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Characteristics of Croatian Manufacturing Exporters and the Export Recovery during the Great Recession – the CompNet Trade Module Research Results

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Zagreb, September 2018

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Abstract

This paper presents the results of an extensive investigation of Croatian firms' export distribution over the 2002-2014 period within the Competitiveness Research Network (CompNet). Our analysis shows that aggregate exports are concentrated in a small number of large enterprises. Furthermore, the recovery of Croatian exports after the outbreak of the global financial crisis was slow. The exports of large companies declined, while small and medium-sized companies increased their exports during the recession and drove the recovery of aggregate exports. The number of new exporters increased and their average productivity increased. Moreover, we confirm the well-known existence of a strong positive correlation between exports and productivity, as well as the superior characteristics of exporters as compared to non-exporting firms. Additionally, the results show heterogeneity across sectors and show that the average productivity premium tends to increase with the experience of the firms in the export market.

Keywords:
CompNet, concentration, correlation, exports, heterogeneity, productivity

JEL:
D21, F14, L6

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Contents

1 Introduction

Globalisation and trade liberalisation have increased international competitive pressures, especially on small open economies like Croatia. This environment makes it necessary to analyse the behaviour of exporting firms and possibly to revise policies aimed at enhancing the growth of exports on a macro and a micro level. The objective of this paper is to present a detailed analysis of microeconomic aspects of Croatian exports using firm-level data.

This paper relies heavily on the results compiled in the Trade module of the CompNet[1] database. The CompNet was set up by the European System of Central Banks in March 2012 with two main objectives: (i) to study competitiveness in the EU using a multi-dimensional approach (macro, micro and cross-border levels) and (ii) to understand better the theoretical and empirical links between the drivers of competitiveness and macroeconomic performance. For more details about CompNet see Lopez-Garcia et al (2014 and 2015) and Di Mauro and Ronchi (2015), while more information about analysis of Croatian firms in the CompNet Productivity module can be found in Valdec and Zrnc (2017). This paper presents a detailed assessment of Croatian firms' export performance by various criteria such as sector and firm size, including comparisons with other countries.

Our findings can be summarised as follows. First, aggregate exports are concentrated in a small number of large enterprises but the base of exporters has been increasing, especially since the EU accession. Furthermore, small and medium-sized companies increased their exports during the recession and drove the recovery of aggregate exports. Productivity appears to be strongly associated with a higher probability of a firm being an exporter and there is robust evidence that Croatian exporters are more productive than non-exporters. Finally, we also find that there are significant differences within the group of exporters, while the average productivity tends to increase with experience of the firm in the export market.

The rest of the paper is organised as follows. Section 2 describes the Trade module of CompNet. In the next section, we analyse the microeconomic aspects of Croatian exports. After that, we discuss the microeconomic aspects of the export recovery during the recession and section 5 concludes.

2 Description of the Trade module

The Trade module is an add-on in the CompNet that analyses the export behaviour of European firms[2]. The rich firm-based data set enables analysis of the population of exporters over time. This can facilitate a better understanding of the dynamics of overall export performance in participating countries, including Croatia.

The analysis in this module was performed only for the manufacturing sector (NACE rev 2.).[3] Two samples were constructed: a full sample (ALL) that covers all manufacturing firms with at least 1 employee and a restricted sample (20E) that includes only firms with more than 20 employees. A minimum of EUR 1,000 for the export values is required for a firm to be considered an exporter. The definitions used in this module are shown in Table 1.

Table 1 Trade status of firms

Exporter	*firm with positive export values in t*
Permanent exporter	*exporter in t-1, t and t+1*
New exporter	*exporter in t and t+1 but non-exporter in t-1*
Exiters	*exporter in t-1 and t, but not in t+1*
Temporary exporter	*exporter in t but not in t-1 and t+1*
Permanent non-exporter	*non-exporter in t-1, t and t+1*
Importer	*firm with positive import values in t*
Two-way trader	firm with positive export and import values in t

Source: Berthou et al. (2015).

Exporters were also analysed according to their size (small, medium and large). In our analysis we consider small companies to have less than 50 employees, medium-size companies from 50 to 250 employees, and large more than 250 employees.

The CompNet dataset contains a number of descriptive statistics computed at various levels of aggregation. Furthermore, it distinguishes firms by their size and international trade

1 More information available at http://www.comp-net.org/index.php?id=239.

2 For more details about Trade module see Berthou et al. (2015).

3 The analysis in CompNet modules includes the firms from approximately sixty NACE divisions (sectors), which are then aggregated using different weights into nine macro-sectors and the level of the overall economy. Manufacturing is one of the nine macro-sectors.

status (Lopez-Garcia et al., 2014.). The descriptive statistics were also computed by productivity deciles (using either TFP, labour productivity, etc.).

Data for Croatian firms are taken from the Annual Financial Statements Registry that Croatian non-financial companies report to the Financial Agency (FINA)[4]. The Croatian data cover the period 2002-2014, while for rest of the countries in the sample the end year is 2013.

3 Microeconomic aspects of Croatian exports

3.1 Main features of Croatian exporters

Almost a third of all Croatian manufacturing firms are exporting (Table 2). The importance of exports is even more evident in a consideration of a sample comprising only firms with more than 20 employees in which two-thirds of them sell in foreign markets. This leads to the conclusion that larger Croatian manufacturers are likely to export. The fraction of exporting firms increased in the post-crisis period for both samples.

In the recent analysed years, exporters are becoming more export-intensive (Figure 1) and reaching pre-recession values. The intensity of exports is represented through the export ratio - the average share of exports in total turnover. Among the population of exporters, export sales represent on average 38% of total turnover in the whole period. The most export-intensive firms are present in manufacture of leather and leather products, other transport equipment, wearing apparel and wood and wood products (Figure A1), while the least export intensive firms are in the manufacture of beverages.

