Trade Crisis? What Trade Crisis?*

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Abstract

International trade fell dramatically between 2008 and 2009. We provide a micro-econometric investigation of the determinants of this fall, using data from a small open economy, Belgium. First, we find that changes in firm-country-product exports and imports occurred almost exclusively at the intensive margin. Whereas quantities and prices contracted sharply, 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, we examine the contribution of various firm, product and country characteristics to the fall in the intensive margin, thereby testing some conjectures that have been put forward in the literature. Our econometric results point toward a broad-based and very homogenous fall in trade. Input-intensive and highly leveraged firms relying strongly on trade credit reduced their imports somewhat more, but the implied magnitudes are small, explaining very little of the variation in the firm-specific part of the trade fall. Last, we show that exports-to-turnover and imports-to-intermediates ratios at the firm level did neither systematically decrease nor reveal strong firm- or sector-specific patterns. All of our results therefore 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 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 data suggests that there is no specific 'trade crisis'.

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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 by far 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 this trade collapse (e.g., Benassy-Quéré *et al.*, 2009; Levchenko *et al.*, 2009).

Why did trade collapse so much during the recent crisis? Most conjectures focus on the supply-side to explain why the fall was not commensurate with the recession: a dramatic trade credit crunch (Auboin, 2009); 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, some 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 the drawing down of inventories and the postponement of durable goods purchases. In principle, all these conjectures may play a role so that only a detailed empirical analysis can allow us to discriminate between them.

The main contribution of this paper is to provide a detailed micro-econometric investigation of the determinants of the trade collapse for a small open economy, Belgium. Using Belgian data has several advantages. First, given its small size, international shocks can be viewed as being 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 to the EU. Last, very high export and import shares of sales and purchases, respectively, make the 'super-exporter' Belgium an ideal laboratory to study the impacts of the crisis on vertical specialization and global value chains.[2] Matching Belgian customs data on all firm-country-product exports and imports with balance sheet data, we perform three empirical exercises.

First, we decompose the trade collapse along several margins as in Bernard *et al.* (2010). Doing so allows us to assess the respective contributions of the different key channels to the observed fall in trade. Second, we use a two-stage econometric procedure to investigate and discriminate among the aforementioned conjectures. More precisely, we look at the distribution of the trade fall along firm,

[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 for the *disruption* of global value chains is required to link the increasing importance of intermediates to higher short-term trade elasticities. To our knowledge, such evidence is missing to date.

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

country, and product characteristics to identify compositional effects. Last, we compare the trade fall to the domestic benchmark by examining changes in exports-to-turnover and imports-to-intermediates ratios across firms. Doing so allows us to understand whether firms engaged in international transactions suffered more in their foreign than in their domestic market. Should this be the case, talking about a 'trade crisis' would be justified.

Our key findings can be summarized as follows. First, decomposing the trade collapse into an *extensive* margin (changes in the number of firms, the average number of destination and origin markets per firm, and the average number of products per market-firm) and into an *intensive* margin (changes in average values), we find that virtually all of the trade collapse occurred at the latter 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 volumes. This result echoes findings by Bernard *et al.* (2010) on the 1997 Asian crisis, but given the magnitude of the current trade collapse it is nonetheless remarkable. It highlights the extreme flexibility of business relationships across firms, their input suppliers, and their clients. Presumably the recovery will be faster than it could have been with large, and potentially irreversible, changes at the extensive margin, and their associated high upfront costs. Fears that the global economy could face a major, and potentially very long and costly, trade crisis seem misplaced.

Second, we isolate firm-, country- and product-specific components of the trade collapse and regress them on observable firm, product and country characteristics. We find that the fall in the intensive margin was very evenly spread across both products and markets, although exports to EU partners and countries which experienced a less severe fall of their GDP decreased less. We also find that larger and more indebted firms (especially with trade credit as opposed to financial credit), as well as firms relying more on imported intermediate inputs, contracted somewhat more their imports. We do not, however, pick up any compositional effects on the export side. Furthermore, even in the case of imports the implied magnitudes are small — these characteristics hence explain only a tiny fraction of the variation in the firm-specific component of the trade fall at the intensive margin. Finally, industry dummies have little explanatory power for exports and hardly any for imports. Overall our econometric analysis casts doubt on supply-side explanations of the trade collapse, while suggesting that aggregate statistics can be misleading. This applies particularly to the larger fall in 'Intermediate & Capital goods' as well as 'Consumer Durables'. Our analysis reveals that the somewhat larger fall in the trade of durable goods is either statistically insignificant, or driven by specific characteristics of the trading firms or industries, rather than the nature of the goods themselves.

Last, we focus on demand-side explanations and examine the possibility of a general fall in demand. We start by showing that exports-to-production and imports-to-production ratios did not decrease in the aggregate, and that they actually increased in about half of the sectors. To gain further insights, we use firm-level information and regress exports-to-turnover and imports-to-intermediate ratios on firm characteristics and industry dummies. Our econometric analysis reveals that there is almost no pattern across firms, thus confirming that foreign operations were not significantly differently affected than domestic operations. We may thus conclude that a general fall in demand for tradables is the

main culprit of the recent trade collapse.

Our paper is closely related to ongoing empirical investigations of the trade collapse relying on other datasets. Levchenko *et al.* (2009) examine the variation in US exports and imports in a cross-section of 6-digit industries. They find some support for the 'fragmentation explanation', as well as for the role of durable goods, but no evidence of a trade credit effect or of the use of inventories. They also find that industries experiencing larger reductions in domestic output had a larger fall in trade. Eaton *et al.* (2010) calibrate the Eaton-Kortum model for about 30 countries and find that a global demand shock can explain more than half of the decrease in trade flows. For a few countries in their sample (including China and Japan), they also assess a limited role for an increase of implicit trade frictions as measured by bilateral Head-Ries indices (Head and Ries, 2001). However, since their analysis relies on aggregate data, it may well hide important cross-industry and cross-firm patterns that we can identify from the microdata. Furthermore, because of their black-box nature, implicit trade frictions cannot help us to discriminate between alternative supply-side explanations. Bricongne *et al.* (2009) examine French firm-level exports from the year 2000 onwards. Using the methodology developed by Rajan and Zingales (1998), they find that the export collapse during the recession is more pronounced among exporters in sectors that depend more on external finance. They detect no differences across exporter size classes though. Finally, Baldwin (2009) provides a comprehensive collection of empirical studies which mostly rely on more aggregated data or present more descriptive evidence. Some of the studies decompose the margins of trade using US and French data, obtaining results similar to ours. The general conclusion favors demand-side explanations of the trade collapse, though that conclusion is reached without firm-level econometric analysis.

Our work is also more broadly related to studies of changes in trade patterns during major macroeconomic crises. Bernard *et al.* (2010) 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) provide firm-level evidence for Japanese exports in the 1990's. Matching exporters with their main banks, they find that shocks to bank health (a proxy for the availability of trade credit) are correlated with firm-level export declines. 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) examine how inventory management affects firms' import behavior. They show that firms hold large inventories of imported goods, and that the use of inventories can explain substantial falls in trade after a terms-of-trade shock.

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 relates exports to turnover and imports to intermediate

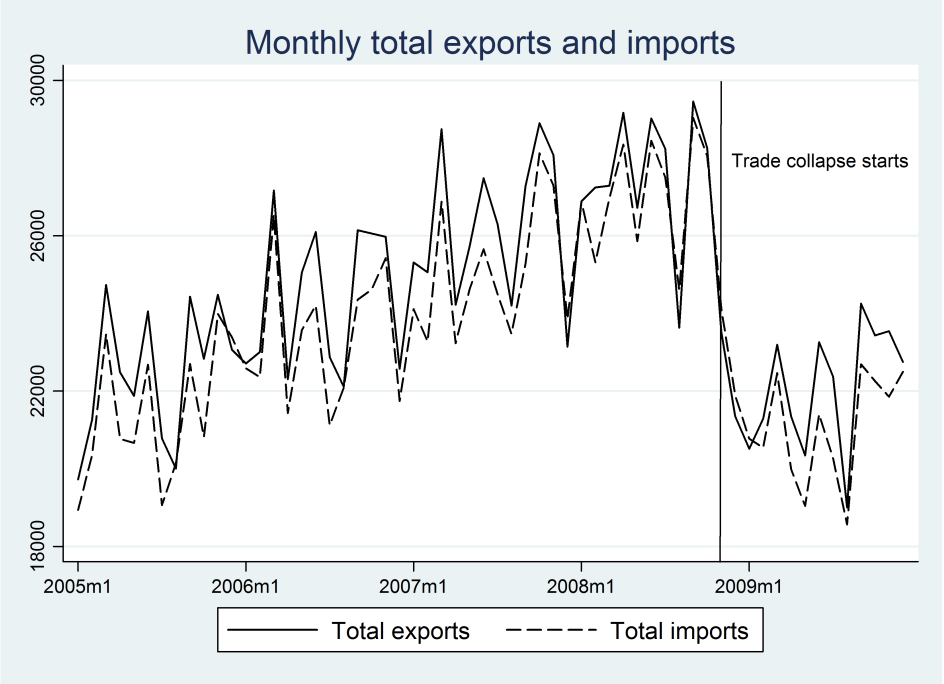

Figure 1: Monthly exports and imports (million euros).

purchases to test for the existence of a global demand shock. 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.

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

We first examine the dramatic fall of Belgian imports and exports between the first semesters of 2008 and 2009. As can be seen from Figure 1, the Belgian trade collapse is visible in the data from November 2008 onwards, with monthly merchandise exports and imports falling by about 10% relative to their value in November 2007. Monthly changes become increasingly dramatic until July 2009 when a reversal of the trend seems to occur. We therefore focus on the period between the first semesters of 2008 and 2009, during which exports and imports fell by 23.83% and 24.63%, respectively.

Differences across product categories. An important finding from 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 of the EU Main Industrial Groupings classification. Although intermediates and consumer durables were not subject to any particular fiscal stimulus packages during the period we consider, trade in these products fell much more dramatically than trade in other categories, with

the exception of energy. These first statistics seem to lend credence to explanations based on the disruption of global value chains or the postponement of durable goods purchases.

Table 1: Percentage changes in exports and imports by broad product category.

Product category	Change in Exports (%)	Change in Imports (%)
Consumer non-durables	-1.77	9.14
Intermediates	-31.14	-30.92
Capital goods	-24.32	-26.85
Consumer durables	-36.08	-39.30
Energy	-41.72	-41.86
Other	-24.17	-18.78

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

Table 2 provides a finer breakdown of the trade collapse across Prodcom-2008 2-digit product codes during our period of analysis.[3] As can be seen from the figures in Table 2, trade in nearly all broad product categories fell, though in a very heterogeneous way. As for exports, 'Other mining and quarrying' (code 8) and 'Manufacture of basic metals' (code 24) are the product groups that suffered the largest drops of nearly 50%, while a few other categories like 'Manufacture of leather and related products' (code 15), 'Printing and reproduction of recorded media' (code 18), 'Manufacture of basic pharmaceutical products and preparations' (code 21), and 'Manufacture of other transport equipment' (code 30) were basically unaffected. Concerning imports, Table 2 reveals a very similar sectoral pattern.

Foreign and domestic operations. In line with developments in other OECD countries, Belgian trade fell much more than Belgian GDP — the fall of about 24% in imports and exports must be contrasted with a 'modest' 3.25% drop in nominal GDP over the same period. Of course, trade is not value added, and since it involves essentially manufactured goods, the fall in trade should be compared with the roughly 25% fall in manufacturing production value over the same period.[4] Hence, in the aggregate, the fall in trade was commensurate with the fall in production. This can also be seen from Figure 2, which reports monthly changes from January 2005 to June 2009 in the export-to-production and the import-to-production ratios, respectively. 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 sectoral level, Table 2 further compares those same two ratios using data for the first semester 2008 and the first semester 2009 by Prodcom-2008 2-digit product codes. Inspection of the two tables reveals that the aggregate results depicted by Figure 2 also roughly hold within broad product categories.

