61	18.27	-81.99
Margin's contribution			-8.76%		108.76%

Imports of Exiters

		Extensive margin			*Intensive margin*
Cohort	Total	Firms	Countries	Products	Sales
2008S1	1.73	4,543	1.57	3.36	72,023
2009S1	1.70	7,715	1.47	3.10	48,358
$(\Delta - 1)\%$	-1.35	69.82	-6.22	-7.74	-32.86
Margin's contribution			-2,832.58%		2,932.58%

Notes: Total exports (imports) are given in billion euros while average sales are given in euros. $(\Delta - 1)\%$ refers to percentage difference between cohorts: 2009S1 stayers exported 26.81% less in 2009S1 than did 2008S1 stayers in 2008S1. See Appendix A for further details.

Table 13: Firm, country, and product regressors.

Variable name	**Description**
Firm characteristics (2007 values)	
D_{size}	size (in term of employment) of the firm
D_{prod}	value added over workers
D_{interm_share}	share of intermediates over turnover
$D_{share\_exp\_sales}$	share of exports over turnover
$D_{share\_imp\_interm}$	share of imports over intermediates
$D_{value\_add\_chain}$	(exports*imports)/turnover
$D_{ext\_fin\_dep}$	(investments-operating profits)/investments
$D_{share\_debts\_o\_liab}$	share of debts over total liabilities
$D_{share\_debts\_due\_after\_one}$	share of debts due after one year
$D_{share\_fin\_debt}$	share of financial debt.
D_{share_stock}	share of stock over turnover
for	foreign firm dummy
mne	multinational dummy
η_s	NACE rev1.1 2-digit dummies
Country characteristics	
$OECD\_NO\_EU$	dummy for country belonging to the OECD (in 2008) but not to the EU
$NO\_OECD\_NO\_EU$	dummy for country neither belonging to the OECD nor to the EU
$exch\_rate\_change$	% change in the nominal exchange rate with the euro between the end of the first quarter of 2008 (2007) and the end of the first quarter of 2009 (2008)
$growth\_rate\_GDP$	average annual growth rate of the country between 2008 (2007) and 2009 (2008)
Product characteristics	
$intermediates$	intermediate goods dummy
$capital\_goods$	capital goods dummy
$consumer\_durables$	durable consumer goods dummy
$consumer\_non\_durables$	non-durable consumer goods dummy
$energy$	energy related goods dummy
$redidual$	goods not belonging to the previous categories
$frac_{lib\_diff}$	measure of product differentiation (based on Rauch, 1999)

Notes: All firm characteristics prefixed with a 'D' are dummy variables that take value one if the firm characteristic is above the NACE rev 1.1 2-digit industry median across trading firms and zero otherwise. Data sources and the definitions of variables are provided in Appendix A.

Table 14: Exports and imports growth: firm, country, and product determinants.