Croatian aggregate exports are concentrated around a small number of enterprises that largely determine the dynamics of the overall exports. The largest five exporters accounted for 20% of the total Croatian goods exports during the 2002-2014 period, and the top ten exporters for around 30%. This is also approximately the average for CEE countries (Berthou et al. 2015). Exports are even more concentrated in more narrowly defined 2-digit NACE sectors, which is due to the smaller size of the export cohort. The ten largest firms account for around 80% to 90% of total exports for most of these sectors (Figure A2).

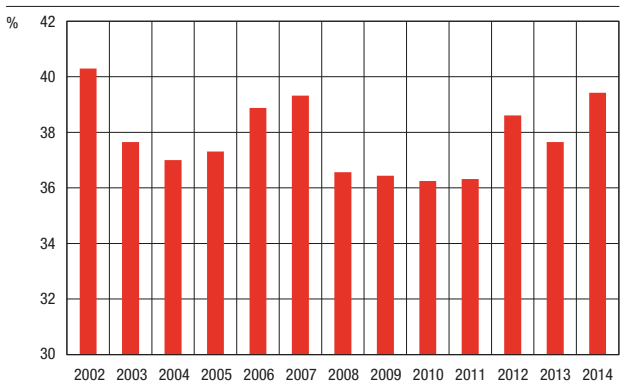
However, the share of the top ten firms in aggregate exports is declining (Figure 2), and overall exports have increased since the crisis. Hence, we can conclude that after the EU accession, exports growth is spread among a greater number of firms, which is explored in depth in the following sections.

3.2 Differentials between exporters and non-exporters

The fact that exporters tend to have superior characteristics as compared to non-exporters is well embodied in the empirical literature. The aim of CompNet's Trade module was to check these findings and possibly outline in which specific industries exporters tend to outperform their counterparties the most. In this section we compare the performance of exporting firms to that of non-exporting firms in the Croatian manufacturing sector using non-parametric measures like labour productivity, and parametric like total factor productivity (TFP).

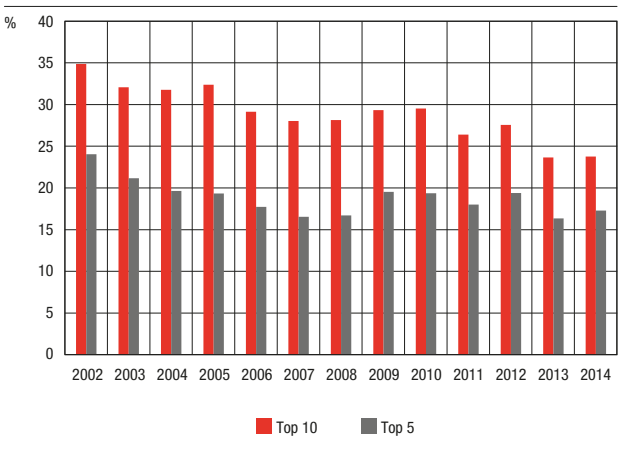
We define labour productivity as real value added per employee in thousands of euros. Total factor productivity (TFP) accounts for the changes in total output growth relative to the growth of utilised labour and capital and is estimated as a residual in a standard Cobb-Douglas production function.

Figure 1 Export ratio, manufacturing sector



Note: Export ratio is calculated at firm-level as share of export value in total turnover of exporting firms and then aggregated to total manufacturing sector.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure 2 Share of top exporters, manufacturing sector



Source: Authors' calculations based on the CompNet database (sample ALL).

4 More information about data used can be found in Lopez-Garcia et al (2015) and Valdec and Zrnc (2017).

Table 2 Proportion of exporters in the total number of firms in the sample per year

Year	Sample ALL							Sample 20E						
	NON-EXPORTERS	EXPORTERS	PERMANENT EXPORTERS	NEW EXPORTERS	IMPORTERS	PERMANENT NON-EXPORTERS	TWOWAY	NON-EXPORTERS	EXPORTERS	PERMANENT EXPORTERS	NEW EXPORTERS	IMPORTERS	PERMANENT NON-EXPORTERS	TWOWAY
2002	68.1%	31.9%	–	–	37.4%	–	20.9%	31.8%	68.2%	–	–	71.0%	–	55.4%
2003	68.9%	31.1%	19.6%	2.2%	38.0%	43.8%	21.2%	34.2%	65.8%	47.9%	1.5%	71.5%	17.6%	54.4%
2004	68.4%	31.6%	20.3%	2.6%	38.7%	45.2%	22.3%	34.7%	65.3%	50.0%	2.1%	73.7%	16.7%	56.4%
2005	67.6%	32.4%	21.0%	2.4%	38.4%	44.7%	22.9%	31.9%	68.1%	51.6%	2.3%	74.3%	17.9%	59.1%
2006	68.4%	31.6%	19.6%	2.0%	38.3%	40.6%	21.9%	35.4%	64.6%	45.8%	1.5%	71.9%	15.6%	55.3%
2007	68.0%	32.0%	19.2%	1.9%	37.8%	43.3%	21.8%	35.6%	64.4%	46.0%	2.1%	71.6%	18.9%	54.4%
2008	72.3%	27.7%	17.3%	1.2%	33.6%	41.2%	18.6%	39.8%	60.2%	42.7%	1.4%	64.9%	19.3%	47.6%
2009	74.0%	26.0%	17.6%	1.5%	31.2%	46.4%	17.2%	39.7%	60.3%	44.5%	2.0%	63.1%	21.6%	47.9%
2010	73.0%	27.0%	17.5%	2.1%	30.2%	46.7%	17.6%	39.0%	61.0%	47.4%	2.0%	61.5%	22.4%	48.0%
2011	72.2%	27.8%	19.0%	2.0%	30.3%	48.1%	17.9%	37.2%	62.8%	47.5%	1.9%	62.0%	21.8%	48.7%
2012	71.4%	28.6%	20.0%	1.8%	29.8%	47.7%	18.0%	35.2%	64.8%	50.7%	1.6%	62.1%	19.6%	50.0%
2013	71.0%	29.0%	19.8%	2.4%	28.7%	44.6%	17.8%	33.7%	66.3%	50.0%	2.7%	61.1%	18.0%	49.2%
2014	69.7%	30.3%	–	–	28.6%	–	17.7%	33.3%	66.7%	–	–	59.1%	–	49.3%

Source: Authors' calculations based on the CompNet database.

