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The Role of extensive margins of exports in *The Great Export Recovery* in Germany, 2009/2010*

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Abstract:

This paper contributes to the literature by documenting for the first time the contribution of adding (and dropping) goods and destination countries to the sharp increase in exports of goods in the German economy as a whole during the Great Export Recovery in 2009/2010. The empirical investigation finds that firms that exported in both 2009 and 2010 are much more important for the export dynamics than export starters and export stoppers. Firms that increased their exports (and that were the drivers of the export boom) exported on average more goods and to more destination countries in 2009 than firms that decreased their exports, and they increased both extensive margins of exports on average while firms with decreased exports reduced both the number of goods exported and the number of countries exported to. These empirical regularities can be linked to recent theoretical models of multi-product, multiple-destination exporters that point to a positive link between firm productivity and both extensive margins of exports. Although the data do not allow a direct test of the hypothesis, the evidence at hand justifies that we can argue that the more productive firms with higher and increasing extensive margins of exports are the drivers of *The Great Export Recovery* of 2009/2010 in Germany.

JEL Classification: F14

Keywords: Extensive margins of exports, The Great Export Recovery, Germany

* All computations were done at the Research Data Centre of the German Statistical Office. I thank Rafael Beier for preparing the data, running my Stata do-files and checking the results for any violation of privacy. The enterprise level data used are confidential but not exclusive; see http://www.forschungsdatenzentrum.de/nutzungsbedingungen.asp for any details regarding the access to the data. To facilitate replication the Stata do-file used is available on request.

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1. Motivation

After the severe collapse of exports during the Great Recession in 2009 global trade flows rebounded strongly in 2010. According to the WTO's World Trade Report 2011 the rise in the volume in goods exports in 2010 was the largest on record, enabling world trade to return to its pre-crisis level (World Trade Organization 2011, p. 19). German exports of goods are a case in point. In 2009 the value of total exports declined by 18.4 percent compared to 2008. This was followed by an increase in exports by 18.5 percent in 2010 (Statistisches Bundesamt 2012, p. 414).

While a number of studies analyze the Great Trade Collapse of 2008/2009 from a macroeconomic point of view and some studies take a microeconomic perspective and try to understand what was going on under the veil of the macroeconomic developments by looking at firm level data[1] there is, to the best of my knowledge, only one investigation of the Great Export Recovery of 2009/2010that is based on firm-level data.[2] Wagner (2012a) uses data for firms from manufacturing industries in Germany and finds that a very large share of the increase in exports in 2010 was due to positive changes of exports in enterprises that continued to export while the increase of exports due to export starters was tiny. Due to the data used this study is limited in two ways. First, only firms from manufacturing industries are considered. Second, no information on the number of goods exported and the number of countries exported to is available in the data, and, therefore, the role of these extensive margins of exports are not analyzed.

[1] See Wagner (2013) for a discussion of this literature and a study for Germany that uses firm-level data. An in-depth analysis of the great trade collapse can be found in Bems, Johnson and Yi (2012).

[2] For studies using macroeconomic data see World Trade Organization (2011) with evidence for many countries and Loschky (2011) for detailed evidence on Germany.

This paper contributes to the literature by documenting for the first time the contribution of adding (and dropping) goods and destination countries to the sharp increase in exports of goods in the German economy as a whole during the Great Export Recovery in 2009/2010. The empirical findings are linked to recent results from theoretical models of multi-product multi-destination exporters. Given that Germany is one of the leading actors on the world market for goods, the findings reported are interesting per se. Furthermore, the empirical approach used can easily be applied for other countries with suitable data, and the results could be used to learn more about the micro-structure of the recent export boom from a cross-country perspective.

To anticipate the most important results, we find that firms that exported in both 2009 and 2010 are much more important for the export dynamics than export starters and export stoppers. A more detailed classification of firms with increased (decreased) exports reveals that some of these firms decreased (increased) the number of goods exported and / or the number of countries exported to. However, the most important sub-groups are firm with increased exports that export more goods to more countries and firms with decreased exports that export a smaller number of goods to a smaller number of countries.

The rest of the paper is organized as follows. Section 2 introduces the data used and the empirical approach applied. Section 3 reports the results from the empirical investigation. Section 4 links these results to the recent theoretical literature on multi-product, multiple-destination exporters.

