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The Role of Product Level Entry and Exit in Export and Productivity Growth: Evidence from Estonia

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Abstract

Recent empirical studies of international trade have stressed that firm level decisions about the number of export products or markets represent an important margin of adjustment in response to globalization and changes in economic conditions. We investigate how decisions about the export product mix are associated with aggregate export dynamics and productivity of firms. For that purpose we use detailed product data and export market level data of the full population of Estonia's firms. Decomposition analysis of trade flows shows that both the relative importance of firms starting exporting and the role of product level churning (firms adding and dropping products) in total Estonian export growth increases significantly after accession to the EU in 2004. We show that starting to export and adding and dropping export products in the same period is associated with higher firm productivity compared to exporters that keep their export mix unchanged or decrease its breadth. Dropping peripheral products is associated with higher productivity only in the case of firms with a relatively large number of export products.

JEL Classification: F10, F14, D24

Keywords: exporting, multi-product exporters, extensive margin of trade

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1. INTRODUCTION

In trade literature, there has recently been a significant increase in the attention paid to the role of product and firm level heterogeneity in trade and productivity dynamics. Empirical regularities discovered about the importance of product level heterogeneity have guided the development of new multi-product producer based models of trade theory (Bernard et al. 2010, Eckel and Neary 2010, etc). These recent models of international trade have outlined that important adjustments to globalization may function through the within-firm product-level extensive margin of trade (number of exported products). Some of these implications have also been further tested in empirical papers. These primarily concentrate on the general descriptive statistics about product level heterogeneity and trade, the role of trade liberalization and fall in trade costs as drivers of changes in the export product mix of firms (e.g. Iacovone and Javorcik 2010, Berthou and Fontagné 2012, etc.), and the relationship between changes in the product mix of producers and their productivity (e.g. Bernard et al. 2010, 2011a, 2011b).

Our paper investigates, based on firm- and export product level data from the full population of exporters from Estonia, whether introducing new export products and dropping existing export products (export product churning) is a significant driver of aggregate export growth and whether it is a significant explanatory factor of productivity differences among Estonia's exporters. It concentrates on the case of a small open economy in Europe, where a large share of output is exported (according to Statistics Estonia, exports accounted for 61 per cent GDP in 2010). Therefore, export product level entry-exit may also possibly be expected to have strong effects for the aggregate economy. One contribution of the paper is that it accounts for changes in CN (Combined Nomenclature) product codes over time. For that purpose, a Stata code is developed that accounts for changes in CN classification at the 8-digit level for 1995–2009. Our paper investigates the period before and after Estonia's accession to the EU, covering years 1995–2009. In addition, an advantage of this study is that before EU accession, the dataset for 1995–2003 covers all exporters, including small firms. Investigations of this recently available dataset of Estonia's exports at firm and product level makes it possible to identify new stylized facts about exports and firm level adjustments that have been unobservable in analyses at a more aggregate level.

Among Central and Eastern European countries, similar datasets have been used to study other related topics in the case of Slovenia by Damijan et al. (2011), and in the case of Hungary by Görg et al. (2012). This study also complements the more detailed analysis of the causal effects of multi-product and multimarket export entry on productivity in Estonia by Masso and Vahter (2011). This paper provides a variety of descriptive statistics related to the 'breadth' of the export mix.

The standard 'new' new trade theory models (Melitz 2003, Melitz and Ottaviano 2008) that allow for heterogeneity of productivity of firms assume that each firm produces and exports just one variety of product. More recently, the theoretical literature of the 'new' new trade theory has added more detail in outlining the role of firm and product level heterogeneity in explaining the changes in firm level and aggregate level performance (see e.g. Bernard et al. 2010, Eckel and Neary 2010). These papers concentrate increasingly on the relationship between adjustments to the 'breadth' of product mix (i.e. adding and dropping products), international trade and the performance of firms.