Specifically, we calculate the TFP using the approach of Wooldridge (2009)[5].

Firstly, we examine the correlation between productivity and export intensity at firm level. The results show that the correlation between firm-level exports and firm-level productivity is positive and is stronger for TFP than for labour productivity. The results are quite divergent across sectors, with the strongest positive correlation observed in manufacture of basic metals and other non-metallic mineral products. We conclude that more productive firms tend to export more than less productive firms (conditional on their participation in the export market).

In order to understand better the link between exports and productivity, we compare the performance of exporting firms to their non-exporting counterparts by using several different measures: labour productivity, TFP, wages, unit labour costs (ULC) and firm size measured with employment. Labour productivity and the TFP are explained above. Wages are calculated as the real total wage bill per employee, the ULC is defined as the total labour cost over the value of real output and the employment represents the average yearly number of employees calculated in full-time equivalent.

We find that Croatian exporting manufacturing firms have on average 35% larger labour productivity than firms operating solely in the domestic market within the same sector (Figure 4). The most pronounced difference in labour productivity between exporters and non-exporters can be found in the manufacture of food products and beverages, and the least difference in the textile industry (Figure A3). The more pronounced difference between exporters and non-exporters is confirmed using TFP instead of labour productivity. For example, in the manufacture of chemicals, paper and food products TFP is on average 95% higher for exporters.

Exporting companies tend to pay higher wages than their counterparts. However, exporters' higher productivity makes them relatively competitive as compared to non-exporters, which is evident in their lower ULC. Comparing wages by industry, we can see that wages in the manufacture of chemicals and the other transport equipment are significantly higher in exporting companies than in non-exporting companies. At the

Figure 3 Correlation coefficients

Note: Correlation coefficients are based on sector-level data, which are transferred to the manufacturing sector-level by taking simple un-weighted average over sectors.
Source: Authors' calculations based on the CompNet database (sample ALL).

5 For more details about the TFP computation in CompNet see Lopez-Garcia et al. (2015).

same time, the difference is very small in the textiles and the wood industry. The ULC of exporters is on average 15% lower than that of non-exporters. Cost effectiveness of exporters is most pronounced in the manufacture of beverages, food products and repair and installation of machinery and equipment (Figure A3). The results also show that the difference in the performance of exporting compared to non-exporting firms, no matter the measure used, has increased in recent years.

Finally, data also show that exporters are significantly larger in terms of number of employees than non-exporters: up to 10 times larger on average in some sectors.

There are also differences among exporters, with size and experience having the strongest effect. Taking into account the trade status of the exporting firms, one can observe that export premium, either in terms of labour productivity or TFP, is the highest for the top exporters (Figure 5); this is most pronounced in the manufacture of food products and basic pharmaceutical products (Figure A4). Moreover, new exporters and firms exiting from the export market also show higher productivity than non-exporters in the same sector. Finally, there is a significant dispersion in productivity among the population of exporters in different manufacturing industries but on average productivity premia tend to increase with experience of the firms in the export market. These findings are also confirmed for other countries in the sample (Berthou et al., 2015).