[3]The Prodcom classification is a product classification used in the EU since Council Regulation (EEC) No 3924/91 of December 19, 1991 on the establishment of a Community survey of industrial production (OJ L 374, 31.12.1991, p.1).

[4]Based on the production statistics (Prodcom dataset), manufacturing production volumes fell by 18%, while manufacturing production value fell by 25% over the period we consider. Observe that the overall change and the price and quantity decomposition are roughly comparable with those of aggregate trade. These statistics are also consistent with the small changes in overall exports-to-production and imports-to-production ratios that can be seen in Table 2.

Table 2: % changes in exports, imports, export/production, and import/production ratios by product

Prodcom-2008 industry name	% Export change	Exp./Prod. ratio 2008	Exp./Prod. ratio 2009	% Imp. change	Imp./Prod. ratio 2008	Imp./Prod. ratio 2009
Other mining and quarrying	-47.69	10.44	6.63	-48.66	11.17	6.96
Mfg of food products	-5.23	0.86	0.86	-8.39	0.64	0.62
Mfg of beverages	-21.78	0.73	0.57	-25.60	0.72	0.53
Mfg of tobacco products	-3.12	1.10	1.16	3.83	0.90	1.02
Mfg of textiles	-26.59	1.08	1.11	-22.27	0.53	0.58
Mfg of wearing apparel	-3.42	24.56	31.42	-3.85	27.98	35.63
Mfg of leather and related products	2.98	30.17	41.24	-2.60	23.44	30.30
Mfg of wood, products of wood	-30.96	0.73	0.67	-25.22	0.66	0.66
Mfg of paper and paper products	-18.44	1.00	0.97	-17.17	1.07	1.05
Printing and reproduction of recorded media	74.70	0.05	0.10	50.75	0.05	0.09
Mfg of chemicals and chemical products	-30.70	1.45	1.53	-37.80	1.12	1.06
Mfg of basic pharmaceutical products	4.07	4.51	4.61	33.72	2.60	3.42
Mfg of rubber and plastic products	-21.47	1.38	1.33	-22.55	1.23	1.16
Mfg of other non-metallic mineral products	-24.05	0.64	0.59	-23.35	0.44	0.41
Mfg of basic metals	-47.13	1.10	1.13	-42.20	0.69	0.77
Mfg of fabric. metal products,	-22.06	0.60	0.60	-24.55	0.67	0.65
Mfg of computer, electronic and optical products	-21.22	4.40	4.68	-15.28	5.67	6.49
Mfg of electrical equipment	-18.51	1.28	1.32	-16.43	1.45	1.52
Mfg of machinery and equipment n. e. c.	-26.79	2.00	2.00	-30.99	1.99	1.88
Mfg of motor vehicles, trailers and semi-trailers	-34.74	1.43	1.43	-33.27	1.69	1.74
Mfg of other transport equipment	1.43	1.82	2.08	-21.26	1.82	1.61
Mfg of furniture	-17.94	0.88	0.81	-15.50	1.34	1.27
Other manufacturing	-1.94	12.06	13.46	-5.64	11.63	12.49
Repair and installation of machinery	-34.46	0.04	0.03	-7.53	0.07	0.07
Total	-23.29	1.43	1.48	-23.21	1.26	1.29

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, for which no production data is available.

Geographical structure of the trade collapse. Table 3 breaks down changes in total trade (exports plus imports) with Belgium's top-100 trade partners between the first semester of 2008 and the first semester of 2009. Trade with the Netherlands (Belgium's most important trade partner) fell by 31.07%. Trade with other major EU partners (Germany, France) as well as with Japan and Korea fell by a similar magnitude. Trade with the US and, especially, China and Hong Kong seems to be much less affected by the collapse. Although there is no strongly visible geographical structure, trade seems to have fallen less on average with nearby EU partners and even less with China and the US.[5] Our subsequent econometric analysis will partly confirm these findings for the case of Belgian exports.

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

[5]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.

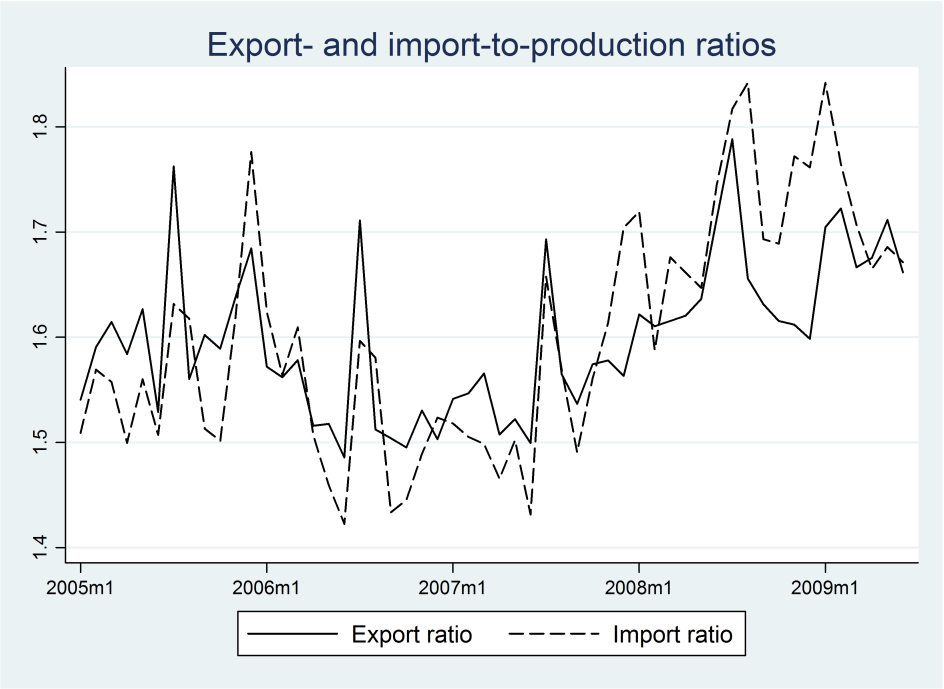

Figure 2: Monthly export- and import-to-production value ratios.

Aggregate 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 economic units that trade products across different destinations, 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, 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. Sharp differences across broad product categories might also hide substantial heterogeneity within categories which contain hundreds of products. Some effects may cancel out within each broad category. Even worse, characteristics of each category also pick up characteristics of non-trading firms.

We therefore take the analysis now to a finer level of disaggregation. We first decompose in the next Section the contribution of the different margins to the trade collapse using exports and imports at the firm-product-country level. 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 will then expand on the question of whether the trade collapse is driven by a generalized fall in demand of manufacturing goods or whether the smoking gun must be sought elsewhere.

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

Country	Rank	% Trade change	Country	Rank	% Trade change	Country	Rank	% Trade change
NL	1	-31.07	AU	35	0.85	LV	69	-37.23
DE	2	-27.00	MX	36	-16.66	CY	70	-32.50
FR	3	-23.60	SG	37	32.12	CI	71	-20.35
GB	4	-28.57	BG	38	-43.23	EC	72	29.06
US	5	-13.74	SK	39	-24.48	PE	73	-34.00
IT	6	-24.22	TH	40	-18.68	BY	74	-19.97
ES	7	-24.22	RO	41	-25.35	LB	75	-0.93
IE	8	33.06	EG	42	-37.84	SN	76	-60.98
SE	9	-37.05	ID	43	-2.95	KW	77	10.64
CN	10	-0.71	QA	44	36.41	SY	78	-30.44
JP	11	-21.16	TW	45	-17.10	CM	79	33.46
LU	12	-30.55	VE	46	-50.13	GH	80	-15.36
RU	13	-45.80	MA	47	-21.42	JO	81	13.27
IN	14	-27.83	VN	48	-21.98	DO	82	-42.35
PL	15	-22.61	MY	49	-15.60	LY	83	29.11
CH	16	-24.02	LT	50	-19.57	ZM	84	-47.31
NO	17	-32.34	UA	51	-33.60	LK	85	-15.72
TR	18	-32.27	AR	52	-34.80	SR	86	28.48
IL	19	-54.46	SI	53	-24.81	KZ	87	-12.51
CZ	20	-22.12	CO	54	-4.33	IS	88	-30.40
AT	21	-24.80	TN	55	-15.95	SL	89	-59.36
FI	22	-31.28	CD	56	-43.04	LS	90	-20.87
DK	23	-27.29	NG	57	1.11	MT	91	32.35
BR	24	-26.95	IR	58	-10.64	KE	92	-11.06
CA	25	-13.12	CL	59	9.15	NC	93	-22.31
KR	26	-34.74	MH	60	-99.99	BJ	94	-27.60
AE	27	-38.31	PH	61	-23.55	CG	95	-5.71
PT	28	-21.80	NZ	62	-5.61	MR	96	-58.99
HU	29	-19.53	CR	63	-4.60	GN	97	-2.77
GR	30	-19.04	PK	64	-8.78	BF	98	15.65
DZ	31	-41.13	AO	65	24.34	BA	99	-33.23
HK	32	-3.92	EE	66	-12.48	OM	100	2.32
ZA	33	-26.74	HR	67	-30.12			

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

3 The margins of the trade collapse

To gauge each margin's contribution to the Belgian trade collapse, we perform a decomposition of exports and imports along the lines suggested by Bernard *et al.* (2010). 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 the first semester of 2008 and the first semester of 2009 as follows:

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

The first three terms in expression (1) capture changes in the *extensive margin* of trade, whereas the last term captures changes in the *intensive margin*.[6] Since our dataset reports information about quantities exported, we can even more finely 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 an analogous way.

Table 4: Changes in the margins of Belgian exports between 2008–2009

Total exports (all firm-country-product combinations)							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	1,36907E+11	18,684	6.91	6.01	176,439.1	120,040.4	1.47
2009	1,04276E+11	18,848	6.80	6.09	133,710.2	97,425.2	1.37
$(\Delta - 1)\%$	-23.83%	0.88%	-1.63%	1.29%	-24.22%	-18.84%	-6.63%
Margin's contribution			-1.85%		101.85%		

Notes: See Appendix A for further details.

Table 4 reveals that Belgian exports for all firm-country-product combinations fell by almost 24% between the first semester of 2008 and the first semester of 2009. Despite that huge fall, the number of exporters and the number of products shipped on average by each exporter to each country both slightly increased by 0.88% and by 1.29%, respectively. The average number of countries served by Belgian exporters dropped by -1.63%. Changes at the extensive margin hence *increased* Belgian exports by $(1.0088 \times 0.9837 \times 1.0129 - 1) \times 100\% = 0.51\%$, i.e., by about half a percentage point. As can be seen from Column 6 in Table 4, changes at the intensive margin were much larger than changes at the extensive margin. Indeed, between the first semester of 2008 and the first semester of 2009, the average value of exports per firm-country-product felt by 24.22%. As can be seen from the last line, the intensive margin thus contributes to more than 100% of the observed change in exports, whereas the contribution of the extensive margin is even slightly negative (though negligible).[7]

One advantage of our dataset is that it provides information on either quantities or weights of shipments.[8] This allows us, as mentioned before, to decompose the change in export values more finely into quantity and price changes. As can be seen from the last two columns of Table 4, changes in the intensive margin are largely driven by changes in quantities shipped. On average, Belgian exports by firm-country-product decreased in terms of quantities by 18.83%. Average unit prices also fell, but 'only' by 6.63%. A first conclusion thus emerges: *the collapse of Belgian exports is overwhelmingly*

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

[7] Combining the two margins of trade, the total change in Belgian exports is given by $(1.0088 \times 0.9837 \times 1.01286 \times 0.7578 - 1) \times 100\% = -23.83\%$. 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.