	2008S1–2009S1 Into the collapse		2007S1–2008S1 Before the collapse	
Coefficient	**Exports growth**	**Imports growth**	**Exports growth**	**Imports growth**
		Firm characteristics		
D_{size}	0.0065	0.0286^{a}	0.0371^{b}	0.0218^{b}
	(0.023)	(0.010)	(0.018)	(0.009)
D_{prod}	0.0007	-0.0034	0.0108	0.0391^{a}
	(0.020)	(0.011)	(0.015)	(0.009)
D_{interm_share}	-0.0162	-0.0208^{c}	0.0032	0.0071
	(0.023)	(0.011)	(0.015)	(0.009)
$D_{share\_exp\_sales}$	-0.0326	-0.0380^{b}	-0.0087	0.0191
	(0.046)	(0.019)	(0.022)	(0.012)
$D_{share\_imp\_interm}$	0.0100	-0.0263^{b}	-0.0511^{a}	-0.0280^{b}
	(0.023)	(0.012)	(0.019)	(0.011)
$D_{value\_add\_chain}$	0.0160	-0.0505^{b}	0.0309	-0.0507^{a}
	(0.042)	(0.023)	(0.026)	(0.014)
$D_{ext\_fin\_dep}$	-0.0149	-0.0291^{a}	-0.0350	-0.0256^{b}
	(0.016)	(0.010)	(0.021)	(0.012)
$D_{share\_debts\_o\_liab}$	-0.0345	-0.0121	-0.0168	-0.0055
	(0.026)	(0.012)	(0.017)	(0.010)
$D_{share\_debts\_due\_after\_one}$	0.0560^{a}	0.0199	0.0104	0.0097
	(0.019)	(0.013)	(0.019)	(0.012)
$D_{share\_fin\_debt}$	-0.0459^{b}	-0.0032	0.0209	0.0011
	(0.023)	(0.013)	(0.021)	(0.011)
D_{share_stock}	0.0338^{c}	-0.0131	0.0104	0.0113
	(0.020)	(0.013)	(0.021)	(0.010)
for	-0.0263	0.0116	0.0181	0.0029
	(0.031)	(0.025)	(0.025)	(0.013)
mne	-0.0141	0.0005	0.0114	-0.0304
	(0.030)	(0.024)	(0.027)	(0.023)
		Country characteristics		
$OECD\_NO\_EU$	0.1229^{a}	0.1853^{a}	-0.1561^{a}	-0.2988^{a}
	(0.043)	(0.026)	(0.028)	(0.036)
$NO\_OECD\_NO\_EU$	0.0271	0.1599^{a}	-0.0742^{b}	-0.2255^{a}
	(0.038)	(0.038)	(0.032)	(0.041)
$exch\_rate\_change$	-0.4654^{a}	-0.0525	-0.2885^{a}	-0.2988^{a}
	(0.092)	(0.062)	(0.064)	(0.079)
$growth\_rate\_GDP$	0.0253^{a}	0.0063	0.0138^{a}	0.0056
	(0.005)	(0.004)	(0.005)	(0.004)
		Product characteristics		
$intermediates$	-0.0359^{c}	-0.0580^{a}	0.0126	-0.0246^{c}
	(0.019)	(0.014)	(0.018)	(0.015)
$capital\_goods$	-0.0801^{a}	-0.0610^{a}	-0.0055	-0.0393
	(0.030)	(0.016)	(0.025)	(0.031)
$consumer\_durables$	-0.1306^{a}	-0.0873^{a}	-0.0171	-0.0305
	(0.038)	(0.020)	(0.045)	(0.022)
$energy$	-0.0380	-0.0021	0.0944^{b}	-0.0409
	(0.043)	(0.040)	(0.039)	(0.065)
$residual$	-0.0429	-0.0333^{b}	0.0150	-0.0572^{b}
	(0.030)	(0.014)	(0.029)	(0.025)
$frac_{lib\_diff}$	0.0171	0.0242^{b}	-0.0347^{b}	-0.0255^{b}
	(0.020)	(0.011)	(0.017)	(0.012)
Constant	-0.2459^{b}	-0.0960	-0.0679	-0.0655
	(0.110)	(0.094)	(0.073)	(0.089)
NACE dummies	Yes	Yes	Yes	Yes
Observations	204,598	255,035	196,029	251,079
R^2	0.0091	0.0073	0.0044	0.0062

Notes: Multi-level clustered standard errors following Cameron *et al.* (2006) are given in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Table 15: Correlation matrix of firm-level variables in the 2008S1-2009S1 export growth regression.

D_{size}	1												
D_{prod}	0.00	1											
D_{interm_share}	-0.01	-0.02	1										
$D_{share\_exp\_sales}$	0.10	0.10	0.00	1									
$D_{share\_imp\_interm}$	0.08	0.10	-0.12	0.20	1								
$D_{value\_add\_chain}$	0.37	0.17	0.07	0.44	0.32	1							
$D_{ext\_fin\_dep}$	-0.03	-0.34	0.11	-0.06	-0.07	-0.09	1						
$D_{share\_debts\_o\_liab}$	-0.06	-0.10	0.15	-0.06	-0.01	-0.04	0.13	1					
$D_{share\_debts\_due\_after\_one}$	0.00	-0.11	-0.06	-0.04	-0.01	-0.03	0.16	0.22	1				
$D_{share\_fin\_debt}$	0.01	-0.08	-0.06	-0.01	0.04	0.00	0.13	0.26	0.52	1			
D_{share_stock}	-0.03	-0.08	-0.05	0.15	0.22	0.04	0.06	0.04	0.06	0.10	1		
for	0.21	0.27	0.07	0.04	0.07	0.21	-0.16	-0.04	-0.20	-0.14	-0.13	1	
mne	0.19	0.19	0.00	0.06	-0.03	0.19	-0.05	-0.02	0.02	0.03	-0.07	0.43	1

Table 16: Firm-level export/turnover and imports/intermediates ratio change.