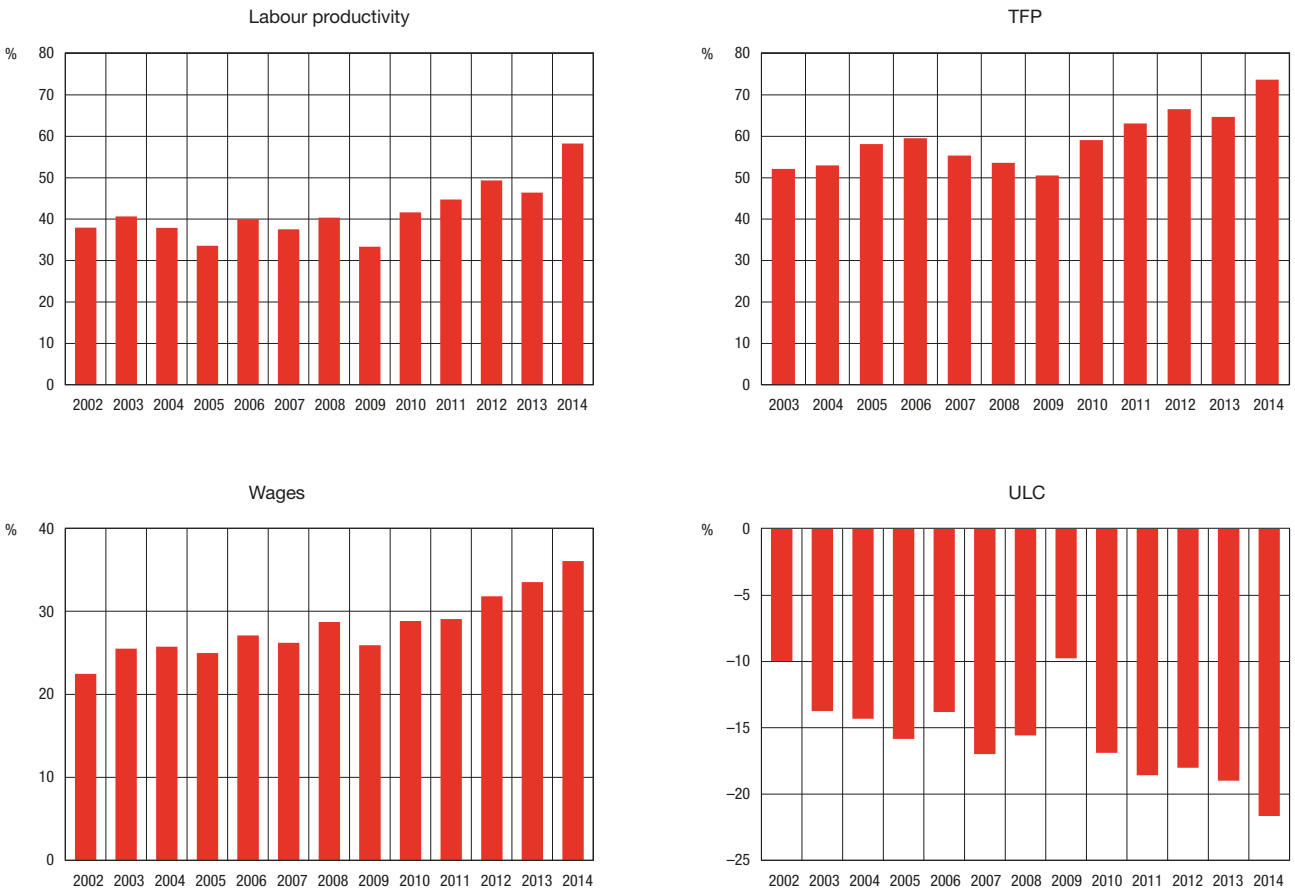
The findings of the non-parametric analysis presented above are further strengthened by estimating export productivity premia by regressing firms' performance indicators on an export dummy and a set of control variables (usually including industry, year, crisis dummies, etc.):

$$InX_{it} = \alpha + \beta Export_{it} + \gamma Control_{it} + \varepsilon^{it}$$

where i represents the individual firm, t represents the year, X_{it} represents the firm's productivity (TFP); *Export* is a dummy of the firm's current export status (1 if the firm is an exporter in year t, 0 otherwise); *Control* is a vector of the firm specific controls; ε is the random error.

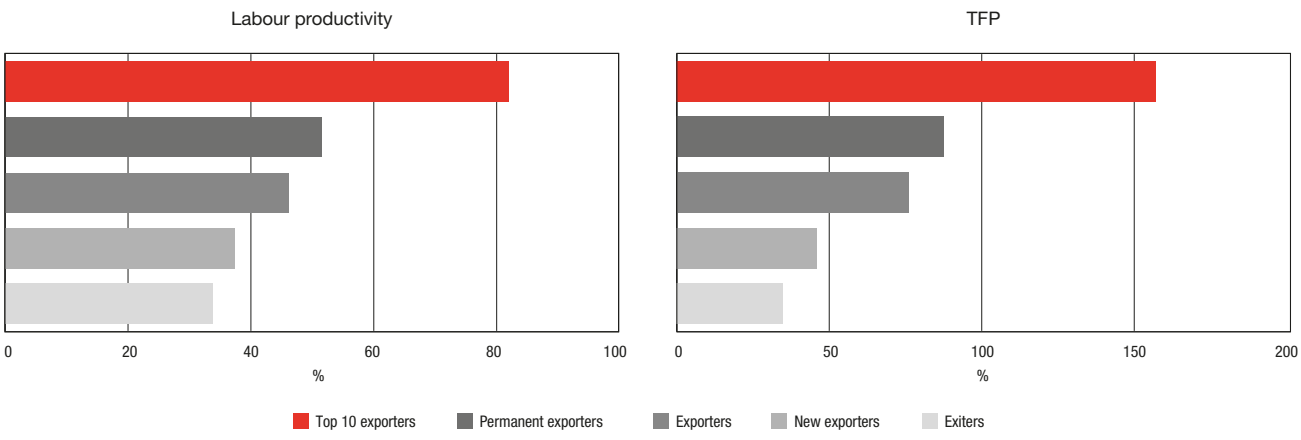
The export premia computed from the estimated coefficient β as $100(exp(\beta)-1)$ show the average percentage difference between exporters and non-exporters after controlling for the characteristics included in the control vector. This simple model was estimated for manufacturing firms for the period 2002-2014, controlling for sector, size and crisis events. The results show that the total factor productivity exporter premium for all firms is 35.5%, while this difference shrinks to

Figure 4 Export premia in:



Notes: Export premia in percentage are calculated as differences in specific measure of exporters and non-exporters in the same 2 digit NACE sector. Sector-level values are transferred to the manufacturing sector-level by taking a simple un-weighted average over sectors. Sectors with less than 10 exporters are excluded.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure 5 Export premia over export status in:



Note: Please see notes to Figure 4.
Source: Authors' calculations based on the CompNet database (sample ALL).

18.3% when only firms with 20 or more employees are analysed. Similar studies conducted by Valdec and Zrnc (2015) and Lukinić-Čardić (2012) also confirm the robust export premia of manufacturing firms in Croatia.

The analysis presented above documents different characteristics of exporters and non-exporters, but is not sufficient to identify a causal effect. The literature provides two prevalent but not mutually exclusive hypotheses on the link between exports and productivity. The *self-selection* hypothesis suggests that only relatively more productive firms export due to fixed costs related to sales on foreign markets. The other hypothesis is *learning by exporting* which states that firms become more productive while exporting, due to learning effects when exposed to foreign competition. Valdec and Zrnc (2015) confirm the *self-selection* hypothesis for the nexus of Croatian manufacturing firms, meaning that many of the superior characteristics of new exporters precede their entrance into the export market. On the other hand, the authors find scant evidence for *learning by exporting*.