[8] For the finer decomposition using changes in quantities and in prices, the total change in exports is decomposed as $(1.0088 \times 0.9837 \times 1.01286 \times 0.8116 \times 0.9337 - 1) \times 100\% = -23.83\%$, where the last two terms in the decomposition are the quantity and price changes.

driven by a fall in sales per firm-country-product, which is itself driven to a large extent by a sharp fall in quantities exported and some decrease in unit prices.

Table 5: Changes in the margins of Belgian imports between 2008–2009

Total imports (all firm-country-product combinations)							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	1,34749E+11	32,272	3.92	7.09	150,358.0	134,303.0	1.12
2009	1,01564E+11	34,336	3.78	6.87	113,803.0	112,488.8	1.01
$(\Delta - 1)\%$	-24.63%	6.40%	-3.38%	-3.13%	-24.31%	-16.24%	-9.63%
Margin's contribution			1.48%		98.52%		

Notes: See Appendix A for further details.

Table 5 performs the same decomposition for total Belgian imports, which fell by about 25% across all firm-country-product combinations between the first semester of 2008 and the first semester of 2009. Observe that the overall picture is very similar to that of exports, although there is slightly more change at the extensive margin. There is 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 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 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, which is 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 next repeat the above decompositions by splitting our sample more finely along various dimensions. In particular, we ask the following five 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) Is the trade collapse and the change in trade margins more pronounced for 'Intermediate & Capital goods' than for other goods? (iii) Are large or small, and more or less productive, firms affected differently? (iv) Does a firm's ownership status (foreign versus domestically owned) and its multinational status matter? (v) Does a firm's debt structure in terms of overall leverage or financial verus 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 2008–2009 recession. In particular, items (i) and (ii) provide information about geographic or product shifts in trade flows, while items (iii) to (v) provide information about reallocation of market shares across firms, the collapse of global value chains, and the importance of access to credit.

We present results for exports and imports separately.[9] Table 6 decomposes the margins of Belgian exports to EU member states, to OECD non-EU countries, and to non-OECD non-EU countries,

[9]We present only the most significant results and briefly comment on others. The full set of results is available as an Excel spreadsheet from the authors upon request.

respectively. As can be seen, total export changes are very similar across the three country groups. The single most important insight is the overwhelming contribution of the intensive margin. There is virtually no 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 23–24% meaning that the small differences in the total export decrease across regions is due to the extensive margin.[10]

Table 6: Changes in the margins of Belgian exports across 'regions'

Exports to EU member states only							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	1,04225E+11	8,068	7.78	8.67	191,497.1	147,480.3	1.30
2009	7,81317E+10	8,172	7.55	8.70	145,421.9	120,508.9	1.21
$(\Delta - 1)\%$	-25.04%	1.29%	-2.92%	0.39%	-24.06%	-18.29%	-7.06%
Margin's contribution			4.49%		95.51%		
Exports to OECD non-EU countries							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	1,61283E+10	8,802	2.22	3.96	208,043.4	79,582.0	2.61
2009	1,30351E+10	8,883	2.19	4.23	158,347.3	53,178.7	2.98
$(\Delta - 1)\%$	-19.18%	0.92%	-1.44%	6.75%	-23.89%	-33.18%	13.90%
Margin's contribution			-28.19%		128.19%		
Exports to non-OECD non-EU countries							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	1,65533E+10	11,242	4.16	3.30	107,380.9	43,506.41	2.47
2009	1,31088E+10	11,332	4.14	3.42	81,793.4	42,766.63	1.91
$(\Delta - 1)\%$	-20.81%	0.80%	-0.46%	3.61%	-23.83%	-1.70%	-22.51%
Margin's contribution			-16.67%		116.67%		

Notes: See Appendix A for further details.

Recall that the change in the extensive margin for total Belgian exports in Table 4 amounts to about 0.51%. As shown by Table 6, this aggregate figure masks some 'regional' variation. Indeed, the extensive margin falls by about 1.28% for exports to EU member states, whereas it increases by 6.19% and 3.96% for exports to OECD non-EU countries and for exports to non-OECD non-EU countries, respectively. While these figures are rather small, they still show that there are some cross-country differences. One possible explanation is that arm's length transactions are relatively more common in the EU. Indeed Bernard *et al.* (2010) show using US data that the extensive margin reacts more strongly to negative shocks for arm's length than for related-party trade. At this stage, however, we

[10]In the Excel spreadsheet (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.

do not know whether these differences are statistically significant, or how much they depend on goods or exporter characteristics. A causal investigation calls for a more detailed econometric analysis that we will perform in Section 4.

Results for imports closely mirror those for exports and are therefore not shown in detail. Imports from EU member states dropped by 25.77%, whereas imports from OECD non-EU countries and for imports from non-OECD non-EU countries dropped by 20.22% and by 23.02%, respectively. The contribution of the intensive margin remains extremely high in all cases, with 90.54%, 132.17% and 131.14%, respectively. The overall change in the extensive margin of -0.42% given by Table 5 is due to a change of -2.78% for imports from EU member states, 7.54% for imports from OECD non-EU countries, and 8.49% for imports from non-OECD non-EU countries.

Table 7: Changes in the margins of Belgian trade in intermediate & capital vs other goods

Exports of goods classified as 'Other goods'							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	6.04862E+10	10,646	4.38	6.03	215,343.9	121,102.2	1.78
2009	4.97915E+10	10,692	4.34	6.07	176,737.8	110,202.4	1.60
$(\Delta - 1)\%$	-17.68%	0.43%	-0.79%	0.66%	-17.93%	-9.00%	-9.81%
Margin's contribution			-1.54%		101.54%		
Exports of goods classified as 'Intermediate & Capital'							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	7.64206E+10	14,026	5.88	6.00	154,365.8	119,437.9	1.29
2009	5.44841E+10	14,195	5.75	6.10	109,375.6	90,198.9	1.21
$(\Delta - 1)\%$	-28.70%	1.20%	-2.18%	1.64%	-29.15%	-24.48%	-6.18%
Margin's contribution			-1.83%		101.83%		
Imports of goods classified as 'Other goods'							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	6.44997E+10	23,164	2.14	7.62	171,036.0	158,043.4	1.08
2009	5.17864E+10	24,581	2.10	7.34	136,916.4	143,612.4	0.95
$(\Delta - 1)\%$	-19.71%	6.12%	-1.92%	-3.63%	-19.95%	-9.13%	-11.90%
Margin's contribution			-1.35%		101.35%		
Imports of goods classified as 'Intermediate & Capital'							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	7.02493E+10	23,796	3.23	6.75	135,335.2	117,055.5	1.16
2009	4.97771E+10	24,959	3.14	6.56	96,801.8	89,595.7	1.08
$(\Delta - 1)\%$	-29.14%	4.89%	-2.77%	-2.86%	-28.47%	-23.46%	-6.55%
Margin's contribution			2.73%		97.27%		

Notes: See Appendix A for further details.

Table 7 summarizes the differences in margins across goods classified as either 'Intermediate & Capital' or 'Other goods' (the latter category aggregates all other products, see Appendix A for further details). The underlying idea is to compare the margins of the fall across intermediate and final product categories. As can be seen, the intensive margin contributes again the most to the overall

change in exports and imports. However, one finding stands out: *both Belgian exports and Belgian imports have collapsed more for products classified as 'Intermediate & Capital' goods than for products classified as 'Other goods'*. Though this result mirrors aggregate evidence provided by Levchenko *et al.* (2009) for the US, our decomposition further suggests that this pattern is entirely driven by the intensive margin. What these figures do not tell us is whether this pattern is significant in a statistical sense and if it is truly related to the nature of the goods rather than to some characteristics of the firms or countries involved in the trade of such goods. Again, we will deal with these issues in Section 4.

Table 8: Changes in the margins of Belgian trade for large and small firms

Exports by small firms							
		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	4.80179E+09	5,318	4.23	2.75	77,522.1	95,637.0	0.81
2009	3.81642E+09	5,188	4.28	2.82	61,031.5	72,718.9	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*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	7.74100E+10	7,465	10.4352	6.21	159,929.3	128,679.1	1.24
2009	5.62404E+10	7,519	10.1366	6.43	114,783.4	98,514.9	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*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	5.48759E+09	9,342	3.01	4.62	42,230.4	75,865.9	0.56
2009	4.78525E+09	9,483	3.02	4.59	36,386.2	68,043.1	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*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	8.21206E+10	11,570	6.30	8.42	133,884.5	129,900.5	1.03
2009	5.71080E+10	11,642	6.21	8.25	95,777.8	108,496.8	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: See Appendix A for further details.

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.[11] 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

[11]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.

the differences are modest.[12] 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 almost 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, which is not that surprising as the positive correlation between productivity and size has been extensively documented in the literature. 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%. Observe 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'.

Table 9: Changes in the margins of imports according to ownership structure

Imports by non-multinational firms

		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	5.33268E+10	24,941	4.06	6.76	77,934.3	85,981.6	0.91
2009	4.08815E+10	25,421	4.00	6.62	60,734.5	72,400.1	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*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	3.69497E+10	702	12.25	10.68	402,287.7	392,167.8	1.03
2009	2.34222E+10	717	12.03	10.29	263,974.4	323,630.2	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*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	3.5710E+10	24,297	3.97	6.51	56,815.5	70,084.1	0.81
2009	2.8601E+10	24,798	3.92	6.35	46,356.6	62,856.0	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
2008	5,45665E+10	1,346	9.82	11.17	369,749.5	344,252.7	1.07
2009	3,57027E+10	1,340	9.83	10.99	246,448.2	266,920.0	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: See Appendix A for further details.

Table 9 decomposes the margins of changes in imports across multinational and non-multinational,

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

as well as across foreign owned versus non-foreign owned firms.[13] 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.

Table 10: Changes in the margins of exports according to debt structure

Exports by firms with low share of debts over liabilities

		Extensive margin			*Intensive margin*		
Year	Total	Firms	Countries	Products	Sales	Quantities	Prices
2008	4.51564E+10	7,651	7.57	5.52	141,146.4	116,985.4	1.21
2009	3.40815E+10	7,672	7.47	5.69	104,475.7	89,787.6	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
2008	3.87590E+10	7,507	6.50	5.02	158,246.5	134,592.8	1.18
2009	2.72396E+10	7,391	6.43	5.06	113,401.2	105,279.0	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
2008	3.98487E+10	7,580	6.71	5.10	153,370.5	117,823.4	1.30
2009	3.01846E+10	7,527	6.67	5.22	115,226.3	91,938.7	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
2008	4.40612E+10	7,521	7.39	5.48	144,628.4	130,557.6	1.11
2009	3.11260E+10	7,467	7.29	5.59	102,356.2	100,254.8	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: See Appendix A for further details.

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

[13] 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.

experienced slightly larger 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.

Summary of the key findings. 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 across all decompositions, both for imports and exports. 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. It secondly suggests that, since we observe negligible changes in the extensive margin even in the wake of a major shock, sunk costs are an extremely important component of trade costs. If trade costs were recoverable (i.e., essentially variable or fixed) we should have seen massive contractions in the extensive margins with firms exiting markets and severing trade relations to avoid losses. Thirdly, our findings also suggest that trade will pick up again rapidly as the recession fades and as the macroeconomic environment returns to normal.

In a nutshell, we do not find much evidence for what could be called an irreversible 'trade crisis'. It is not a trade crisis — just a trade collapse. Of course, our decompositions are still descriptive exercises which are not suited to identify the magnitudes, significance and contribution of the different determinants of that collapse. In order to answer these questions, we next need to take full advantage of our firm-country-product and balance sheet data.