For example, in recent models it has been found that trade liberalization or change in competition induces endogenous changes in the number of (export) products produced by the firm. For example, in the heterogeneous producer multi-product (and monopolistic competition) trade model by Bernard et al. (2010) it has been shown that as a result of trade liberalization or increased competition firms may drop their marginal products (those with high unit costs) and concentrate more on core competencies (i.e. products with relatively low unit costs). This results in within-firm productivity improvement due to reallocating resources and specializing in products where the firm has lower unit costs. A similar implication can be drawn from the trade model (with oligopolistic competition) by Eckel and Neary (2010). Therefore, one could expect product level decisions within the firm about dropping and adding export products to have significant consequences for the performance of firms, and therefore, also on economy-wide performance.

The rapid development of the new-new trade theory models with product level heterogeneity has been accompanied by an increase in the empirical analysis of the relationship between micro-heterogeneity and aggregate export changes. In particular, there has been an increase since 2010 of empirical studies of product level heterogeneity and trade (e.g. Iacovone and Javorcik 2010, Berthou and Fontagné 2012, etc.); for example, Iacovone and Javorcik (2010) using data from Mexico, Freund and Pierola (2010) from Peru, Bernard et al. (2010) from the USA, Albornoz et al. (2010) from Argentina, Görg et al. (2012) from Hungary, Damijan et al. (2011) from Slovenia and Defever et al. (2011) from China. Such studies also pose challenges to researchers due to the need for very detailed firm level export data broken down at different export product levels. Only recently has such data become somewhat more available. Another challenge in the case of panel data is created by the need to account for the changes in the classification of export products over time. This is important in order to avoid confusing changes in product classification with product level entry and exit.

A good early and introductory overview about the importance of product level selection processes based on an analysis of firm and product level trade data is provided in Bernard et al. (2007). Bernard et al. (2010) show the importance of within-firm reallocation effects in determining aggregate output growth. They find that net product adding and dropping by surviving firms in the US accounts for roughly one third of the aggregate growth in the US manufacturing industry. Iacovone and Javorcik (2010) show that product level churning (adding and dropping of products) is an important margin of adjustment in response to globalization, based on data from Mexico. They also show that new exporters enter foreign markets with a small number of products and that new export discoveries are relatively rare and are imitated shortly after by other firms. Export discoveries are defined as products not exported before by any firms in the country.

Bernard et al. (2010) demonstrate that US manufacturing firms that faced above-median Canadian tariff reductions after the introduction of NAFTA reduce the number of goods they produce relative to firms experiencing a below-median fall in Canadian tariffs. Based on detailed trade data from Hungary, Görg et al. (2012) outline how the duration of the export of a single variety of product to a foreign destination depends on firm and product level characteristics. They find, in line with theoretical models, that firm- as well as firm-product specific competencies are important in determining export mix.

Berthou and Fontagné (2012) demonstrate, using a dataset from France, that the effects of a fall in trade costs appear to function especially through changes in the number of products exported by the firm. This effect is stronger for more productive firms. To identify the effects of falling trade costs, these authors use the event of the introduction of the euro.

Our empirical approach in this paper employs detailed trade transaction data from Estonia. This includes information about exports for each Estonian firm according to destination and product group at the CN 8-digit level. The studied period covers 1995–2009. There was a significant number of changes in definitions of product groups in the CN classification over this period (see Appendix 1, and the Eurostat' website of CN classification: http://ec.europa.eu/eurostat/ramon/relations/index.cfm?TargetUrl=LST_REL&StrLanguageCode=EN&IntCurrentPage=2). We have endeavoured to account for this, as otherwise one could possibly mistake a part of the effects of changes in product mix for changes in the definitions of product groups in the CN classification. For analysis of the relationship between product churning and firm productivity we also use additional firm level information from the Business Registry of Estonia.

Based on various decomposition methods and regression analysis, we show the significant importance of product level entry and exit by firms for aggregate trade and productivity statistics in Estonia. The effects on trade dynamics are especially evident after accession to the EU, which increased the product churning rate (especially the product destruction rate) compared to the previous period. More intensive product adding and both adding and dropping by the firm on a yearly basis are associated with the higher productivity of the firm in subsequent periods.