Table 3 Total factor productivity export premia estimates

Sample:	ALL	20E
Estimated coefficient	0.304***	0.168***
	(0.00905)	(0.0165)
Export premia in %	35.5	18.3

Notes: Robust standard errors in parentheses. *, ** and *** refer to 10%, 5% and 1% statistical significance levels, respectively. The export premia in % were calculated as 100(exp(β)-1).
Source: Berthou et al. (2015).

4 Microeconomic aspects of the export recovery during the recession

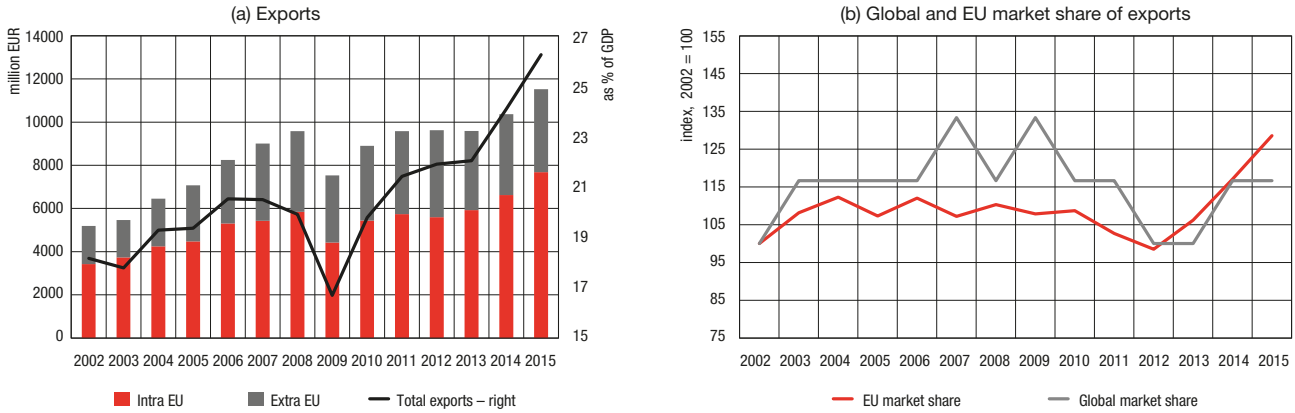
After the initial shock of the recession dissipated, exports started increasing (Figure 6). However, it is evident that the stronger recovery of Croatian exports started only after Croatia joined the EU. Croatia's accession to the common, single EU market considerably reduced administrative barriers to trade by greatly simplifying procedures and paper load and thus the time and cost required to deliver goods to buyers in other countries. This has potentially led to a strong rise in merchandise trade with EU member states, especially with new member states. Ranilović (2017) provides econometric evidence that this was indeed the case.

After the EU accession the share of Croatian exports in the EU market started increasing. Furthermore, the growth of goods exports contributed to the recovery of Croatian market share in global trade.

It seems that the increase in exports during the recession was driven by the export expansion of small and medium-sized enterprises. Although exports are usually driven by large producers, during the recession most of the growth in exports was achieved by small and medium-size companies (i.e. SME), while large companies decreased their sales abroad (Figure 7). This is in sharp contrast with pre-recession times, when large companies contributed the most to export growth. The SMEs have many disadvantages relative to large firms, such as low access to finance. However, it seems that these firms were more agile and able to compete on foreign markets during times of financial stress and (domestic) demand contraction.

Large businesses drove most of the exports growth before the recession in the majority of countries covered by CompNet, so Croatia is not an exception in this regard. During the recession, mainly large enterprises increased their exports in Italy, Spain and Denmark, while in Estonia and Latvia export growth was based mainly on the SMEs (Figure 8). Contraction of large firms' exports led to aggregate export contraction, except in Estonia. This lends support to the potential importance of idiosyncratic firm-level shocks influencing aggregate

Figure 6 International trade in goods



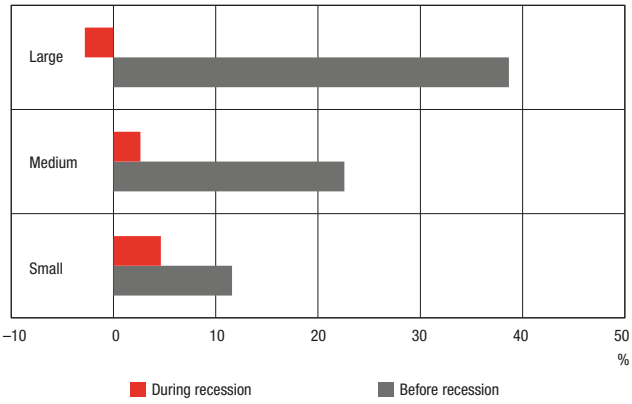
Note: EU market share of exports of goods is calculated as a ratio between exports of one country dispatched to EU countries (Intrastat) and total exports of the EU (Intrastat and Extrastat).
Sources: CBS and Eurostat.

outcomes (Gabaix, 2011). In some countries, e.g. Croatia, exports did not recover to pre-crisis levels even after five years and as can be seen from CompNet data, this is related to large firms' export contraction.

In Croatia, the sector with potentially the largest idiosyncratic shocks is ship building. The shipyards are dominantly large enterprises and have traditionally been among the most important exporters. However, as a part of the EU accession, shipyards that in the past relied heavily on state aid were privatised and restructured which strongly affected their exports. The decline in exports for large firms vanishes (Figure A5) when the sector of other transport equipment (mainly ships) is removed from Figure 7. However, even when the effect of shipyards is removed from total exports, the growth in exports of large firms remains lower than that of SMEs and relative to pre-recession levels. This implies that shipyards were not the only reason why Croatian export growth was subdued in the aftermath of the recession.