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

As shown in the previous Section, the bulk of the fall in Belgian trade occurred at the intensive margin. Since the number of firms, of markets per firm, and of products per market did not change much, we can safely analyze the determinants of the trade collapse by focusing solely on the intensive margin (i.e., firm-country-product transaction values).[14] As can be seen from Table 11, 98.65% of 2008 first-semester exports and 97.97% of 2009 first-semester exports were accounted for by 'stayers' — firms that were exporting in both semesters. The remaining share in 2008 is due to 'exiters' — firms that exported in the first semester of 2008 but not in the first semester of 2009; whereas the remaining share

[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.

in 2009 is accounted for by 'entrants' — firms that exported in the first semester of 2009 but not in the first semester of 2008. As further shown in Table 11, the figures for the 2006–2007 and 2007–2008 first-semester exports are roughly similar, thus suggesting that 2008–2009 was not an exceptional year in terms of firm dynamics. Finally, the observed patterns also hold for imports.

Table 11: The Belgian dynamics of exports and imports

	2008–2009 trade dynamics					
	Exports			**Imports**		
Firm Type	N of firms	Trade share in		N of firms	Trade share in	
		2009	2008		2009	2008
Stayers	13,511	0.98	0.99	24,447	0.98	0.99
Entrants	5,337	0.02	0.00	9,889	0.02	0.00
Exiters	5,173	0.00	0.01	7,825	0.00	0.01
	2007–2008 trade dynamics					
	Exports			**Imports**		
Firm Type	N of firms	Trade share in		N of firms	Trade share in	
		2008	2007		2008	2007
Stayers	13,032	0.94	0.94	21,859	0.94	0.99
Entrants	5,652	0.06	0.00	10,413	0.06	0.00
Exiters	4,724	0.00	0.06	4,608	0.00	0.01
	2006–2007 trade dynamics					
	Exports			**Imports**		
Firm Type	N of firms	Trade share in		N of firms	Trade share in	
		2007	2006		2007	2006
Stayers	12,983	0.98	0.98	20,568	0.97	0.98
Entrants	4,773	0.02	0.00	5,899	0.03	0.00
Exiters	5,729	0.00	0.02	5,466	0.00	0.02

Notes: See Appendix A for further details.

4.1 Econometric model

Given the overwhelming contribution of the stayers to export and import volumes, we can safely explore the determinants of the fall in trade using a balanced panel of firms. The data for the regression analysis thus consists in export and import values by firm-country-product in the first semesters of 2008 and 2009, for 'stayers' only. Using that data, we employ a two-stage econometric procedure to discriminate among the key conjectures surveyed in the introduction. We first decompose the fall in trade into firm-, country- and product-specific components, which we then regress on observable characteristics. Our quantification of the respective contribution of each conjecture therefore relies on the distribution of the fall in trade along firm, product and country characteristics. If, say, highly leveraged firms have a greater firm-specific component to their fall in trade, we can infer that restricted access to credit played a part in explaining the trade collapse. The purpose of our empirical exercise is thus to both identify the causes and to disentangle the various compositional effects during the trade collapse. In what follows we describe the procedure for exports, with the one for imports being identical.

In the first stage, we run a simple OLS regression of (log) export values by firm-country-product on firm, country and product dummies at each of the two points in time. Product dummies pertain to the HS 4-digit level, thus delivering more than 1,000 categories. From these two first-step cross-section

regressions we compute the firm-, country- and product-specific components of the fall in trade. In the second stage, we then regress the difference between the computed fixed effects in 2009 and 2008 on a set of observable characteristics. In the case of the firm fixed effects, we use lagged information from 2007 balance sheets to avoid endogeneity of firm characteristics (such as productivity, employment, and financial structure). Formally, the two equations of the first stage of the procedure are given by:

$$\log X_{icp}^{2009} = \eta_i^{2009} + \eta_c^{2009} + \eta_p^{2009} + \epsilon_{icp}^{2009} \tag{2}$$

$$\log X_{icp}^{2008} = \eta_i^{2008} + \eta_c^{2008} + \eta_p^{2008} + \epsilon_{icp}^{2008} \tag{3}$$

where ϵ_{icp}^{2009} and ϵ_{icp}^{2008} are assumed to be i.i.d. After having estimated separately equations (2) and (3) by OLS, we define the differences in fixed effects as follows:

$$\Delta\hat{\eta}_i \equiv \hat{\eta}_i^{2009} - \hat{\eta}_i^{2008}, \quad \Delta\hat{\eta}_c \equiv \hat{\eta}_c^{2009} - \hat{\eta}_c^{2008} \quad \text{and} \quad \Delta\hat{\eta}_p \equiv \hat{\eta}_p^{2009} - \hat{\eta}_p^{2008}.$$

In the second stage, we estimate via OLS (using the White correction for heteroscedasticity) the following three equations:

$$\Delta\hat{\eta}_i = \alpha + W_i'\beta + \eta_s + \xi_i \tag{4}$$

$$\Delta\hat{\eta}_c = \kappa + Z_c'\gamma + \xi_c \tag{5}$$

$$\Delta\hat{\eta}_p = \psi + S_p'\zeta + \xi_p, \tag{6}$$

where ξ_i, ξ_c, and ξ_p have the standard properties for the consistency of OLS, η_s is a sectoral dummy, and W_i, Z_c and S_p denote firm, country, and product characteristics, respectively. It is important to stress that we neither impose that ϵ_{icp}^{2008} is uncorrelated with fixed effects in (2), nor that ϵ_{icp}^{2009} is uncorrelated with fixed effects in (3). If these additional restrictions were satisfied, we could directly estimate $\Delta\hat{\eta}_i$, $\Delta\hat{\eta}_c$, and $\Delta\hat{\eta}_p$ from a unique first-stage regression, where the dependent variable would be the difference between log exports in 2009 and log exports in 2008.

Table 12 summarizes the list of characteristics we use in the second stage. All firm characteristics starting by *D-* are binary variables, taking value 1 if a particular characteristic is above the sectoral median across all trading firms. Doing so allows us to maximize the number of firms we can use 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. As a robustness check, we also ran the same regressions with all variables in continuous form. The results, reported in Appendix B, are qualitatively similar.

As mentioned before, the procedure for imports is the same and relies on the same set of regressors in the second stage. The advantage of using the foregoing two-step procedure, as compared to a single stage in which we would directly regress the difference between $\log X_{icp}^{2009}$ and $\log X_{icp}^{2008}$ on the three sets of characteristics, is that our standard errors are robust to the presence of unobserved firm, country, and product characteristics (ξ_i, ξ_c, and ξ_p). Those characteristics cannot be simultaneously controlled for by a clustering correction involving a single stage.

Table 12: 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
$nace2$	nace 2 digit dummies
Country characteristics	
$oecd_{2008}$	dummy for country belonging to OECD (but not to the EU) in 2008
EU	EU country dummy
$exch\_rate_{08-09}$	% change in the nominal exchange rate with the euro between the end of the first quarter 2008 and the end of the first quarter 2009
$growth\_rate_{08-09}$	average annual growth rate of the country between 2008 and 2009
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. Data sources and the definitions of variables are provided in Appendix A.

4.2 Results

The first-stage fixed effects regressions of log exports and log imports in the first semester of 2008 and 2009 perform well in terms of capturing the variation across firms, countries, and products. The correlation between actual and predicted log exports is about 0.64 across both the 495,110 triples in 2008 and the 497,747 triples in 2009. The correlation between actual and predicted log imports is instead about 0.59 across both the 582,743 triples in 2008 and the 582,927 triples in 2009. Columns 2 and 3 of Table 13 provide a variance decomposition of the contribution of estimated firm, country, and product fixed effects differences in explaining $\Delta lnX_{icp} \equiv \log X_{icp}^{2009} - \log X_{icp}^{2008}$ along with the remaining residual term $\Delta\hat{\epsilon}_{icp} \equiv \hat{\epsilon}_{icp}^{2009} - \hat{\epsilon}_{icp}^{2008}$. The same information is reported for imports. As one can see, among fixed effects, differences in the firm-specific component displays the highest variation. 'Firm' is thus the most important dimension for explaining variation in ΔlnX_{icp}, followed by 'product' and then by 'country'. At the same time, however, the standard deviation of the predicted change $\Delta\hat{\eta}_i + \Delta\hat{\eta}_c + \Delta\hat{\eta}_p$ is only about one-third of the standard deviation of the residual term $\Delta\hat{\epsilon}_{icp}$, thereby

suggesting that the major fraction of the trade variation between the two semesters has been orthogonal to firm-, country-, and product-specific patterns. Observe that this is not a peculiar feature of the 2008–2009 period. As can be seen from Columns 4 and 5 of Table 13, the standard deviation of the actual and predicted trade change, as well as of the residual term, are of similar magnitude for the 2007–2008 period.

Table 13: Variance decomposition of ΔlnX_{icp}

	2008–2009		**2007–2008**	
Standard deviation of	**Exports**	**Imports**	**Exports**	**Imports**
ΔlnX_{icp}	1.4581	1.4680	1.3923	1.4156
$\Delta\hat{\eta}_i + \Delta\hat{\eta}_c + \Delta\hat{\eta}_p$	0.4763	0.5628	0.5442	0.6832
$\Delta\hat{\eta}_i$	0.4507	0.5510	0.4797	0.5604
$\Delta\hat{\eta}_c$	0.0977	0.0799	0.2564	0.4117
$\Delta\hat{\eta}_p$	0.1807	0.1302	0.2145	0.1624
$\Delta\hat{\epsilon}_{icp}$	1.4561	1.4826	1.4157	1.4672

4.2.1 Firm characteristics

The first thing to point out about the analysis of firm-level determinants is that the computed firm fixed effects are extremely correlated between 2008 and 2009. More precisely, that correlation is 0.96 for exporters in the whole firm-country-product stayers dataset (318,335 triples), and 0.81 when comparing them across the 13,551 stayer firms. This feature also holds for imports, with a correlation of 0.91 in the whole firm-country-product stayers dataset (347,153 triples), and 0.77 when comparing them across the 24,447 stayer firms.[15] These high correlations already suggest that the fall in trade has been extremely evenly spread across firms — it is quite difficult to imagine that any sort of firm characteristic could explain a great deal of the difference between the two sets of fixed effects. Table 14 reports the value and significance of the firm-specific variables as well as the number of observations and the R^2. Table 15 shows the value and significance of the industry dummies obtained from the same regression, with the sector 'Manufacture of motor vehicles, trailers and semi-trailers' being the excluded category. As one can see, despite our large battery of firm variables and industry dummies, very few coefficients are significant and the R^2 is very low.

Results in Table 14 show that not a single firm-specific characteristic has any significant explanatory power for the drop in exports. They also show that large and productive firms with a high share of inputs in their production process (especially if imported), and with a high leverage (especially trade credit), experienced a more severe fall in imports. There is, however, no evidence that firms with greater involvement in global value chains have experienced a greater fall in imports. Furthermore, the magnitude of the coefficients suggests a modest contribution of the covariates to explaining the 24.31% intensive margin change of imports. For example the most negative significant coefficient is

[15] Although some firms are lost because of the lack of balance sheet data, we are able to keep roughly 2/3 of the stayers in both exports and imports. These firms account for more than 60% of total trade in both semesters. Unfortunately, we do not have balance sheet data for some big exporters and importers because all the public sector, as well as some specific firm types, are exempted from providing such information. See the Appendix for further details.