2. DATA AND METHODS

This paper employs detailed product-level and market-level foreign trade data about the full population of exporting firms in Estonia, covering the period from 1995 to 2009. Until Estonia's accession to the EU in May 2004, all trade flows were recorded in customs statistics. After accession, in the case of intra-EU trade, only trade transactions by firms with intra-EU trade to a value of more than 100,000 EUR per year were fully collected by the national statistics authority. However, such exporters have accounted for the vast majority of Estonia's exports. Even after 2004, the export statistics in the dataset follows the aggregate export indicators for Estonia rather closely (see Appendix 2).

One advantage of detailed trade data from Estonia is the good coverage of firms, especially for 1995–2003. For example, in the study on Mexico by Iacovone and Javorcik (2010), only establishments of more than 100 employees were automatically included in the sample. In our case (until 2004), all small firms are included in the export dataset.

Estonia's dataset includes information for each firm about exports by product (defined based on the 8-digit CN code) and by destination country. For the econometric analysis, the variables have been aggregated to a yearly format. Examples of products at the 8-digit CN level include milk with a fat content of less than 1 per cent, packed in a container not exceeding two litres (CN code 04011010); frozen peas (*Pisum sativum*, 07102100); aluminium wire, not alloyed, of maximum cross-sectional dimension exceeding 7 mm (7605 1100); specific types of fertilizers (e.g. ammonium nitrate in aqueous solution: 31023010); specific types of fibreboard (e.g. 44111210 and 44111290); threaded sleeves (tube or pipe fittings) of iron or of stainless steel (73072210); self-propelled track laying machinery (8429 1100), etc. In the case of alcoholic drinks, beer and wine as general products are defined at the 4-digit level: 2203 for beer and 2204 for wine. Product code 22030001 at the 8-digit level indicates beer made from malt in bottles holding 10 litres or less.

There have been changes to the CN classification over the period of our study. For example, some 8-digit CN product level codes have been merged into one in the CN classification while others have been split. We have accounted for these changes in the CN codes, as these may affect some of the findings about the role of the product level extensive margin of trade (for details please see Appendix 1). It is important to account for these changes and not to confuse changes in classification with adding or dropping new export products.

As a result of these adjustments, the dataset was reduced by about 5 per cent of firm-product combinations. This was inevitable because in a number of cases it was not possible to determine unambiguously the sequence or continuity of some of the particular export product definitions in the CN classification in subsequent periods. Accounting for these changes did not have a large impact on the estimated indicators, but the effect was nevertheless significant. For example, as a result, the rates for the creation and destruction of export variety dropped approximately by 4 percentage points: from 46 per cent to 42 per cent in the case of the export variety creation rate at the 8-digit CN product code level.

The detailed export dataset has been merged with firm level information about performance indicators and other firm level controls (such as size, age, etc.). This firm level information is available for the entire population of Estonian firms from Estonia's Business Registry database. The matching of the two datasets was executed based on the registry codes for firms and was therefore straightforward. The Business Registry's firm level database includes annual reports with balance sheets and profit and loss statements for all Estonian firms. This data is employed to calculate the productivity of firms, and to calculate some control variables for the regression analysis.

Our empirical analysis relies, firstly, on decomposing the change in the aggregate growth of exports into the contribution of different components, including the product level extensive margin of trade. Secondly, we estimate simple (pooled OLS) regression models to describe the association between product churning and firm level productivity.

Our export decomposition exercise initially applies a decomposition method similar to that used in Bernard et al. (2010) to decompose the US aggregate manufacturing output into broad components. Bernard et al. (2010) divided the output growth into contributions according to firm level entry and exit, the product level extensive margin (growth due to added and dropped products) of surviving firms and the product level intensive margin of surviving firms (sales per product). They concentrated on the analysis of 5-year periods using information from the US Census of Manufacturers for 1972–1997.

Instead of aggregate output we are interested in the decomposition of aggregate real export growth. Therefore, we perform a similar decomposition to Bernard et al. (2010) using firm level export data on all exporters. Thus, we divide the real export growth of Estonia by the contributions of firms entering/exiting from exporting and the contributions of continuing exporters. The contribution of continuing exporters is further divided into the contribution according to added/dropped products (product level extensive margin) and growth/decline of continued export product (the product level intensive margin). Note that entry to and exit from exporting may be partly caused by firm level commencement of business activities and firm level closure of all activities, in addition to firm level export market related decisions (i.e. a firm previously selling only to the domestic market starting to sell its products also abroad).