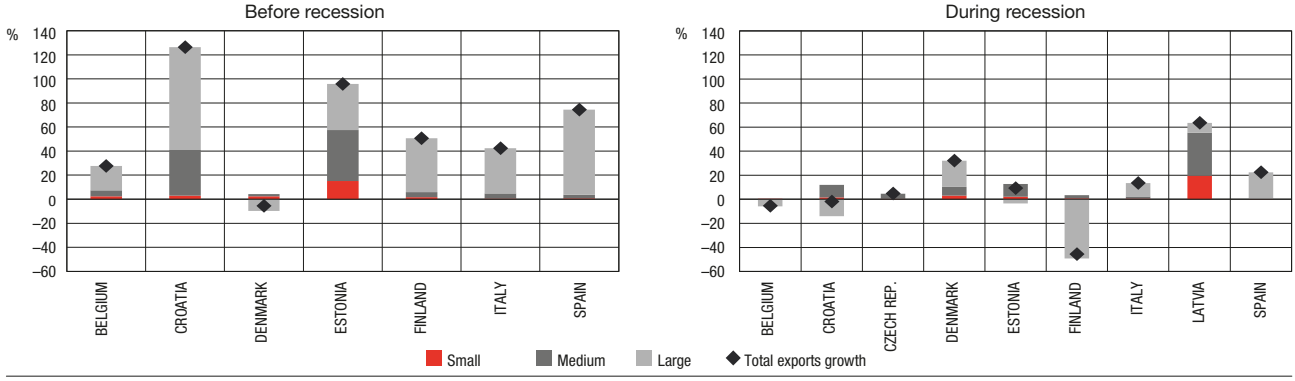
During the recession, Croatian firms oriented more towards the international market to replace declining domestic

Figure 7 Contribution to total manufacturing exports growth rate by firm size



Notes: Before the recession refers to the years between 2002 and 2008, while during the recession refers to the years between 2009 and 2014.These are contributions to the aggregate exports growth rate, therefore they should not sum up to 100%.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure 8 Contribution to total manufacturing exports growth by firm size and country

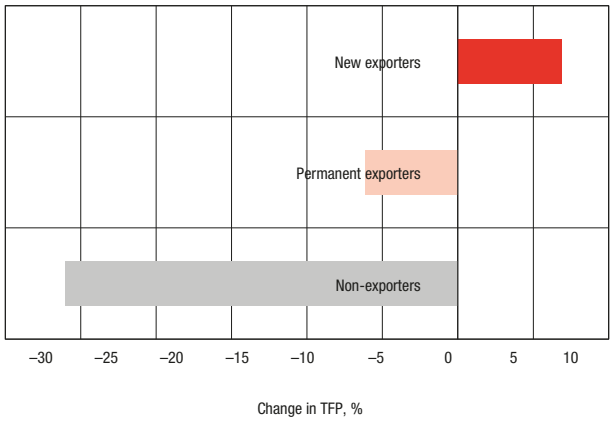


Notes: Before the recession refers to the years between 2002 and 2008, while during the recession refers to the years between 2009 and 2013. In the pre-recession period, data for Czech Republic and Latvia are not available at entire sample period. These are contributions to the aggregate exports growth rate, therefore they should not sum up to 100%. The coverage for Croatia in Figure 7 and 8 in during recession period differs due to availability for other countries.
Source: Authors' calculations based on the CompNet database (sample ALL).

demand. Not only did existing exporters on average increase their exports, but the number of new exporters rose considerably. These dynamics resulted in a 5% increase of the exporting firms' share in the total number of firms. In the previous section we found that exporters are on average more productive than non-exporters. This might imply that the growth in the number of new exporters could be driven by their increased productivity growth.

The data indeed corrobarate this hypothesis. TFP increased considerably during the recession for the new exporters as a group, while for non-exporters it dropped sharply (Figure 9). Moreover, TFP decreased for permanent exporters as well but to a smaller extent than to non-exporters. All in all, it seems that the new exporters cushioned the fall in the aggregate TFP that happened during the recession (Valdec and Zrnc, 2017), while old exporters and especially non-exporters were the main drivers of the decline in aggregate productivity.

Figure 9 Export status and cumulative TFP growth during the recession



Note: During the recession refers to the years between 2009 and 2014.
Source: Authors' calculations based on the CompNet database (sample ALL).

5 Conclusion

In this paper we analysed Croatian exporting firms using the CompNet Trade module. A significant portion (around one third) of Croatian manufacturers are exporting their products, but, as in many other countries, aggregate exports in Croatia are very concentrated, and a few large companies mainly drive the overall export performance. However, the importance of small and medium-sized enterprises in total exports has increased, especially since EU accession.

CompNet results confirm the superior characteristics of exporters as compared to non-exporting firms. To be more specific, Croatian exporting manufacturing firms have on average higher productivity, lower unit labour costs and more employees than firms operating solely in the domestic market. Additionally, a significant dispersion in productivity among exporters is also present in different manufacturing industries, but on average productivity premia tend to increase with experience of the firms in the export market.

Furthermore, we analysed microeconomic aspects of the export recovery during the recession. The results show that the slow recovery of the Croatian exports was due to declining exports of large companies while small and medium-sized companies increased their exports during the recession and drove the recovery of aggregate exports. Faced with declining domestic demand, firms increased their reliance on foreign markets. Furthermore, there was an increase in the number of new exporters, whose productivity, as a group, rose. The recent data show that since 2014 positive export developments in Croatia continued, and therefore we consider that further exploration of this topic is of interest.