2. Data and empirical method

The empirical investigation uses a newly constructed data set that is based on customs' records about goods exported to countries outside the European Union and on information delivered by firms about goods exported to EU member countries (that exceed a reporting threshold of 400.000 Euro). These transaction-level data were aggregated at the level of the exporting enterprise by the German Statistical Office for the first time for the reporting year 2009 and are now available for the reporting year 2010, too. The data have information at the firm level about the value of all exports, the number of different goods exported (measured at the 8-digit level of classification) and the number of destination countries. These firm-level data are the basis for the aggregate figures of goods exported reported by the Statistical Office. The amount of exports in the firm-level data sum up to 794,780 Million Euro in 2009 and 943,987 Euro in 2010, and the growth rate is 18.7 percent. These figures are very close to the amounts published in the Statistical Yearbook (803,312 and 951,959 Million Euro and a growth rate of 18.5 percent; see Statistisches Bundesamt 2012, p. 414); the differences are due to estimates added by the Statistical Office to cover exports below the reporting threshold and to take care of non-reporting by some firms.

The data for 2009 and 2010 can be used to compare firms between both years. Firms that did not export in both years are ignored here. Each of the other firms belongs to one of five types:

(1) *Export starters* (firms that did not report exports in 2009 but in 2010).

(2) *Enterprises with increased exports* between 2009 and 2010.

(3) *Enterprises with constant exports* in both years.

(4) *Enterprises with decreased exports* between 2009 and 2010.

(5) *Export stoppers* (firms that did report exports in 2009 but not in 2010).

Note that the group of export starters includes plants which exported in 2009 to countries inside the EU only but which had not to report because the amount of exports was below the reporting threshold of 400.000 Euro. A similar point applies to firms classified as export stoppers that continued to export to EU member countries only in 2010, but which had not to report any longer because the sum of exports was below the threshold value.

The net change in total exports between the two years is the sum of the positive gross changes by the first two types and the negative gross changes by the last two types of firms. The percentage rate of change in total exports can be decomposed accordingly to show the relative contribution of each of these types of firms to total export dynamics (see Wagner 2013). Furthermore, the change in the number of goods exported and in the number of countries exported to can be documented for the types of firms to learn about the role of these extensive margins of exports in export dynamics.

3. Results from the empirical investigation

Results for the decomposition of export dynamics for the types of firms defined above are reported in Table 1. Note that there are no firms with constant exports. This is due to the use of a deflator when transforming nominal export values reported by the enterprises into real export values (measured in constant 2005 prices) used in the calculations here.

From the first row of Table 1 it can be seen that exports from manufacturing enterprises rose dramatically by 14.8 percent in real terms from 2009 to 2010 during *The Great Export Recovery*. Most of this increase is due to positive changes of exports in enterprises that exported in both years; these firms form the largest group. The increase of exports due to the twenty-thousand export starters is small. Surprisingly (at least for readers not familiar with earlier studies on export dynamics based on firm level panel data) even in this period of an extreme export increase there were more than twenty-thousand enterprises with decreased exports – more than one fifth of all firms fall into this group (see third row of Table 1). The decrease of exports due to these firms is about the same size as the overall increase of exports. Firms that stop to export form the smallest group of firms, and their contribution to the dynamic of exports is small.

Note that the group of firms that increased their exports from 2009 to 2010 are the drivers of the export-boom. The share of these firms in total exports increased from 67 percent in 2009 to more than 82 percent in 2010.

Information on the extensive margins of exports – the number of destination countries and the number of goods exported – in the four types of firms in both years are reported in Table 2. Both export starters and export stoppers are on average less engaged in exports at both extensive margins than firms that continue to export. Firms with increased exports exported more goods to more countries in 2009 than firms that decreased their exports, and firms with increased exports increased both extensive margins from 2009 to 2010, while firms with decreased exports exported a smaller number of goods to a smaller number of countries. This is a new fact that has not been reported before, and it reveals that a change at the intensive margin (the

amount of exports) goes hand in hand with a change in the same direction at both extensive margins (number of goods exported, number of destination countries).

In the last step of the empirical investigation we look at firms with increased exports and decreased exports separately and classify firms of each type in nine groups according to both the change in the number of destination countries (increased / constant / decreased) and the change in the number of goods exported (increased / constant/ decreased).

Table 3 reports results for firms with increased exports. The most important group according to both the number of firms and the share in exports in both years is made of firms with an increase in both extensive margins. These firms increased both the number of goods exported and the number of countries exported to considerably, and their share in total exports expanded by some ten percentage points. All other groups are far less important.