Let us denote here Y_t as aggregate exports at time t, thus $\Delta Y_{t,t-k}$ denotes the change in exports between time t and *t-k*., where *k* is the number of years (we made calculations with *k =1, 3, 5*). The aggregate change in total exports can then be decomposed as follows:

$$\Delta Y_{t,t-k} = \sum_{j\in N}\Delta Y_{j,t-k} + \sum_{j\in X}\Delta Y_{j,t-k} + \sum_{j\in C}\left[\sum_{j\in G}\Delta Y_{i,j,t-k} + \sum_{j\in S}\Delta Y_{i,j,t-k} + \sum_{j\in A}\Delta Y_{i,j,t-k} + \sum_{j\in D}\Delta Y_{i,j,t-k}\right] = \\ = \sum_{j\in N} Y_{j,t} + \sum_{j\in X} Y_{j,t-k} + \sum_{j\in C}\left[\sum_{j\in G}\Delta Y_{i,j,t-k} + \sum_{j\in S}\Delta Y_{i,j,t-k} + \sum_{j\in A} Y_{i,j,t} + \sum_{j\in D} Y_{i,j,t-k}\right] \tag{1}$$

Here *N* denotes new entrants to exports at time *t* (i.e. those that did not export at time *t-k*, but export at time *t*), *X* - firms that cease to export, *C*- firms that continue exporting (they export both in period *t* and *t-k*). In the case of continuing exporters, *G* denotes products with increasing exports, *S* denotes shrinking export products, *A* new export products and *D* products that are dropped (by continuing exporters).

Therefore, the first term on the right-hand side of Equation (1) shows the contribution of new exporters to aggregate export growth over the period between *t* and *t-k.* The second term shows the change in exports due to exiting exporters. The third terms outlines the contribution by continuing exporters. Among continuing exporters we differentiate between 4 types of products (see the terms in brackets in Equation 1)—the contribution by growing, shrinking, new and discontinued export products.

The decomposition by Navarro (2012) analysing data from Chile alternatively decomposes the export sales of continuing firms (*C*) as follows:

$$\sum_{j\in C}\Delta Y_{j,t-k} = \sum_{j\in U}\Delta Y_{j,t-k} + \sum_{j\in M}\Delta Y_{j,t-k} + \sum_{j\in L}\Delta Y_{j,t-k} + \sum_{j\in E}\Delta Y_{j,t-k}\ . \tag{2}$$

The first term on the right-hand side of Equation (2) denotes change in the exports of continuing firms due to firms that do not change their export product mix (*U*). The second term shows the contribution by continuing exporters that increase their number of products (*M*), the third term is the contribution by firms that decrease their variety of export products (*L*). The last term in Equation (2) shows the contribution by firms that change their product mix—both adding and dropping products, but keeping their volume of export products at the same level as in the previous period *t-k* (this group is denoted by *E*).

In addition to the decomposition analysis we also investigate the role of product entry and exit for the productivity of Estonian firms. To find out whether productivity differs on average between firms that add export products, firms that drop export products, firms that both add and drop export products, or firms that do not change their export mix, we estimate simple pooled OLS regression models based on the following equation:

$$\ln(VA_{it+1}/L_{it+1}) = \beta_0 + \beta_1 ADD_{it} + \beta_2 DROP_{it} + \beta_3 ADD\_AND\_DROP_{it} \\ + \beta_4 X_{it} + \delta_k + \gamma_t + \varepsilon_{it} \tag{3}$$

Here *i* denotes the firm, *k* - the sector and *t* - the year. VA_{it} denotes value added (deflated), L_{it} - number of employees. ADD_{it} is a dummy variable (0, 1) that is equal to 1 in the case of firms that add new export products in the current year (compared to the previous year), but do not drop any product varieties. $DROP_{it}$ is a dummy variable (0, 1) that is equal to 1 in the case of firms that drop export products in the current year (compared to the previous year), but do not add any new export varieties. $ADD\_AND\_DROP_{it}$ is a dummy variable (0, 1) that is equal to 1 if firms both add and drop products in the current year (compared to the previous year). This last variable enables us to find out the conditional productivity premium of firms that both add and drop export products. Equation (3) also includes sector fixed effects at the 3-digit NACE sector level (δ_k), year effects (γ_t), some standard control variables used in productivity regressions (X_{it}) and an idiosyncratic error term (ε_{it}). We also check whether the coefficients for the dummies for dropping or adding products are different for firms with different numbers of export products. We do so in order to control for economies of scope. For example, adding an additional export product could have a different effect on productivity if the firm has previously had a small or large number of export products.