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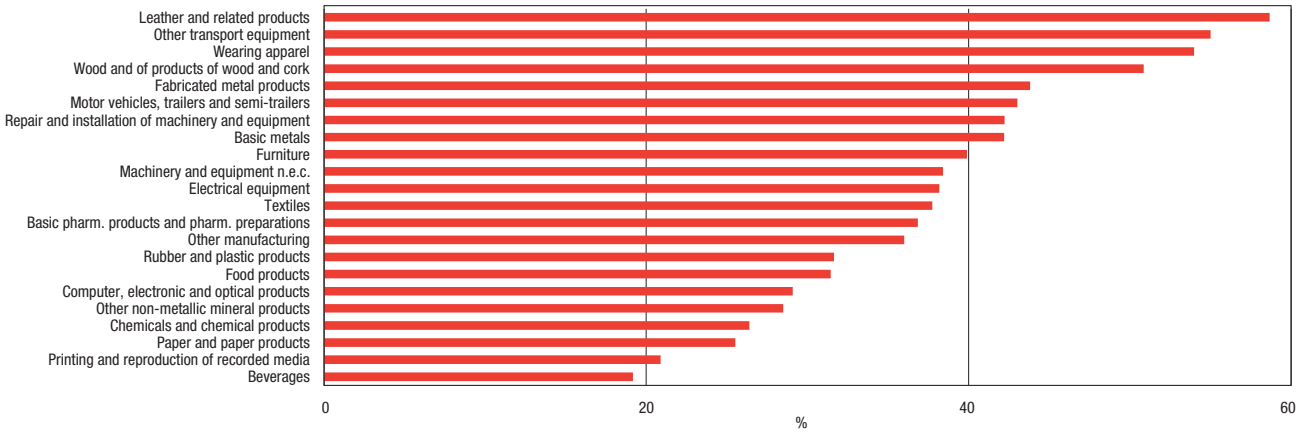
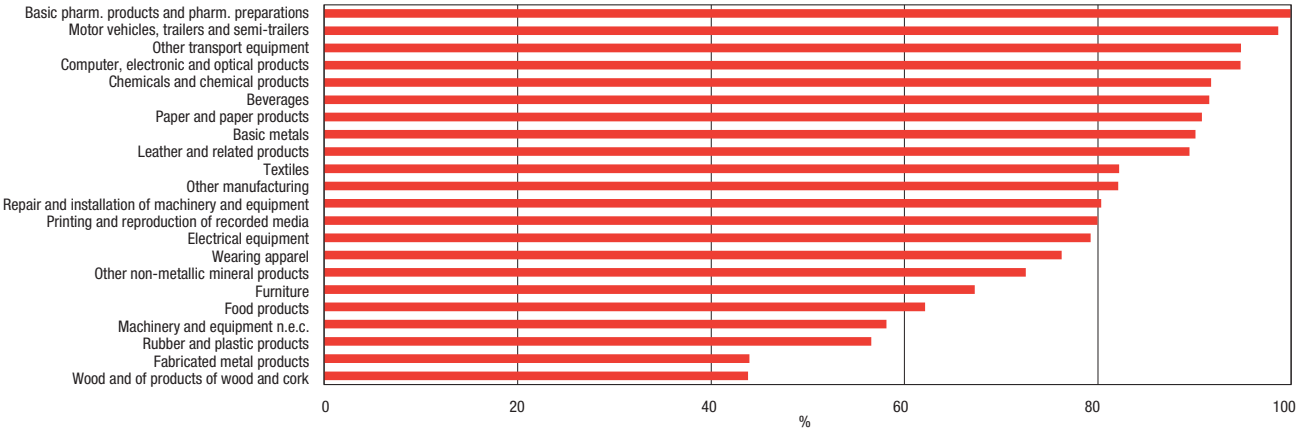
Appendix

Figure A1 Export ratio, by 2 digit NACE sectors (average 2002-2014)