	2008S1–2009S1 Into the collapse		2007S1–2008S1 Before the collapse	
Coefficient	**Exports to Turnover change**	**Imports to Intermediates change**	**Exports to Turnover change**	**Imports Intermediates change**
D_{size}	-0.0084	-0.0357^{c}	0.0936^{a}	0.0502^{a}
	(0.035)	(0.021)	(0.032)	(0.019)
D_{prod}	0.0032	0.0401^{b}	0.0557^{c}	0.0263
	(0.033)	(0.020)	(0.030)	(0.018)
D_{interm_share}	0.0293	-0.0127	0.0442	0.0583^{a}
	(0.030)	(0.019)	(0.027)	(0.017)
$D_{share\_exp\_sales}$	-0.1478^{a}	0.0541	-0.1290^{a}	-0.0116
	(0.035)	(0.037)	(0.031)	(0.030)
$D_{share\_imp\_interm}$	0.0231	-0.1165^{a}	0.0012	-0.0187
	(0.034)	(0.019)	(0.029)	(0.016)
$D_{value\_add\_chain}$	-0.1006^{b}	-0.0744^{b}	-0.0561	0.0209
	(0.042)	(0.036)	(0.036)	(0.029)
$D_{ext\_fin\_dep}$	-0.0172	-0.0366^{c}	-0.0826^{a}	0.0089
	(0.033)	(0.020)	(0.029)	(0.017)
$D_{share\_debts\_o\_liab}$	-0.0072	-0.0053	0.0225	-0.0110
	(0.031)	(0.019)	(0.028)	(0.017)
$D_{share\_debts\_due\_after\_one}$	-0.0058	-0.0041	0.0513^{c}	0.0108
	(0.032)	(0.022)	(0.030)	(0.018)
$D_{share\_fin\_debt}$	-0.0389	0.0392^{c}	-0.0260	-0.0031
	(0.032)	(0.022)	(0.030)	(0.019)
D_{share_stock}	0.0267	0.0166	0.0372	0.0106
	(0.029)	(0.018)	(0.027)	(0.017)
for	-0.0113	0.0923^{b}	-0.0986^{b}	-0.0360
	(0.045)	(0.040)	(0.047)	(0.030)
mne	-0.0242	-0.0082	0.0813^{c}	0.0350
	(0.050)	(0.042)	(0.044)	(0.036)
Constant	0.1234	-0.1582	-0.1278	-0.1051
	(0.114)	(0.120)	(0.101)	(0.065)
NACE dummies	Yes	Yes	Yes	Yes
Observations	8,360	14,388	8,250	13,983
R^2	0.0164	0.0115	0.0191	0.0078

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Figure 1: Monthly exports and imports (million euros).