The coefficients for the dummies for adding and dropping products enable us to draw conclusions about the role of product churning in the productivity of firms. For example, based on the trade theory model by Eckel and Neary (2010), we could expect that dropping (peripheral) products (with relatively high unit costs) is associated with higher firm level productivity due to concentrating on core competences in the firm. Also, if experimenting with entry at the product level is important for the success of firms and for discovering competitive advantages abroad, then we could expect the coefficient for the dummy $ADD\_AND\_DROP_{it}$ to be positive in Equation (3), and potentially also larger than the coefficient for the dummy ADD_{it} (firms that only add new products). We could expect that firms that are actively involved in testing foreign markets with different products have higher productivity than firms that do not change their export mix, or only drop their existing export products or only introduce new ones during a given year.

Of course, our analysis provides simple correlations that should not be interpreted as evidence of clear causal effects. The causality in Equation (3) can also run the other way around: firms with higher productivity may be able to overcome the product specific fixed costs of export entry and can therefore add new export products. This two-way causality is confirmed in more detail in the analysis of the productivity growth of new export entrants in Masso and Vahter (2011). There the authors show at first that multi-product export entry requires higher productivity to cover the sunk costs of exporting. At the same time, export entry with multiple products results in stronger effects on firm productivity than export entry with only one product variety.

3. RESULTS

In Estonia, the total number of exporting firms represents a rather high proportion of all active firms in the manufacturing industry (see Table 1)—in 2003 it was 49.1 per cent.[1] If we exclude micro-firms, then this ratio is even higher. This number is high in international comparisons; exporting is a common activity among firms in Estonia. For example, Bernard *et al.* (2007) show that exporters account for only about 4 per cent of all firms in the US manufacturing industry (based on figures from 2000). At the same time, the share of exporters in the manufacturing industry in Sweden (e.g. as outlined by Lööf 2010) is even higher than in Estonia.

[1] Note that after EU enlargement our dataset from Statistics Estonia does not correctly reflect the share of exporters in the total number of firms, as the intra-EU trade statistics have not been fully collected for all small exporters since entry to the EU.

The bulk of aggregate exports in Estonia is concentrated among a small share of firms, as evident from Figure 1. Of the largest exporters, 1 per cent accounted for almost 50 per cent of exports in 2009, five per cent accounted for 70 per cent and 10 per cent account for about 85 per cent of exports. For a long time during the period of our study approximately one third of all Estonian exports were accounted for by one electronics manufacturer, Elcoteq. Compared to the 1990s, the concentration of exports has slightly decreased, but still remains at a high level. The high concentration of exports is of course not a surprise. It is a stylized finding from other countries as well, including larger countries than Estonia. For example, Berthou and Fontagné (2012) show this for France, and Mayer and Ottaviano (2008) for several European countries.

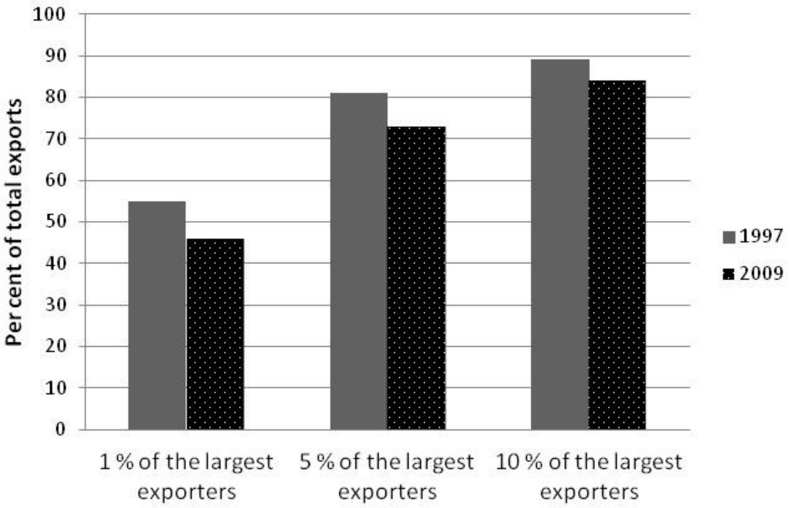

Figure 1. Share of the largest exporters in total exports of Estonia (%)