Table 14: Firm FE difference regression results (firm variables)

Coefficient	**Exports**	**Imports**
D_{size}	-0.0108	-0.0766^{a}
	(0.0322)	(0.0215)
D_{prod}	-0.0239	-0.0458^{b}
	(0.0293)	(0.0196)
D_{interm_share}	-0.0044	-0.0323^{c}
	(0.0269)	(0.0184)
$D_{share\_exp\_sales}$	-0.0390	-0.0187
	(0.0323)	(0.0315)
$D_{share\_imp\_interm}$	0.0312	-0.0586^{a}
	(0.0299)	(0.0188)
$D_{value\_add\_chain}$	0.0083	-0.0228
	(0.0377)	(0.0319)
$D_{ext\_fin\_dep}$	0.0069	0.0045
	(0.0292)	(0.0192)
$D_{share\_debts\_o\_liab}$	-0.0037	-0.0510^{a}
	(0.0278)	(0.0192)
$D_{share\_debts\_due\_after\_one}$	0.0228	0.0176
	(0.0304)	(0.0224)
$D_{share\_fin\_debt}$	-0.0071	0.0387^{c}
	(0.0310)	(0.0220)
D_{share_stock}	-0.0006	-0.0046
	(0.0265)	(0.0181)
for	0.0161	0.0532
	(0.0440)	(0.0363)
mne	-0.0695	-0.0586
	(0.0478)	(0.0377)
constant	-0.1281	-0.0529
	(0.1328)	(0.1033)
Observations	8572	14,681
R^2	0.0110	0.0084

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

the one on firm size with a value of -0.0766. Hence, the average difference in the fall in imports between small and large firms is only 7.66 percentage points. Even in the hypothetical case of equal trade shares for small and large firms, the 24.31% overall figure would imply a a 20.48% drop for small firms and a 28.14% drop for large firms. These figures are small enough to cast doubt on the fact that firm-specific components, and the associated conjectures mentioned in the introduction, could explain a significant let alone the major part of the trade collapse.

Given the substantial attention they have attracted in the debate on the 'trade crisis', it is worth noting the modest contribution of financial variables to individual changes in trade values. We acknowledge that our measures, just as all others used thus far, only imperfectly capture access to credit in general and trade financing in particular. Nevertheless, it is interesting to relate these to aggregate figures on credit in Belgium. Authorized and used credit lines over 25,000 euros, of which the beneficiary is a Belgian resident firm, increased by 6.29% and 6.97%, respectively, between June 2008 and

June 2009. In comparison both authorized and used credit lines were increasing by 10% or more a year between 2005 and 2008. When considering manufacturing only, authorized and used credit lines decreased by 4.40% and 3.11%, respectively, between June 2008 and June 2009. Furthermore, the use of letters of credit, a typical financial instrument used in international trade, decreased by 5.18% over the same period.[16] All these indicators point to the conclusion that *there has been a credit crunch in Belgium in general and in the manufacturing sector in particular*. Our econometric analysis tells us that this credit crunch did not affect trade much more firms that rely more on external finance and/or debt, or firms that trade different goods with different countries. In the next Section we further provide evidence showing that the credit crunch did not disproportionately affect the activity of trading across national boundaries *per se*.

Turning to cross-industry compositional effects, the Nace rev1.1 2-digit dummies summarized in Table 15 suggest that the trade collapse has been quite evenly spread across sectors. Only ten industry dummies are significant for exports, and two for imports. The two industries experiencing the greatest fall in imports, 'Crude oil and natural gas extraction' and 'Water transport' have presumably been hit the hardest due to the reduced demand for transportation services. Interestingly, neither multinational status nor foreign ownership have any effects once other characteristics are controlled for.

To summarize our main findings, the fall in exports was very homogenous within each sector. Firm characteristics are not particularly significant and have not much explanatory power. Across sectors, only 10 sectors out of 54 experienced a fall that significantly differed from that of the motor vehicle industry. When taken together, these findings indicate that, contrary to the descriptive evidence documented in Table 8, the stronger decrease in exports recorded for larger firms is not a statistically significant element to understand the fall in exports. Such a conclusion can be reached only using econometric tools and detailed firm-level data. By contrast, there is some intra-industry heterogeneity in the fall in imports, but almost no difference across sectors. Only two industries experienced a greater fall in imports, and those industries were largely related to transportation and trade itself. Within sectors, larger and more productive firms with higher leverage and higher input intensity experienced a statistically significantly larger fall in imports. Though this result is more consistent with the descriptive evidence presented in the previous Section, the difference is rather small with respect to the overall reduction in trade. Explanations based on firm characteristics are therefore not able to account for much of the trade collapse.

4.2.2 Country characteristics

As with the firm fixed effects, the 2008 and 2009 country fixed effects are again highly correlated: 0.99 for exporters in the whole firm-country-product stayers dataset, and 0.74 when comparing them across the 219 destination countries. Turning to imports, the correlation is 0.96 in the whole firm-country-product stayers dataset, and 0.30 when comparing them across the 203 origin countries. Observe that the raw correlations between the fixed effects across the origin and the destination countries is

[16] These figures are computed from data provided by the Central Corporate Credit Register of the National Bank of Belgium (NBB).

Table 15: Firm FE difference regression results (sector dummies)

Exports				Imports			
Industry	Coeff.	Industry	Coeff.	Industry	Coeff.	Industry	Coeff.
nace_01	-0.3691^{b}	nace_40	1.4994	nace_01	0.0347	nace_40	0.4965
	(0.1875)		(1.8603)		(0.1355)		(0.3698)
nace_02	-0.1630	nace_41	1.4944^{a}	nace_02	-0.2971	nace_41	-0.2670
	(0.4066)		(0.1338)		(0.5259)		(0.1983)
nace_05	0.2546^{c}	nace_45	-0.2570	nace_05	0.3071	nace_45	0.0291
	(0.1532)		(0.2088)		(0.9869)		(0.1124)
nace_11		nace_50	-0.0821	nace_11	-0.5144^{a}	nace_50	-0.0428
			(0.1330)		(0.1038)		(0.1081)
nace_13	0.0000	nace_51	-0.0704	nace_13		nace_51	0.0372
	(0.0000)		(0.1264)				(0.1001)
nace_14	-0.3647^{c}	nace_52	-0.0767	nace_14	0.1558	nace_52	0.0839
	(0.2207)		(0.1382)		(0.2318)		(0.1018)
nace_15	0.0528	nace_55	0.1824	nace_15	0.0844	nace_55	0.0672
	(0.1295)		(0.3005)		(0.1041)		(0.1653)
nace_16	0.2100	nace_60	0.1065	nace_16	0.4654	nace_60	-0.2329
	(0.2665)		(0.3072)		(0.4883)		(0.1824)
nace_17	-0.0251	nace_61	0.0000	nace_17	0.0549	nace_61	-0.9044^{a}
	(0.1365)		(0.0000)		(0.1169)		(0.1036)
nace_18	0.2666	nace_62	-0.2328	nace_18	0.1680	nace_62	-0.0374
	(0.1761)		(0.4797)		(0.1254)		(0.1840)
nace_19	0.2456	nace_63	-0.1544	nace_19	0.3748	nace_63	0.1737
	(0.3132)		(0.3227)		(0.4212)		(0.2354)
nace_20	-0.2811	nace_64	0.6601^{b}	nace_20	-0.0273	nace_64	0.0226
	(0.1871)		(0.3243)		(0.1198)		(0.2793)
nace_21	-0.0429	nace_65	0.0000	nace_21	0.0196	nace_65	0.0000
	(0.1568)		(0.0000)		(0.1268)		(0.0000)
nace_22	-0.0757	nace_66	0.0000	nace_22	-0.0022	nace_66	0.0000
	(0.1597)		(0.0000)		(0.1348)		(0.0000)
nace_23	0.3873	nace_67	0.0000	nace_23	-0.1874	nace_67	0.0000
	(0.3882)		(0.0000)		(0.1717)		(0.0000)
nace_24	0.0474	nace_70	-0.6179	nace_24	0.0445	nace_70	0.3856
	(0.1347)		(0.4125)		(0.1081)		(0.3066)
nace_25	-0.0530	nace_71	-0.0137	nace_25	-0.0997	nace_71	-0.0242
	(0.1345)		(0.2228)		(0.1095)		(0.1897)
nace_26	0.0571	nace_72	-0.0083	nace_26	-0.0331	nace_72	0.1577
	(0.1520)		(0.1789)		(0.1147)		(0.1641)
nace_27	-0.3121^{b}	nace_73	0.1223	nace_27	-0.1273	nace_73	0.1075
	(0.1499)		(0.3638)		(0.1311)		(0.2468)
nace_28	-0.1337	nace_74	0.0208	nace_28	-0.0598	nace_74	0.1035
	(0.1382)		(0.1493)		(0.1094)		(0.1159)
nace_29	-0.1199	nace_80	-3.0020^{a}	nace_29	-0.0309	nace_80	0.3191
	(0.1460)		(0.2400)		(0.1130)		(0.4157)
nace_30	-0.4001^{c}	nace_85	0.2552	nace_30	-0.0422	nace_85	0.2611
	(0.2306)		(0.8368)		(0.2869)		(0.2885)
nace_31	-0.1272	nace_90	-0.5246^{b}	nace_31	0.0029	nace_90	0.2851
	(0.1575)		(0.2514)		(0.1256)		(0.4048)
nace_32	0.0193	nace_91	0.4323^{a}	nace_32	-0.1125	nace_91	-0.1050
	(0.2592)		(0.1350)		(0.1967)		(0.4876)
nace_33	-0.2127	nace_92	0.3272	nace_33	0.1452	nace_92	0.0421
	(0.1847)		(0.3349)		(0.1427)		(0.1936)
nace_35	0.2400	nace_93	0.8281	nace_35	0.0131	nace_93	-0.0623
	(0.2178)		(0.5143)		(0.1943)		(0.2164)
nace_36	-0.1061	nace_99	0.0000	nace_36	0.1694	nace_99	0.0000
	(0.1470)		(0.0000)		(0.1143)		(0.0000)
nace_37	-0.3136			nace_37	0.2751		
	(0.2130)				(0.2007)		

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The omitted Nace rev2 industry is nace_34 ('Manufacture of motor vehicles, trailers and semi-trailers')

substantially lower than in the firm-country-product dimension. The reason is that the fixed effects that changed the most are those of countries with low trade volumes and few transactions.

Table 16: Country FE difference regression results

Coefficient	**Exports**	**Imports**
$oecd_{2008}$	0.0512	0.1790
	(0.0553)	(0.3076)
EU	0.1206^{b}	0.3373
	(0.0485)	(0.3871)
$exch\_rate_{08-09}$	-0.0783	0.3816
	(0.2192)	(1.2790)
$growth\_rate_{08-09}$	0.0367^{a}	0.0219
	(0.0076)	(0.0627)
Constant	-0.2761^{a}	-0.4209
	(0.0374)	(0.3023)
Observations	175	171
R^2	0.1130	0.0047

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

As can be seen from Table 16, only two variables (EU membership and the trading partner's growth rate) are significantly associated with changes in exports, whereas none is significantly associated with changes in imports.[17] The fall in exports has been significantly less severe for EU partners (12% gap) and for countries suffering a weaker economic downturn (3.7% gap per unit of growth). Yet, the R^2 is quite low in both regressions, thus suggesting that the trade collapse has affected markets in a quite uniform way.

4.2.3 Product characteristics

The analysis of the product fixed effects yields similar lessons to that of firm and country fixed effects. The correlation between product fixed effects for exporters is 0.99 in the whole firm-country-product stayers dataset, and 0.88 when comparing them across the 1,197 exported product categories. Turning to imports, the correlation of product fixed effects is 0.99 in the whole firm-country-product stayers dataset, and 0.92 when comparing them across the 1,207 imported product categories. Inspection of Table 17 reveals that 'Intermediate goods' experienced a smaller fall in exports than the reference category 'Consumer nondurables', although the difference is only weakly significant. Likewise, only the Rauch measure of product differentiation is weakly significant for imports.[18] The R^2 is quite low in both regressions, thus suggesting that the trade collapse has affected products in a very similar way with no systematic patterns.