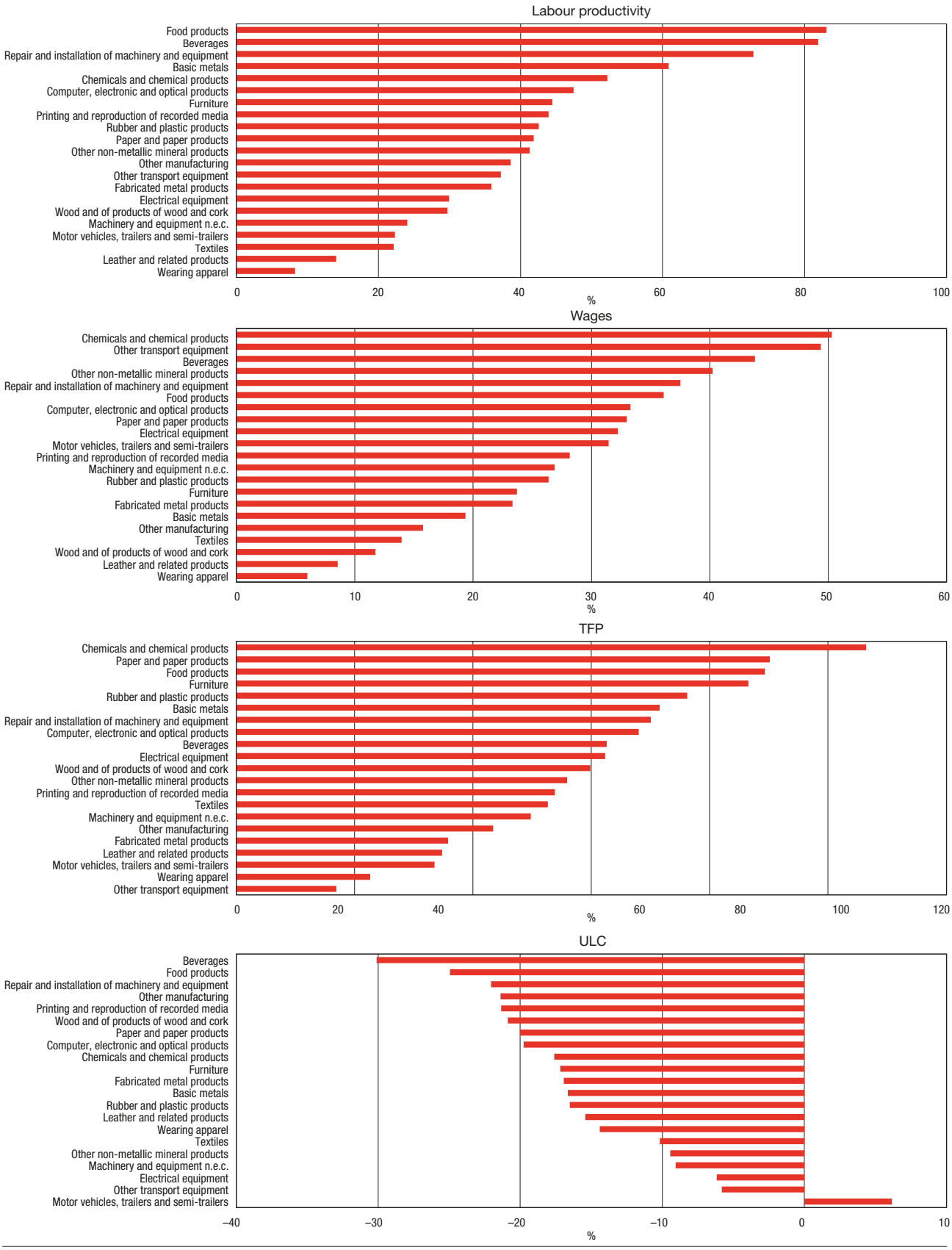
Note: Export ratio is calculated at firm level as share of export value in total turnover of exporting firms and then aggregated to 2 digit NACE sectors.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure A2 Share of top 10 exporters, by 2 digit NACE sectors (average 2002-2014)



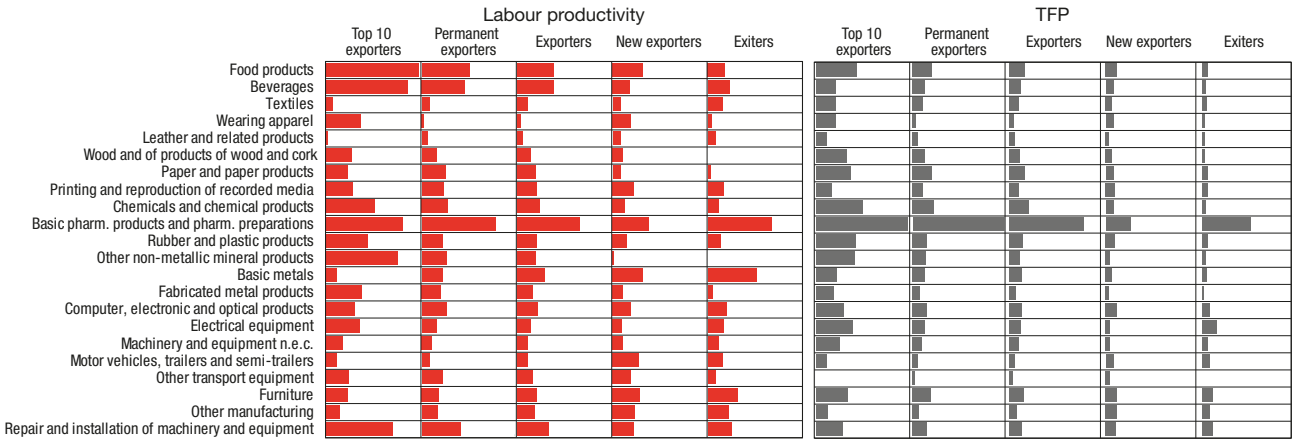
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure A3 Export premia in (average 2002-2014):



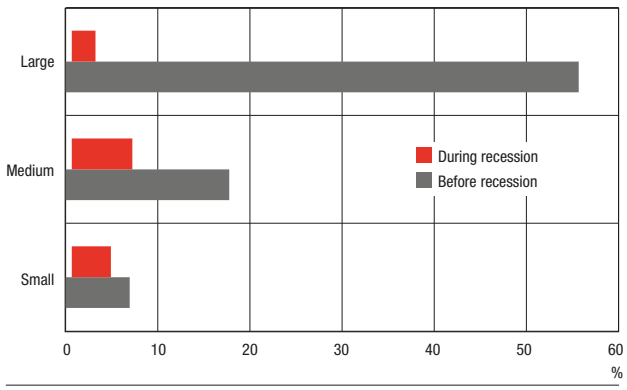
Note: Please see notes to Figure 4.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure A4 Export premia over export status (average 2002-2014):



Notes: Please see notes to Figure 4. The purpose of this Figure is to illustrate the amplitude of export premia over different export status in different manufacturing sectors.
Source: Authors' calculations based on the CompNet database (sample ALL).

Figure A5 Contribution to total manufacturing exports growth rate by firm size



Notes: Before the recession refers to the years between 2002 and 2008, while during the recession refers to the years between 2009 and 2014. These are contributions to the aggregate exports growth rate, therefore they should not sum up to 100%. The data used for the construction of this graph differ from Figure 7, since no outlier procedure was performed on data presented in this graph.
Source: Authors' calculations based on the CompNet database (sample ALL).

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