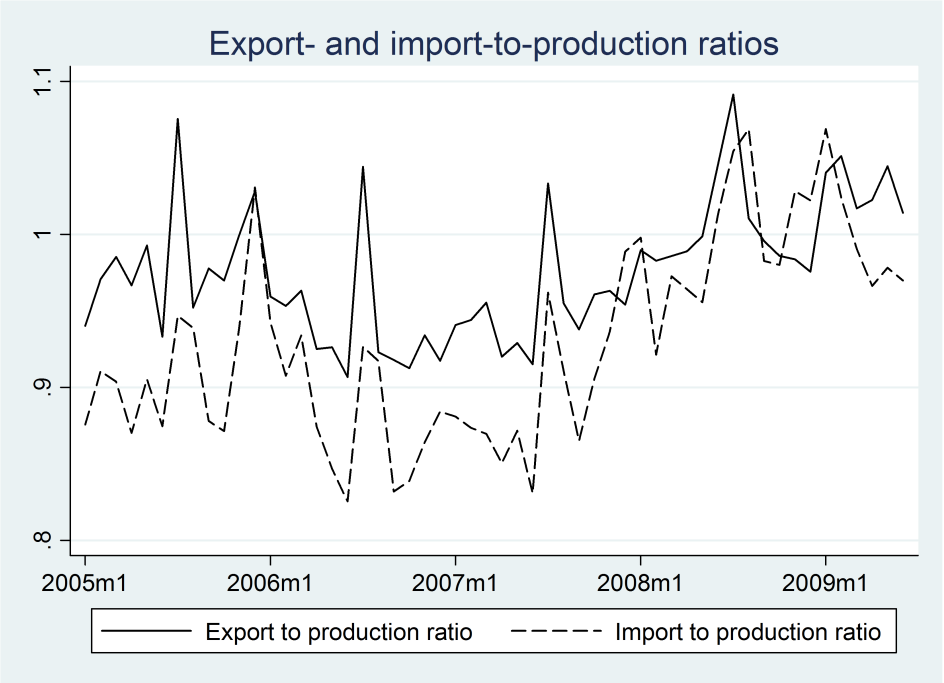

Figure 2: Monthly export- and import-to-production value ratios. Export and Imports refer only to those goods for which data on production is available from the Prodcom dataset.

D Robustness checks

In this Appendix, we present additional estimation results for the export and import growth analysis of Section 4, as well as for the exports-to-turnover and imports-to-intermediates ratio analysis of Section 5. We present results for two robustness checks: (i) no NACE industry dummies; (ii) continuous firm-level variables. For the latter set of results, all variables are analogous to those summarized in Table 13, except that the variables starting with C are now measured in continuous form and no longer as a dummy with respect to the NACE rev 1.1 two-digit sectoral median value of the characteristic among trading firms. To deal with outliers, we trim the data at 1% by eliminating, for each continuous covariate, those observations lying above (below) the 99.5 (0.5) percentile. We consider firm size and productivity in log.

Tables 17 and 18 summarize the results obtained without NACE dummies while Tables 19 and 20 show estimations with continuous firm-level variables. Results are mostly qualitatively similar to those in the main text.

One difference between estimation with binary and continuous firm-level variables pertains to the coefficients of financial characteristics. These coefficients are significant in the former and insignificant in the latter. This difference might be due to non-linear effects of financial covariates. Therefore our last robustness check introduces quadratic terms for $C_{share\_debts\_due\_after\_one}$ and $C_{share\_fin\_debt}$. Results (available upon request) show significantly positive and negative coefficients for $C_{share\_debts\_due\_after\_one}$ and $C_{share\_fin\_debt}$ for the period 2008S1–2009S1, with square terms being significant and of opposite sign. The same coefficients are not significant for 2007S1–2008S1. We conclude that our findings in regressions with binary covariates are confirmed, although firms with very short maturities or very high leverage somewhat behaved differently.

Table 17: Exports and imports growth: firm, country, and product determinants, no NACE dummies.