It is of particular interest to note that exports and imports of 'Consumer durables' were not affected in a significantly different way than other goods. This finding contrasts with Levchenko *et al.* (2009)

[17] A few countries disappear from our regression analysis because of missing data on covariates.

[18] A few products disappear from our regression analysis because of missing data on covariates.

Table 17: Product FE difference regression results

Coefficient	**Exports**	**Imports**
intermediates	0.0611^{c}	-0.0165
	(0.0342)	(0.0267)
capital_goods	-0.0921	0.0262
	(0.0629)	(0.0461)
consumer_durables	-0.0603	0.0105
	(0.0922)	(0.0468)
energy	0.9271	0.1488
	(0.6289)	(0.2089)
residual	-0.0303	-0.0234
	(0.0673)	(0.0399)
$frac_{lib\_diff}$	-0.0008	0.0445^{c}
	(0.0357)	(0.0240)
constant	-0.2053^{a}	-0.2150^{a}
	(0.0342)	(0.0256)
Observations	1101	1109
R^2	0.0315	0.0075

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The residual goods category is *consumer_non_durables*.

who, using US industry-level data for the same time period, find that exports and imports of durables fell by 5.5 and 7.2 percentage points more than the average industry, respectively. Such a difference may in principle come from a different definition of durables with respect to Levchenko *et al.* (2009), but it may also come from an aggregation bias. Indeed, our aggregate figures in Tables 1 and 7 point to a larger drop of trade in some goods categories like intermediates, consumer durables, and energy. However, this pattern is not statistically significant when looking at the microdata. When we break down these goods categories into detailed HS 4-digit products, and wash out the firm- and country-specific components related to the trade collapse by using fixed effects, there is no evidence that different product categories experienced different fortunes. The same conclusions apply to capital goods. Put differently, we find no evidence in favor of a stronger fall of trade in 'postponable purchases'. Aggregate results are thus driven by either firm- and/or country-specific patterns related to the goods category, or by the very noisy behavior of HS 4-digit products trade drops within each goods category. Given the very high correlation of HS 4-digit products fixed effects between 2008 and 2009, the first hypothesis is likely to be the correct one.

5 A generalized fall in demand?

So far, we have found only very limited evidence (both in magnitude and significance) of systematic patterns in the collapse of Belgian exports and imports within and between industries, as well as across products and markets. These findings are at odds with the main supply-side based explanations for the trade collapse discussed in the introduction. This leaves the possibility that a demand-side based

explanation, namely a general fall in demand for manufactures, is the key to understanding the decrease in trade. To investigate this hypothesis, we now examine changes in exports-to-turnover and imports-to-intermediates ratios at the firm level. If international trade *per se* is in a crisis, both ratios should have fallen during the period we consider.

There is no systematic evidence of a fall in exports-to-production and imports-to-production ratios in Belgium, as shown earlier in Table 2 and in Figure 2. This holds for the whole economy or across broad product categories. In fact, those ratios even increased in some product categories, thus implying that domestic production contracted more than trade. This descriptive evidence would be enough to cast doubts on the existence of a 'trade crisis' in Belgium. Nevertheless, compositional effects across firms and industries should provide valuable information on the channel(s) through which the fall in demand affected exports and imports in Belgium. We therefore turn to a more detailed micro-econometric analysis.

Table 18: Firm-level export/turnover and imports/intermediates ratios (firm regressors)

Coefficient	**Exports**	**Imports**
D_{size}	-0.0084	-0.0357^{c}
	(0.0352)	(0.0213)
D_{prod}	0.0032	0.0401^{b}
	(0.0334)	(0.0198)
D_{interm_share}	0.0293	-0.0127
	(0.0295)	(0.0189)
$D_{share\_exp\_sales}$	-0.1478^{a}	0.0541
	(0.0350)	(0.0366)
$D_{share\_imp\_interm}$	0.0231	-0.1165^{a}
	(0.0343)	(0.0186)
$D_{value\_add\_chain}$	-0.1006^{b}	-0.0744^{b}
	(0.0419)	(0.0355)
$D_{ext\_fin\_dep}$	-0.0172	-0.0366^{c}
	(0.0327)	(0.0195)
$D_{share\_debts\_o\_liab}$	-0.0072	-0.0053
	(0.0305)	(0.0192)
$D_{share\_debts\_due\_after\_one}$	-0.0058	-0.0041
	(0.0318)	(0.0216)
$D_{share\_fin\_debt}$	-0.0389	0.0392^{c}
	(0.0320)	(0.0217)
D_{share_stock}	0.0267	0.0166
	(0.0295)	(0.0182)
for	-0.0113	0.0923^{b}
	(0.0447)	(0.0395)
mne	-0.0242	-0.0082
	(0.0497)	(0.0419)
Constant	0.1234	-0.1582
	(0.1141)	(0.1200)
Observations	8,360	14,388
R^2	0.0164	0.0115

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

Table 19: Firm-level export/turnover and imports/intermediates ratios (sector dummies)

Exports				Imports			
Industry	Coeff.	Industry	Coeff.	Industry	Coeff.	Industry	Coeff.
nace_1	-0.1900	nace_40	0.9427	nace_1	0.0592	nace_40	-0.5807
	(0.1659)		(0.9521)		(0.1553)		(0.5559)
nace_2	-0.1199	nace_41	0.4215^{a}	nace_2	-0.3484	nace_41	-0.0231
	(0.1218)		(0.1155)		(0.4388)		(0.2739)
nace_5	0.0148	nace_45	-0.3220	nace_5	0.5294^{a}	nace_45	0.1629
	(0.1207)		(0.2062)		(0.1942)		(0.1301)
nace_11	0.0000	nace_50	-0.1677	nace_11	2.9083^{a}	nace_50	0.1469
	(0.0000)		(0.1174)		(0.1219)		(0.1287)
nace_13	0.0000	nace_51	0.0012	nace_13	0.0000	nace_51	0.2245^{c}
	(0.0000)		(0.1054)		(0.0000)		(0.1180)
nace_14	-0.0604	nace_52	0.0143	nace_14	0.1652	nace_52	0.2086^{c}
	(0.1307)		(0.1214)		(0.2351)		(0.1194)
nace_15	-0.0478	nace_55	0.1218	nace_15	0.1989	nace_55	-0.1139
	(0.1091)		(0.3472)		(0.1218)		(0.2183)
nace_16	0.1826	nace_60	0.1623	nace_16	0.7542	nace_60	-0.0379
	(0.1909)		(0.2976)		(0.6955)		(0.2180)
nace_17	0.0291	nace_61	0.0000	nace_17	0.0345	nace_61	0.1419
	(0.1181)		(0.0000)		(0.1297)		(0.1198)
nace_18	-0.0573	nace_62	0.0628	nace_18	0.2806^{c}	nace_62	0.2298
	(0.1953)		(0.8567)		(0.1451)		(0.5881)
nace_19	-0.1716	nace_63	-0.6702	nace_19	0.0482	nace_63	0.2062
	(0.4414)		(0.4452)		(0.2753)		(0.2958)
nace_20	-0.3363^{b}	nace_64	0.5807	nace_20	0.1761	nace_64	0.0844
	(0.1433)		(0.4590)		(0.1326)		(0.2727)
nace_21	-0.0222	nace_65	0.0000	nace_21	0.0979	nace_65	0.0000
	(0.1308)		(0.0000)		(0.1279)		(0.0000)
nace_22	0.0028	nace_66	0.0000	nace_22	0.1045	nace_66	0.0000
	(0.1404)		(0.0000)		(0.1508)		(0.0000)
nace_23	-0.3101	nace_67	0.0000	nace_23	0.0997	nace_67	0.0000
	(0.2620)		(0.0000)		(0.2271)		(0.0000)
nace_24	0.1840	nace_70	-0.2314	nace_24	0.1943	nace_70	0.1234
	(0.1161)		(0.2616)		(0.1274)		(0.2508)
nace_25	0.0500	nace_71	0.0503	nace_25	0.0940	nace_71	0.1920
	(0.1096)		(0.2706)		(0.1302)		(0.1773)
nace_26	-0.1303	nace_72	-0.0267	nace_26	0.0632	nace_72	0.2337
	(0.1214)		(0.2090)		(0.1325)		(0.1944)
nace_27	-0.0084	nace_73	0.7344	nace_27	0.0975	nace_73	0.3415
	(0.1129)		(0.4568)		(0.1540)		(0.3493)
nace_28	0.0087	nace_74	0.1126	nace_28	0.0749	nace_74	0.3461^{b}
	(0.1227)		(0.1395)		(0.1264)		(0.1375)
nace_29	0.0749	nace_80	-2.6558^{a}	nace_29	0.1629	nace_80	0.8190^{c}
	(0.1362)		(0.1297)		(0.1346)		(0.4385)
nace_30	0.2536	nace_85	0.5028	nace_30	-0.0105	nace_85	0.5373
	(0.3595)		(1.0612)		(0.2835)		(0.3979)
nace_31	-0.1840	nace_90	-0.5304^{a}	nace_31	0.2477^{c}	nace_90	-0.1080
	(0.1705)		(0.1819)		(0.1444)		(0.4991)
nace_32	0.6034	nace_91	0.2079^{c}	nace_32	0.3306	nace_91	-0.5616
	(0.4045)		(0.1179)		(0.2200)		(0.3694)
nace_33	0.0000	nace_92	0.3141	nace_33	0.5155^{a}	nace_92	0.1616
	(0.2206)		(0.3926)		(0.1719)		(0.2091)
nace_35	0.2969	nace_93	-0.3496	nace_35	0.2980	nace_93	0.0413
	(0.2854)		(0.2751)		(0.1936)		(0.2278)
nace_36	-0.1073	nace_99	0.0000	nace_36	0.1965	nace_99	0.0000
	(0.1270)		(0.0000)		(0.1285)		(0.0000)
nace_37	-0.0808			nace_37	0.2256		
	(0.1971)				(0.2177)		

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The omitted Nace rev2 industry is nace_34 ('Manufacture of motor vehicles, trailers and semi-trailers')

In what follows, we exploit data on firm turnover and intermediates purchases for the first semesters of 2008 and of 2009. [19] The data comes from monthly and quarterly VAT declarations.[20] We construct the log of the firm-level ratio of exports-to-turnover in the first semester of 2008 as follows:

$$\phi_{i,X}^{2008} = \log\left(\frac{X_i^{2008}}{Turn_i^{2008}}\right) \tag{7}$$

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

$$\phi_{i,I}^{2008} = \log\left(\frac{I_i^{2008}}{Inte_i^{2008}}\right) \tag{8}$$

where $Inte_i^{2008}$ denotes firm i's total purchases of intermediates. For 2009, $\phi_{i,X}^{2009}$ and $\phi_{i,I}^{2009}$ are defined in the same way using 2009 first-semester data.