The average breadth of product varieties that an ‘average’ Estonian exporter sells abroad has been growing. Table 1 outlines that the average number of export products per firm was 6.5 in 1997, 8.8 in 2003 and 9.3 in 2009. This reflects the increased diversification of production by Estonian exporters. The average number of export markets (countries) that each firm exports to has also grown. It was 2.9 in 1997, 3.3 in 2003 and 4.5 in 2009.

Table 1. Number of firms and varieties

	Year	Number of exporting firms	Share of exporters	Number of products, 8-digit CN code	Average number of products per firm, 8-digit CN code	Average number of products per firm, 5-digit CN code	Average number of product markets, 8-digit CN code	Average number of markets
Manu-facturing	1997	1740	57.5	11305	6.5	5.3	9.4	2.9
	1999	1944	47.8	14290	7.4	5.9	10.6	2.9
	2001	2217	48.2	17913	8.1	6.5	12.0	3.1
	2003	2388	49.1	20979	8.8	7.1	13.7	3.3
	2005	1640	29.0	14319	8.7	7.1	15.7	4.0
	2007	1454	24.2	13732	9.4	7.6	17.6	4.3
	2009	1377	22.2	12169	8.8	7.1	17.6	4.6
All firms	1997	5691	28.2	36140	6.4	5.3	8.7	2.3
	1999	5606	19.9	42686	7.6	6.3	10.8	2.5
	2001	6256	18.8	54927	8.8	7.1	13.1	2.5
	2003	6550	17.6	61822	9.4	7.6	14.5	2.6
	2005	4654	9.9	44382	9.5	7.5	14.9	2.9
	2007	4896	8.5	48046	9.8	7.7	15.8	2.9
	2009	5464	7.6	54006	9.9	7.7	15.5	2.8

Similar statistics, broken down on the basis of new and continuing exporters, are shown in Table 2. New exporters are defined here as firms that are exporting for the first year (i.e. did not export in the previous period). New exporters make up, depending on the year, about 6–36 per cent of all exporters. Their share in relation to the total number of exporters varies significantly over time. As in the study by Iacovone and Javorcik (2010) on Mexico, we find that the average number of export product varieties is higher among continuing exporters than among new exporters. This provides support to the idea (e.g. Rauch and Watson 2003, Albornoz et al. 2010) that expansion of exports takes place gradually. Sequential entry is evident in the case of different foreign destinations and also in the case of different products.

Table 2. Average number of firms and varieties on the basis of exporting status

	Number of firms		Number of products, 8-digit CN code		Number of products, 6-digit CN code	
Year	Continuing exporter	New exporter	Continuing exporter	New exporter	Continuing exporter	New exporter
1997	4142	1495	8.4	2.9	7.4	2.7
1999	4439	1465	9.9	3.4	8.7	3.1
2001	5010	1359	10.7	3.3	9.4	3.0
2003	4672	974	10.8	3.5	9.4	3.2
2005	3253	1949	11.8	3.2	10.2	3.0
2007	3534	1789	13.0	2.4	11.2	2.3

Continuing exporters (firms that have been exporting for at least one year) sell their goods to a larger number of export markets. A continuing exporter has on average 3.6 foreign markets, while a new exporter has only 1.6 (based on statistics from 2003). In all the years that were studied, new exporters started with a relatively small number of different products and markets. In terms of share of exports, the multi-product firms that sell several products abroad usually have a dominant product that accounts for the vast majority of their export sales (see Appendix 3 for more details). For example, in the case of firms that sell 10 different export products, a single product (at 6-digit CN level) accounts on average for about 70 per cent of their total export sales. The first 5 export products, ranked according to their share in sales, amount for about 98 per cent of total export sales. Similar regularities obviously also hold for firms that sell less or more than 10 products abroad.