	2008S1–2009S1 Into the collapse		2007S1–2008S1 Before the collapse	
Coefficient	**Exports growth**	**Imports growth**	**Exports growth**	**Imports growth**
		Firm characteristics		
D_{size}	0.0013	0.0397^{a}	0.0384^{b}	0.0156^{c}
	(0.022)	(0.009)	(0.016)	(0.008)
D_{prod}	-0.0023	-0.0016	0.0108	0.0371^{a}
	(0.018)	(0.011)	(0.015)	(0.008)
D_{interm_share}	-0.0224	-0.0200^{c}	0.0018	0.0058
	(0.021)	(0.011)	(0.015)	(0.009)
$D_{share\_exp\_sales}$	-0.0282	-0.0506^{a}	-0.0161	0.0237^{b}
	(0.037)	(0.019)	(0.021)	(0.012)
$D_{share\_imp\_interm}$	0.0017	-0.0269^{b}	-0.0517^{a}	-0.0264^{b}
	(0.021)	(0.012)	(0.018)	(0.010)
$D_{value\_add\_chain}$	0.0419	-0.0545^{b}	0.0322	-0.0483^{a}
	(0.037)	(0.023)	(0.023)	(0.012)
$D_{ext\_fin\_dep}$	-0.0239	-0.0341^{a}	-0.0354^{c}	-0.0247^{b}
	(0.017)	(0.010)	(0.021)	(0.010)
$D_{share\_debts\_o\_liab}$	-0.0452^{c}	-0.0195^{c}	-0.0193	-0.0040
	(0.024)	(0.011)	(0.018)	(0.009)
$D_{share\_debts\_due\_after\_one}$	0.0505^{b}	0.0178	0.0122	0.0079
	(0.020)	(0.013)	(0.018)	(0.012)
$D_{share\_fin\_debt}$	-0.0401^{c}	-0.0042	0.0212	0.0022
	(0.022)	(0.013)	(0.020)	(0.010)
D_{share_stock}	0.0296	-0.0148	0.0157	0.0148^{c}
	(0.021)	(0.012)	(0.020)	(0.009)
for	-0.0333	0.0001	0.0149	0.0093
	(0.031)	(0.025)	(0.023)	(0.013)
mne	-0.0101	-0.0049	0.0132	-0.0237
	(0.028)	(0.024)	(0.028)	(0.021)
		Country characteristics		
$OECD\_NO\_EU$	0.1055^{b}	0.1793^{a}	-0.1646^{a}	-0.3027^{a}
	(0.043)	(0.022)	(0.027)	(0.034)
$NO\_OECD\_NO\_EU$	0.0132	0.1582^{a}	-0.0799^{a}	-0.2401^{a}
	(0.036)	(0.037)	(0.031)	(0.040)
$exch\_rate\_change$	-0.4931^{a}	-0.0669	-0.2896^{a}	-0.3128^{a}
	(0.093)	(0.056)	(0.061)	(0.074)
$growth\_rate\_GDP$	0.0251^{a}	0.0064^{c}	0.0136^{a}	0.0068^{c}
	(0.005)	(0.003)	(0.005)	(0.003)
		Product characteristics		
$intermediates$	-0.0790^{a}	-0.0977^{a}	-0.0016	-0.0192^{c}
	(0.017)	(0.012)	(0.017)	(0.012)
$capital\_goods$	-0.1002^{a}	-0.1024^{a}	-0.0088	-0.0243
	(0.028)	(0.015)	(0.023)	(0.022)
$consumer\_durables$	-0.1449^{a}	-0.0991^{a}	-0.0262	-0.0277
	(0.035)	(0.019)	(0.036)	(0.018)
$energy$	-0.0636	-0.0251	0.0873^{b}	-0.0312
	(0.042)	(0.026)	(0.040)	(0.050)
$residual$	-0.0545^{c}	-0.0468^{a}	0.0188	-0.0522^{b}
	(0.030)	(0.013)	(0.026)	(0.022)
$frac_{lib\_diff}$	0.0054	0.0238^{b}	-0.0503^{a}	-0.0355^{a}
	(0.018)	(0.012)	(0.016)	(0.011)
Constant	-0.0776^{c}	-0.0630^{a}	-0.0243	0.0372^{c}
	(0.045)	(0.022)	(0.042)	(0.023)
Observations	204,598	255,035	196,029	251,079
R^2	0.0052	0.0048	0.0030	0.0052

Notes: Multi-level clustered standard errors following Cameron *et al.* (2006) are given in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Table 18: Firm-level export/turnover and imports/intermediates ratio change, no NACE dummies.

	2008S1–2009S1 Into the collapse		**2007S1–2008S1 Before the collapse**	
Coefficient	**Exports to Turnover change**	**Imports to Intermediates change**	**Exports to Turnover change**	**Imports Intermediates change**
D_{size}	-0.0211	-0.0380^{c}	0.1003^{a}	0.0517^{a}
	(0.035)	(0.021)	(0.032)	(0.019)
D_{prod}	-0.0037	0.0373^{c}	0.0536^{c}	0.0280
	(0.033)	(0.020)	(0.030)	(0.018)
D_{interm_share}	0.0264	-0.0108	0.0385	0.0505^{a}
	(0.029)	(0.019)	(0.027)	(0.016)
$D_{share\_exp\_sales}$	-0.1535^{a}	0.0439	-0.1366^{a}	-0.0087
	(0.035)	(0.036)	(0.031)	(0.030)
$D_{share\_imp\_interm}$	0.0403	-0.1107^{a}	0.0057	-0.0192
	(0.034)	(0.019)	(0.029)	(0.016)
$D_{value\_add\_chain}$	-0.0881^{b}	-0.0635^{c}	-0.0453	0.0235
	(0.041)	(0.035)	(0.035)	(0.029)
$D_{ext\_fin\_dep}$	-0.0167	-0.0374^{c}	-0.0867^{a}	0.0081
	(0.033)	(0.020)	(0.029)	(0.017)
$D_{share\_debts\_o\_liab}$	-0.0074	-0.0050	0.0261	-0.0111
	(0.031)	(0.019)	(0.028)	(0.017)
$D_{share\_debts\_due\_after\_one}$	0.0007	-0.0001	0.0511^{c}	0.0071
	(0.032)	(0.022)	(0.030)	(0.019)
$D_{share\_fin\_debt}$	-0.0391	0.0404^{c}	-0.0221	-0.0028
	(0.032)	(0.022)	(0.030)	(0.019)
D_{share_stock}	0.0249	0.0145	0.0372	0.0115
	(0.029)	(0.018)	(0.027)	(0.016)
for	0.0242	0.0677^{c}	-0.1139^{b}	-0.0407
	(0.043)	(0.038)	(0.047)	(0.028)
mne	-0.0120	-0.0151	0.0828^{c}	0.0263
	(0.049)	(0.042)	(0.044)	(0.036)
Constant	0.1057^{b}	0.0329	-0.0602	-0.1394^{a}
	(0.050)	(0.033)	(0.048)	(0.028)
Observations	8,360	14,388	8,250	13,983
R^2	0.0065	0.0046	0.0077	0.0018