Observe first that the difference $\phi_{i,X}^{2009} - \phi_{i,X}^{2008}$ has a mean of 0.0034 and a median of -0.0087: the average exports-to-turnover ratio increases by 0.3%, while the median ratio falls by 0.9%. As the mean ratio in 2008 was 6.2% we can conclude that its growth has been negligible — the ratio of exports-to-turnover at the firm level has not been systematically affected by the trade collapse. Observe furthermore that the correlation between $\phi_{i,X}^{2009}$ and $\phi_{i,X}^{2008}$ equals 0.83 for the 8,360 observations, thus suggesting that firm patterns have been very stable over time. Results for imports-to-intermediates ratios convey the same message. The mean of $\phi_{i,I}^{2009} - \phi_{i,I}^{2008}$ equals 0.0144, while the median equals -0.0035. The average imports-to-intermediates ratio increased by 1.4% while the median ratio fell by 3.5%, starting from an average level of 7.4%. Thus, changes in that ratio were negligible too. Last, the correlation between $\phi_{i,I}^{2009}$ and $\phi_{i,I}^{2008}$ is 0.81 for the 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 lagged firm-level characteristics as before, which are listed in Table 12. As a robustness check, we also ran the same regressions with all variables in continuous form. Tables are reported in Appendix B and the qualitative results are identical. Table 18 reports the values and the significance of the firm-specific variables. Table 19 summarizes the values and the significance of the industry dummies coming from those same regressions, with 'Manufacture of motor vehicles, trailers and semi-trailers' being again the excluded category. As can be seen from Table 18, most firm-level characteristics are not significant in explaining changes in either exports-to-turnover or imports-to-intermediates ratios. The financial variables are insignificant for exports and only weakly significant for imports, with small coefficients in all cases. In the case of imports, size and productivity have weakly significant effects that go in opposite directions. We also find a small increase in the imports-to-intermediate ratios of foreign-owned firms.

[19] 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 these data are available they will only cover the sample of large firms used by the Belgian National Institute of Statistics (NIS) to provide aggregate production figures. We therefore examine ratios of exports to *turnover* and imports to *intermediates purchases*, respectively.

[20] The frequency at which declarations have to be filed depends on the firm's size.

The strongest piece of evidence that we find is that firms which were more involved in global value chains in 2007 (larger share of export sales, larger share of imported intermediates, and a larger ratio of exports times imports over turnover) saw their trade fall more as compared to either their turnover or their intermediate input purchases. This may indicate mean reversion in these ratios, as firms experience idiosyncratic shocks every year in their imports or exports. In any case, the effects are small. For example, a firm with an export-to-turnover ratio of 20%, which is above the median value of 15.5% in 2007, will see this ratio decrease by $20\% \times 0.1478 = 2.95$ percentage points more than a firm below the median between 2008 and 2009. This is hardly strong evidence suggesting that these firms have been hit by a trade-specific major crisis.

As can finally be seen from Table 19, there are again almost no sectoral patterns. Only two of the industry fixed effects are significant in the case of exports-to-turnover, whereas nine fixed effects are significant in the case of imports-to-intermediates. The fact that almost all coefficients are insignificant and that, even when they are significant, their magnitude is small, leads us logically to the same conclusion as before. It is not a trade crisis — just a trade collapse.

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. Our analysis yields surprising, yet reassuring, results.

First, the overwhelming part of the trade collapse came from a fall in average quantities and prices. The remarkable stability of the extensive margin of trade, despite the magnitude of the shock, suggests that sunk costs of entering trading relationships are very important (Roberts and Tybout, 1997). If trade costs were mostly recoverable (i.e., variable and fixed), we should have seen firms exit massively markets, severing trade relations to avoid losses. The existence of large sunk costs creates an option value of remaining an exporter or an importer, thus rationalizing the observed stability. An additional surprising result is that firm size and productivity do not matter much in explaining individual changes in imports and exports. In theory, larger and more productive firms have a greater option value of remaining exporters, and are thus less likely to exit after a negative shock. One possible explanation is that larger firms incur higher sunk costs: they have on average more trading partners in each country, and creating each of these trading relationships entails additional sunk costs. More sophisticated theories explaining systematic differences in entry costs into foreign markets may be equally valid (e.g. Arkolakis, 2009) or Eaton *et al.*, 2009). More research is needed to gain further insight on this issue.

While these results may come as a surprise for researchers, they should come as a relief for policy-makers and as a bad news for catastrophe journalists. History tells us that the intensive margin can bounce back quickly as the macroeconomic environment returns to normal (Schott, 2009). In December 2009, Belgian monthly exports and imports exceeded those of December 2008, the first year-on-year increase since the trade collapse. Early signs of recovery are also visible in other countries (Baldwin, 2009). Had trading relationships been less flexible, the trade collapse would have been much more costly. In that sense, our analysis offers reassuring news: the world is not becoming less globalized.

Second, we find little support for supply-side based explanations of the trade collapse. The fall in trade was extremely evenly spread across firms, products, industries and countries. In our econometric analysis, we find that few firm- or product-level characteristics are systematically related to the fall in trade. Even when they are, their quantitative contribution is rather limited. Access to credit and the share of imported intermediates appear to have played some role, but they explain only a little share of the collapse of imports, and none of the collapse of exports. This finding casts doubt on explanations related to trade finance or the disruption of global value chains. It is strengthened by the fact that exports-to-turnover and imports-to-intermediates ratios did not show any general downward trend, nor any strong systematic correlation with firm characteristics. If there was a recent increase in trade barriers, it had no sizeable effect on Belgian trade.

We also do not find any support for explanations based on the drawing down of inventories, or the postponement of durable consumer goods and capital goods' purchases. The latter is particularly striking, since descriptive statistics show a large decrease in the trade of these goods. We conclude that a generalized fall in the demand for tradable goods was the main culprit behind the trade collapse. While studies using more aggregated data (Baldwin, 2009) or calibrated simulations (Eaton *et al.*, 2010) reach qualitatively similar conclusions, we are not aware of any other firm-level analysis confirming this result to date.

Of course, more research is required to investigate the causes underlying the disproportionate fall in the demand for tradable goods. Candidate explanations may involve a bias towards nontradables in fiscal stimuli packages, a general fall in commodity prices, or substitution patterns among consumer with non-homothetic preferences. Such investigations, while fundamental to our understanding of the crisis, are beyond the scope of the present paper.

Last, let us point out two caveats. As we acknowledge in the paper, 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). Also, implicit trade barriers might have risen more in some places than in others (Jacks *et al.*, 2009; Eaton *et al.*, 2010). More research involving micro-data for other countries is thus certainly called for.

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References

[1] Alessandria, G., J. Kaboski and V. Midrigan (2010) Inventories, Lumpy Trade, and Large Devaluations. *American Economic Review*, forthcoming.

[2] Amiti, M. and D. Weinstein (2009) Exports and Financial Shocks. Mimeographed.

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

[4] Arkolakis, K. (2009) Market Penetration Costs and the New Consumers Margin in International Trade. Mimeographed.

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

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

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

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

[9] Bernard, A.B., Jensen, B.J., Redding, S.J., and P.K. Schott (2010) The Margins of US Trade, *American Economic Review Papers and Proceedings*, forthcoming.

[10] 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.

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

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

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

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

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

[16] 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(4), 858-876.

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

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

[19] 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.

[20] Rajan, R. and L. Zingales (1998) Financial Dependence and Growth, *American Economic Review* 88(3), 559–586.

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

[22] 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(4), 545-64.

[23] Schott, P.K., "US trade margins during the 2008 crisis", in Baldwin, R. (ed.), "The Great Trade Collapse: Causes, Consequences and Prospects", 2009, CEPR. (available online at `http://www.voxeu.org/index.php?q=node/4297`).

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

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

Appendix A: Data

Balance sheet data and firm-level variables. Most firm-level variables have been constructed using 2007 balance sheet data from the Central Balance Sheet Office at the National Bank of Belgium (NBB). The NBB collects the annual accounts of all companies registered in Belgium. Most limited liability companies, plus some other firms, have to file their annual accounts and/or consolidated group accounts with the Central Balance Sheet Office every year. Large companies have to file the full-format

balance sheet, while small companies may use the abbreviated format.[21] There are exceptions as some companies do not file any annual accounts.[22]

For this study, we selected those companies that either filed a full-format or an abbreviated balance sheet in 2007 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 2007 come from mandatory VAT declarations provided by the NBB. Balance sheets also record information on these 4 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 refer to 2007 and come from the Survey of Foreign Direct Investments carried out by the NBB every year.

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.[23] 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 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

[21] Under the Belgian Company Code, a company is regarded as 'large' if: the annual average of its workforce exceeds 100 persons; or if more than one of the following criteria are met: 1) annual average of workforce: 50; 2) annual turnover (excluding VAT): 7,300,000 euro; 3) balance sheet total: 3,650,000 euro.

[22] These 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.

[23] For intra-EU trade, the thresholds above which a legal obligation to declare arises are small. However, firms often do provide information about their trade even when they are below the threshold. Extra-EU trade is virtually exhaustive with the legal requirement for declaration being a value of 1,000 euros or more or a weight of 1,000 kg or more.

methodology described above while considering only trade registered in kilograms. Results are very similar in terms of price and quantity changes between 2008 and 2009. Finally, monthly production data by Prodcom-2008 2-digit codes are provided by the Belgian National Institute of Statistics.

Country and product data. Exchange rate changes between 2008 and 2009 refer to the change in the nominal interbank exchange rates with respect to the euro at noon on April 1st, as recorded by the Bank of Canada. We choose April 1st as our midpoint in the first semester of the year. The average growth rate between 2008 and 2009 is the average of the two annual growth rates of the GDP in the national currency and comes from the IMF World Economic Outlook database as of October 2009. 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' used in the paper refers to the grouping of both intermediate and capital goods. 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 Rauch's 'liberal' classification.

Appendix B: Additional Tables

In this Appendix, we present the results with continuous variables. All variables are analogous to those summarized in Table 12, except that the variables starting with C are now measured in continuous form (and no longer as a dummy with respect to the median value of the characteristic among all trading firms.)

Tables 20 and 21 summarize the results for the firm-level characteristics using the firm fixed effects $\Delta\hat{\eta}_i$ for exports and imports as dependent variable. Tables 22 and 23 summarize the same results using exports-to-turnover and imports-to-intermediates as the dependent variables. As can be seen from those tables, our qualitative results are unaffected.

Table 20: Firm FE difference regression results (firm variables): continuous case

Coefficient	**Exports**	**Imports**
C_{size}	0.0001	-0.0001
	(0.0002)	(0.0001)
C_{prod}	0.3037	0.0647
	(0.2027)	(0.1035)
C_{interm_share}	0.0497	-0.0870^{c}
	(0.0660)	(0.0452)
$C_{share\_exp\_sales}$	-0.1078^{b}	-0.1209^{a}
	(0.0467)	(0.0345)
$C_{share\_imp\_interm}$	0.1088^{c}	-0.0325
	(0.0565)	(0.0397)
$C_{value\_add\_chain}$	-0.0013^{b}	-0.0000
	(0.0007)	(0.0003)
$C_{ext\_fin\_dep}$	0.0010	0.0010
	(0.0009)	(0.0006)
$C_{share\_debts\_o\_liab}$	-0.0069	-0.0980^{b}
	(0.0592)	(0.0406)
$C_{share\_debts\_due\_after\_one}$	0.0907	0.0464
	(0.0844)	(0.0617)
$C_{share\_fin\_debt}$	-0.0277	0.0269
	(0.0581)	(0.0425)
C_{share_stock}	0.0940	0.1186
	(0.1162)	(0.0786)
for	0.0004	0.0218
	(0.0460)	(0.0365)
mne	-0.0660	-0.0623
	(0.0495)	(0.0380)
Constant	-0.1938	-0.0156
	(0.1454)	(0.1089)
Observations	8572	14681
R^2	0.0133	0.0069

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

Table 21: Firm FE difference regression results (sector dummies): continuous case