Results for firms with decreased exports are reported in Table 4. Here, the most important group according to both the number of firms and the share in exports in both years is made of firms with a decrease in both extensive margins. These firms decreased both the number of goods exported and the number of countries exported to considerably, and their share in total exports decreased by more than twelve percentage points. Again, all other groups are far less important.

4. Discussion

The empirical investigation finds that firms that exported in both 2009 and 2010 are much more important for the export dynamics than export starters and export stoppers. Firms that increased their exports (and that were the drivers of the export

boom) exported on average more goods and to more destination countries in 2009 than firms that decreased their exports, and they increased both extensive margins of exports on average while firms with decreased exports reduced both the number of goods exported and the number of countries exported to. A more detailed classification of firms with increased (decreased) exports reveals that some of these firms decreased (increased) one or both extensive margins. However, the most important sub-groups are firm with increased exports that export more goods to more countries and firms with decreased exports that export a smaller number of goods to a smaller number of countries.

These empirical regularities can be linked to recent theoretical models of multi-product, multiple-destination exporters. Bernard, Redding and Schott (2011) (henceforth, BRS) present a general equilibrium model of multi-product, multi-destination firms in which firms are heterogeneous with regard to an attribute that they label “ability” and in which products have attributes that are idiosyncratic across products and possibly also across export destinations within the firm. Products are imperfect substitutes in demand and, within each product firms supply horizontally differentiated varieties of the product. “Ability” is modeled as firm productivity and product attributes as “consumer taste” for the firm’s products. There are fixed costs in exporting to each destination and in exporting each product to each market. Firms with a higher ability can generate sufficient profits to cover the product related fixed export cost at a lower value of product attributes; these firms supply a wider range of products to each market. Firms with a sufficiently low value of ability cannot cover the fixed costs of serving the market and will not export to it. This leads to a hierarchy of firms according to their export activities: The lowest-ability firms are unprofitable and choose to exit, firms with an intermediate ability serve the home market only, the

highest-ability firms export. Firms that export sell their products with the worst attributes on the domestic market only, while the products with the best attributes are exported to the largest number of markets.

In the BRS-model the interaction of firm ability and product attributes drive the differences in exports across firms. Both firm ability and product attributes are unobservable (at least, to a researcher investigating the firm-level data). BRS show that the number of exported products and the number of export destinations, i.e. the firms' extensive margins of exports, are both monotonically increasing in unobserved firm ability (modeled as firm productivity) in the model. BRS test the implications of their model using data for some 30,000 firms from the U.S. in 1997. Empirical evidence is in support of the predictions of the model (see Table III in BRS (2011), p. 1309). Wagner (2012b) reports results of a replication study based on data for exporting firms from German manufacturing industries that are fully in line with these results.

These theoretical considerations and the empirical results for the U. S. and for Germany point to a positive link between firm productivity and both extensive margins considered here. The data used in the empirical investigation in section 3 above, unfortunately, do not have any information on the number of employees in the firms and on total turnover. This information is only available for a subset of firms that can successfully be linked to the enterprise register system so that information from other sources can be added. Productivity of all firms that exported in at least one year from 2009 to 2010, therefore, cannot be measured. This means that a direct test of the hypothesis that the firms that exported a larger number of goods and that exported to a larger number of countries in 2009, and that increased exports from 2009 to 2010 by simultaneously increasing both extensive margins of exports, are

more productive than firms that exported a smaller number of goods and to a smaller number of countries in 2009, and that decreased exports from 2009 to 2010 by simultaneously decreasing both extensive margins of exports, is not possible. The evidence at hand, however, justifies that we can expect exactly this to be the case. The more productive firms with higher and increasing extensive margins of exports are the drivers of *The Great Export Recovery* of 2009 / 2010 in Germany.

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Table 1: Decomposition of export dynamics in Germany, 2009 / 2010

	[1] Total exports in 2009 (Million Euro; 2005 prices)	[2] Total exports in 2010 (Million Euro; 2005 prices)	[3] Rate of change of exports (percent)	[4] Increase of exports due to export starters (% of [1])	[5] Increase of exports due to firms with increased exports (% of [1])	[6] Decrease of exports due to firms with decreased exports (% of [1])	[7] Decrease of exports due to export stoppers (% of [1])
All enterprises	775,590.2	890,553.6	14.82	5.36	27.78	-14.55	-3.76
No. of firms	75,493	85,176		19,657	43,918	21,601	9,974
Share in all firms (%)				20.66	46.16	22.70	10.48
Share in total exports in 2009 (%)				-	67.05	29.19	3.76
Share in total exports in 2010 (%)				4.66	82,59	12.75	-

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009/2010, own calculations.