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Table 19: Exports and imports growth: firm, country, and product determinants, continuous variables.

	2008S1–2009S1 Into the collapse		2007S1–2008S1 Before the collapse	
Coefficient	**Exports growth**	**Imports growth**	**Exports growth**	**Imports growth**
		Firm characteristics		
C_{size}	0.0080	0.0103^{b}	0.0258^{a}	0.0043
	(0.008)	(0.005)	(0.009)	(0.005)
C_{prod}	0.0100	0.0007	0.0251^{a}	0.0244^{a}
	(0.006)	(0.005)	(0.008)	(0.004)
C_{interm_share}	-0.0032	-0.0095^{c}	0.0066	-0.0025
	(0.005)	(0.005)	(0.008)	(0.006)
$C_{share\_exp\_sales}$	0.0019	-0.0244^{a}	-0.0137^{b}	-0.0075
	(0.008)	(0.005)	(0.007)	(0.005)
$C_{share\_imp\_interm}$	0.0070	-0.0119^{b}	-0.0099^{b}	-0.0149^{a}
	(0.006)	(0.005)	(0.005)	(0.003)
$C_{value\_add\_chain}$	-0.0084	-0.0086	-0.0040	-0.0052
	(0.010)	(0.007)	(0.008)	(0.005)
$C_{ext\_fin\_dep}$	0.0097^{c}	-0.0021	0.0047	0.0001
	(0.005)	(0.002)	(0.005)	(0.004)
$C_{share\_debts\_o\_liab}$	-0.0027	-0.0078^{b}	0.0002	-0.0002
	(0.007)	(0.003)	(0.006)	(0.003)
$C_{share\_debts\_due\_after\_one}$	-0.0037	0.0093^{c}	-0.0028	0.0083
	(0.011)	(0.005)	(0.006)	(0.006)
$C_{share\_fin\_debt}$	0.0013	-0.0016	0.0090	-0.0059
	(0.009)	(0.006)	(0.007)	(0.006)
C_{share_stock}	-0.0069	-0.0060	0.0076	0.0086^{b}
	(0.006)	(0.005)	(0.007)	(0.003)
for	-0.0494	0.0190	-0.0226	-0.0185
	(0.030)	(0.024)	(0.024)	(0.018)
mne	-0.0074	-0.0303	0.0195	-0.0311
	(0.026)	(0.027)	(0.026)	(0.023)
		Country characteristics		
$OECD\_NO\_EU$	0.1125^{a}	0.1995^{a}	-0.1829^{a}	-0.2980^{a}
	(0.041)	(0.021)	(0.024)	(0.035)
$NO\_OECD\_NO\_EU$	0.0030	0.1543^{a}	-0.0893^{a}	-0.2409^{a}
	(0.034)	(0.042)	(0.030)	(0.033)
$exch\_rate\_change$	-0.5017^{a}	-0.1273^{b}	-0.2999^{a}	-0.2709^{a}
	(0.109)	(0.063)	(0.076)	(0.078)
$growth\_rate\_GDP$	0.0235^{a}	0.0060	0.0143^{a}	0.0070^{b}
	(0.005)	(0.004)	(0.005)	(0.003)
		Product characteristics		
$intermediates$	-0.0477^{b}	-0.0615^{a}	0.0047	-0.0243^{c}
	(0.019)	(0.017)	(0.019)	(0.013)
$capital\_goods$	-0.1027^{a}	-0.0800^{a}	-0.0261	-0.0359
	(0.026)	(0.017)	(0.026)	(0.031)
$consumer\_durables$	-0.1082^{a}	-0.0946^{a}	-0.0081	-0.0332
	(0.036)	(0.019)	(0.044)	(0.023)
$energy$	-0.0700^{c}	0.0411	0.0588	-0.0297
	(0.042)	(0.035)	(0.064)	(0.062)
$residual$	-0.0317	-0.0531^{a}	-0.0007	-0.0535^{c}
	(0.025)	(0.011)	(0.029)	(0.027)
$frac_{lib\_diff}$	0.0083	0.0248^{b}	-0.0231	-0.0224^{c}
	(0.018)	(0.012)	(0.016)	(0.012)
Constant	-0.2309	-0.1376^{c}	-0.0076	0.2689^{a}
	(0.148)	(0.075)	(0.084)	(0.078)
NACE dummies	Yes	Yes	Yes	Yes
Observations	162,456	224,081	159,991	221,401
R^2	0.0079	0.0070	0.0050	0.0059