Exports				Imports			
Industry	Coeff.	Industry	Coeff.	Industry	Coeff.	Industry	Coeff.
nace_1	-0.3968^{b}	nace_40	0.7590	nace_1	-0.0101	nace_40	0.7153^{b}
	(0.1904)		(1.8853)		(0.1365)		(0.3246)
nace_2	-0.2447	nace_41	1.3540^{a}	nace_2	-0.3582	nace_41	-0.2614
	(0.4144)		(0.1498)		(0.5383)		(0.2039)
nace_5	0.2215	nace_45	-0.2985	nace_5	0.3172	nace_45	-0.0231
	(0.1490)		(0.2117)		(0.9820)		(0.1133)
nace_11		nace_50	-0.1243	nace_11	-0.6452^{a}	nace_50	-0.0699
			(0.1378)		(0.1027)		(0.1096)
nace_13	0.0000	nace_51	-0.1130	nace_13		nace_51	0.0180
	(0.0000)		(0.1297)				(0.1016)
nace_14	-0.3718^{c}	nace_52	-0.1361	nace_14	0.1261	nace_52	0.0289
	(0.2242)		(0.1425)		(0.2333)		(0.1036)
nace_15	0.0418	nace_55	0.1582	nace_15	0.0656	nace_55	0.0232
	(0.1312)		(0.3012)		(0.1042)		(0.1669)
nace_16	0.1630	nace_60	0.0726	nace_16	0.4189	nace_60	-0.2983
	(0.2617)		(0.3084)		(0.4898)		(0.1830)
nace_17	-0.0235	nace_61	0.0000	nace_17	0.0434	nace_61	-0.9413^{a}
	(0.1375)		(0.0000)		(0.1175)		(0.1053)
nace_18	0.2435	nace_62	-0.3370	nace_18	0.1471	nace_62	-0.0978
	(0.1770)		(0.4850)		(0.1262)		(0.1890)
nace_19	0.2047	nace_63	-0.1847	nace_19	0.3373	nace_63	0.1503
	(0.3118)		(0.3241)		(0.4206)		(0.2336)
nace_20	-0.3070	nace_64	0.5639^{c}	nace_20	-0.0672	nace_64	0.0051
	(0.1892)		(0.3191)		(0.1204)		(0.2864)
nace_21	-0.0717	nace_65	0.0000	nace_21	0.0049	nace_65	0.0000
	(0.1575)		(0.0000)		(0.1268)		(0.0000)
nace_22	-0.0987	nace_66	0.0000	nace_22	-0.0569	nace_66	0.0000
	(0.1616)		(0.0000)		(0.1347)		(0.0000)
nace_23	0.7609^{c}	nace_67	0.0000	nace_23	-0.2074	nace_67	0.0000
	(0.4536)		(0.0000)		(0.2013)		(0.0000)
nace_24	0.0379	nace_70	-0.6885^{c}	nace_24	0.0470	nace_70	0.3069
	(0.1352)		(0.3957)		(0.1079)		(0.3083)
nace_25	-0.0643	nace_71	-0.1061	nace_25	-0.1131	nace_71	-0.0719
	(0.1356)		(0.2340)		(0.1097)		(0.1896)
nace_26	0.0393	nace_72	-0.0419	nace_26	-0.0655	nace_72	0.1086
	(0.1532)		(0.1833)		(0.1149)		(0.1648)
nace_27	-0.2784^{c}	nace_73	0.0276	nace_27	-0.0970	nace_73	0.1923
	(0.1499)		(0.3597)		(0.1315)		(0.2673)
nace_28	-0.1433	nace_74	-0.0116	nace_28	-0.0929	nace_74	0.0526
	(0.1396)		(0.1527)		(0.1096)		(0.1169)
nace_29	-0.1256	nace_80	-3.0149^{a}	nace_29	-0.0555	nace_80	0.3012
	(0.1471)		(0.2623)		(0.1134)		(0.4159)
nace_30	-0.4007^{c}	nace_85	0.1468	nace_30	-0.0635	nace_85	0.2265
	(0.2363)		(0.8090)		(0.2898)		(0.2933)
nace_31	-0.1431	nace_90	-0.5563^{b}	nace_31	-0.0175	nace_90	0.2495
	(0.1576)		(0.2509)		(0.1253)		(0.4043)
nace_32	0.0105	nace_91	0.3626^{a}	nace_32	-0.1094	nace_91	-0.1048
	(0.2577)		(0.1362)		(0.1967)		(0.4480)
nace_33	-0.2190	nace_92	0.2820	nace_33	0.0989	nace_92	-0.0382
	(0.1863)		(0.3368)		(0.1432)		(0.1934)
nace_35	0.2181	nace_93	0.7706	nace_35	-0.0129	nace_93	-0.1400
	(0.2181)		(0.5156)		(0.1943)		(0.2176)
nace_36	-0.1227	nace_99	0.0000	nace_36	0.1142	nace_99	0.0000
	(0.1487)		(0.0000)		(0.1149)		(0.0000)
nace_37	-0.3278			nace_37	0.2556		
	(0.2160)				(0.2031)		

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The omitted Nace rev2 industry is nace_34 ('Manufacture of motor vehicles, trailers and semi-trailers')

Table 22: Firm-level export/turnover and imports/intermediates ratios (firm regressors) continuous case

Coefficient	**Exports**	**Imports**
C_{size}	-0.0001	-0.0001
	(0.0002)	(0.0001)
C_{prod}	0.3027	0.1440
	(0.2297)	(0.1384)
C_{interm_share}	0.0635	-0.0416
	(0.0625)	(0.0517)
$C_{share\_exp\_sales}$	-0.2915^{a}	-0.0113
	(0.0509)	(0.0345)
$C_{share\_imp\_interm}$	-0.0501	-0.1150^{a}
	(0.0335)	(0.0445)
$C_{value\_add\_chain}$	0.0000	0.0006
	(0.0004)	(0.0005)
$C_{ext\_fin\_dep}$	0.0001	-0.0008
	(0.0010)	(0.0005)
$C_{share\_debts\_o\_liab}$	-0.0580	-0.0290
	(0.0649)	(0.0415)
$C_{share\_debts\_due\_after\_one}$	0.0611	0.0265
	(0.0926)	(0.0627)
$C_{share\_fin\_debt}$	-0.0939	0.0332
	(0.0615)	(0.0422)
C_{share_stock}	0.2029^{c}	0.1667^{b}
	(0.1173)	(0.0777)
for	-0.0202	0.0772^{b}
	(0.0454)	(0.0390)
mne	-0.0316	-0.0175
	(0.0498)	(0.0432)
Constant	0.1346	-0.1685
	(0.1283)	(0.1280)
Observations	8360	14388
R^2	0.0151	0.0093

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

Table 23: Firm-level export/turnover and imports/intermediates ratios (sector dummies): continuous case

Exports				Imports			
Industry	Coeff.	Industry	Coeff.	Industry	Coeff.	Industry	Coeff.
nace_1	-0.2491	nace_40	1.4521	nace_1	0.0323	nace_40	-0.0919
	(0.1680)		(1.0862)		(0.1561)		(0.6908)
nace_2	-0.2314^{c}	nace_41	0.3757^{a}	nace_2	-0.4299	nace_41	0.0160
	(0.1387)		(0.1299)		(0.4452)		(0.2824)
nace_5	-0.0022	nace_45	-0.4620^{b}	nace_5	0.5666^{a}	nace_45	0.1459
	(0.1215)		(0.2106)		(0.2039)		(0.1319)
nace_11	0.0000	nace_50	-0.2791^{b}	nace_11	2.8486^{a}	nace_50	0.1351
	(0.0000)		(0.1234)		(0.1213)		(0.1303)
nace_13	0.0000	nace_51	-0.0989	nace_13	0.0000	nace_51	0.2113^{c}
	(0.0000)		(0.1106)		(0.0000)		(0.1195)
nace_14	-0.0936	nace_52	-0.1451	nace_14	0.1239	nace_52	0.1750
	(0.1322)		(0.1285)		(0.2344)		(0.1215)
nace_15	-0.0658	nace_55	0.0559	nace_15	0.1898	nace_55	-0.1332
	(0.1122)		(0.3534)		(0.1226)		(0.2183)
nace_16	0.1387	nace_60	0.0700	nace_16	0.7034	nace_60	-0.0628
	(0.1837)		(0.3017)		(0.6943)		(0.2195)
nace_17	0.0398	nace_61	0.0000	nace_17	0.0180	nace_61	0.1449
	(0.1213)		(0.0000)		(0.1308)		(0.1248)
nace_18	-0.0739	nace_62	-0.0990	nace_18	0.2693^{c}	nace_62	0.2147
	(0.1968)		(0.8647)		(0.1463)		(0.6065)
nace_19	-0.2424	nace_63	-0.8178^{c}	nace_19	0.0267	nace_63	0.1612
	(0.4391)		(0.4450)		(0.2719)		(0.2988)
nace_20	-0.3772^{b}	nace_64	0.4962	nace_20	0.1493	nace_64	0.0708
	(0.1469)		(0.4360)		(0.1338)		(0.2826)
nace_21	-0.0356	nace_65	0.0000	nace_21	0.0921	nace_65	0.0000
	(0.1316)		(0.0000)		(0.1284)		(0.0000)
nace_22	-0.0782	nace_66	0.0000	nace_22	0.0741	nace_66	0.0000
	(0.1432)		(0.0000)		(0.1518)		(0.0000)
nace_23	-0.3599	nace_67	0.0000	nace_23	-0.0931	nace_67	0.0000
	(0.2917)		(0.0000)		(0.2538)		(0.0000)
nace_24	0.1690	nace_70	-0.4282	nace_24	0.1775	nace_70	0.0417
	(0.1185)		(0.2630)		(0.1277)		(0.2473)
nace_25	0.0400	nace_71	-0.1018	nace_25	0.0873	nace_71	0.1624
	(0.1127)		(0.2777)		(0.1309)		(0.1806)
nace_26	-0.1711	nace_72	-0.2012	nace_26	0.0429	nace_72	0.1838
	(0.1243)		(0.2138)		(0.1333)		(0.1962)
nace_27	0.0279	nace_73	0.5033	nace_27	0.0922	nace_73	0.3569
	(0.1139)		(0.4667)		(0.1552)		(0.3600)
nace_28	-0.0235	nace_74	-0.0197	nace_28	0.0577	nace_74	0.2958^{b}
	(0.1255)		(0.1441)		(0.1270)		(0.1385)
nace_29	0.0237	nace_80	-2.7587^{a}	nace_29	0.1395	nace_80	0.7327^{c}
	(0.1387)		(0.1573)		(0.1351)		(0.4341)
nace_30	0.1951	nace_85	0.4063	nace_30	-0.0279	nace_85	0.5645
	(0.3584)		(1.0738)		(0.2884)		(0.4022)
nace_31	-0.2320	nace_90	-0.6057^{a}	nace_31	0.2342	nace_90	-0.1275
	(0.1717)		(0.1802)		(0.1447)		(0.4985)
nace_32	0.5792	nace_91	0.0620	nace_32	0.3197	nace_91	-0.5998^{c}
	(0.4049)		(0.1185)		(0.2198)		(0.3332)
nace_33	-0.0636	nace_92	0.1288	nace_33	0.4771^{a}	nace_92	0.0903
	(0.2235)		(0.3972)		(0.1731)		(0.2105)
nace_35	0.2641	nace_93	-0.4403^{c}	nace_35	0.2786	nace_93	-0.0120
	(0.2871)		(0.2667)		(0.1934)		(0.2307)
nace_36	-0.1858	nace_99	0.0000	nace_36	0.1516	nace_99	0.0000
	(0.1306)		(0.0000)		(0.1295)		(0.0000)
nace_37	-0.1148			nace_37	0.2023		
	(0.2001)				(0.2200)		

Notes: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The omitted Nace rev2 industry is nace_34 ('Manufacture of motor vehicles, trailers and semi-trailers')