Table 2: Extensive margins in types of exporters in Germany, 2009 / 2010

	Export starters	Firms with increased exports	Firms with decreased exports	Export stoppers
No. of destination countries 2009	0	12.61	9.14	5.29
(sd)	(0)	(16.24)	(11.63)	(9.86)
No. of destination countries 2010	4.13	14.79	8.70	0
(sd)	(7.70)	(17.73)	(11.72)	(0)
No. of goods exported 2009	0	22.22	18.29	9.08
(sd)	(0)	(71.85)	(79.76)	(32.31)
No. of goods exported 2010	8.36	26.53	17.26	0
(sd)	(35.40)	(78.17)	(74.52)	(0.0)

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009/2010, own calculations.

Table 3: Change in extensive margins in firms with increased exports in Germany, 2009 / 2010

	Number of countries		
	increased	constant	decreased
Number of goods			
increased	[1]	[2]	[3]
no. of firms	16,537	4,978	2,822
(share; %)	(37.65)	(11.33)	(6.43)
share in exports 2009 (%)	33.33	2.96	12.48
share in exports 2010 (%)	42.93	3.51	14,56
no. of goods 2009	29.14	14.27	41.92
no. of goods 2010	39.86	19.99	49.83
no. of countries 2009	15.28	11.02	19.11
no. of countries 2010	20.11	11.02	17.03
constant	[4]	[5]	[6]
no. of firms	4,664	4,458	1,504
(share; %)	(10.62)	(10.15)	(3,42)
share in exports 2009 (%)	1.86	0.76	0.83
share in exports 2010 (%)	2.41	1.06	0.94
no. of goods 2009	6.37	2.61	6.87
no. of goods 2010	6.37	2.61	6.87
no. of countries 2009	10.54	3.19	11.22
no. of countries 2010	13.46	3.19	9.43
decreased	[7]	[8]	[9]
no. of firms	4,420	2,220	2,315
(share; %)	(10.06)	(5.05)	(5.27)
share in exports 2009 (%)	7.17	1.69	5.98
share in exports 2010 (%)	8.33	2.17	6.67
no. of goods 2009	32.68	16.30	31.16
no. of goods 2010	28.26	12.94	26.18
no. of countries 2009	18.94	7.30	15.53
no. of countries 2010	22.53	7.30	13.20

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009/2010, own calculations.

Note: Share is the percentage share of firms from the type in all firms with increased exports. No. of goods is the average number of different goods exported by firms from the type, no. of countries is the average number of destination countries of exports by firms from the type.

Table 4: Change in extensive margins in firms with decreased exports in Germany, 2009 / 2010

	Number of countries		
	increased	constant	decreased
Number of goods			
increased	[1]	[2]	[3]
no. of firms	2,974	1,687	1,589
(share; %)	(13.77)	(7.81)	(7.36)
share in exports 2009 (%)	4.16	0.95	2.26
share in exports 2010 (%)	2.96	0.61	1.64
no. of goods 2009	28.50	14.73	19.56
no. of goods 2010	36.63	19.38	25.28
no. of countries 2009	13.12	6.23	15.09
no. of countries 2010	16.14	6.23	12.34
constant	[4]	[5]	[6]
no. of firms	1,338	3,023	1,878
(share; %)	(6.19)	(13.99)	(8.69)
share in exports 2009 (%)	0.61	0.53	0.56
share in exports 2010 (%)	0.43	0.32	0.31
no. of goods 2009	6.28	2.41	4.54
no. of goods 2010	6.28	2.41	4.54
no. of countries 2009	8.99	2.75	8.80
no. of countries 2010	11.10	2.75	6.44
decreased	[7]	[8]	[9]
no. of firms	1,952	2,601	4,559
(share; %)	(9.04)	(12.04)	(21.11)
share in exports 2009 (%)	2.87	0.70	16.55
share in exports 2010 (%)	1.78	0.42	4.29
no. of goods 2009	35.86	16.15	25.92
no. of goods 2010	29.53	11.49	17.41
no. of countries 2009	12.84	4.26	11.19
no. of countries 2010	15.32	4.26	7.38

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009/2010, own calculations.

Note: Share is the percentage share of firms from the type in all firms with decreased exports. No. of goods is the average number of different goods exported by firms from the type, no. of countries is the average number of destination countries of exports by firms from the type.

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