Notes: Multi-level clustered standard errors following Cameron *et al.* (2006) are given in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Table 20: Firm-level export/turnover and imports/intermediates ratio change, continuous variables.

	2008S1–2009S1 Into the collapse		**2007S1–2008S1 Before the collapse**	
Coefficient	**Exports to Turnover change**	**Imports to Intermediates change**	**Exports to Turnover change**	**Imports Intermediates change**
C_{size}	-0.0349^{b}	-0.0220^{c}	0.0295^{c}	0.0190
	(0.015)	(0.012)	(0.015)	(0.012)
C_{prod}	-0.0034	0.0291^{b}	0.0336^{b}	0.0030
	(0.015)	(0.012)	(0.014)	(0.012)
C_{interm_share}	-0.0167	-0.0189	0.0200	0.0598^{a}
	(0.017)	(0.013)	(0.016)	(0.013)
$C_{share\_exp\_sales}$	-0.0663^{a}	0.0024	-0.0584^{a}	0.0118
	(0.012)	(0.010)	(0.012)	(0.010)
$C_{share\_imp\_interm}$	-0.0054	-0.0690^{a}	-0.0113	-0.0153
	(0.014)	(0.010)	(0.013)	(0.011)
$C_{value\_add\_chain}$	0.0263^{a}	0.0075	0.0079	-0.0066
	(0.008)	(0.008)	(0.009)	(0.007)
$C_{ext\_fin\_dep}$	-0.0055	-0.0043	-0.0050	0.0012
	(0.010)	(0.008)	(0.010)	(0.009)
$C_{share\_debts\_o\_liab}$	-0.0184	0.0009	-0.0081	-0.0128
	(0.012)	(0.012)	(0.014)	(0.012)
$C_{share\_debts\_due\_after\_one}$	0.0138	0.0002	0.0267^{c}	0.0233^{c}
	(0.015)	(0.012)	(0.014)	(0.013)
$C_{share\_fin\_debt}$	-0.0165	0.0052	-0.0116	-0.0089
	(0.015)	(0.012)	(0.015)	(0.012)
C_{share_stock}	0.0051	0.0298^{b}	0.0018	-0.0236^{c}
	(0.015)	(0.013)	(0.015)	(0.014)
for	-0.0480	0.1036^{b}	-0.1018^{b}	-0.0537
	(0.038)	(0.043)	(0.040)	(0.036)
mne	-0.0081	0.0309	0.0286	0.0302
	(0.036)	(0.040)	(0.042)	(0.045)
Constant	0.2500^{c}	0.1147	0.0185	-0.2267^{b}
	(0.128)	(0.134)	(0.122)	(0.100)
NACE dummies	Yes	Yes	Yes	Yes
Observations	7,886	13,694	7,785	13,307
R^2	0.0166	0.0134	0.0169	0.0107

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.