The yearly export product churning rates are notably high in Estonia: at the 8-digit CN product level, on average, the yearly export variety creation rate is 42 per cent and export variety destruction rate 40 per cent for 1995–2009 (see Table 3). We define the export variety creation rate as the ratio of new export varieties introduced at period *t* divided by the total number of varieties exported at *t-1*. We define the export variety destruction rate as the ratio of the number of varieties that are dropped from the export mix at time *t* divided by the total number of varieties exported at period *t-1*. Gross churning is defined, as by Iacovone and Javorcik (2010), as the sum of export variety creation and destruction rates. Net churning is defined as their difference. The high importance of product level entry and exit is an expected result, as Estonia is a small country and firms need to start exporting early due to the limited local market. Also, as Estonia has been a member of the EU since 2004, export entry costs are not high for entry into other nearby EU markets.

Table 3. Export variety churning for different CN product code levels in the manufacturing industry

Level of commodity code	Export variety creation rate	Export variety destruction rate	Gross churning (1)+(2)	Net churning (1)-(2)
CN-4	36%	35%	71%	1%
CN-6	40%	38%	78%	2%
CN-8	42%	40%	82%	3%

Note: Period 1995–2009. Average yearly product churning rates.

Net variety creation is positive in the first part of the sample (1995–2002). Part of this can be attributed to the high level of new firms starting to export. The net variety creation rate decreases and becomes negative, especially in the manufacturing industry, from 2003.[2] The export variety creation rate has a clear decreasing trend over time, as presented in Figure 2 and 3. Note that the year of EU enlargement is denoted with a vertical line. The variety destruction rate is somewhat more stable, except for 2003 and 2004. An important break in the trend can be seen in the temporary significant increase in export variety destruction rates due to entry to the EU in 2004. This is because EU entry also meant ending the free trade agreements between Estonia and countries outside the EU (i.e. Ukraine), and therefore also changes in the variety of products exported abroad.

[2] Iacovone and Javorcik (2010) found based on data from Mexico that the average product creation and destruction rates were respectively 18.8 and 11.4 per cent. They used, however, a different classification from the CN product classification system.

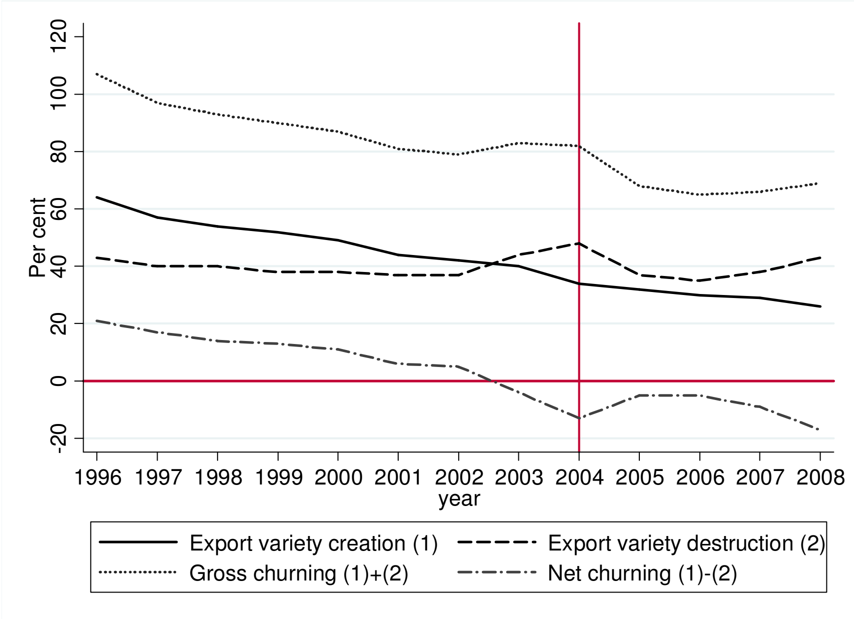

Figure 2. Product churning in the manufacturing industry

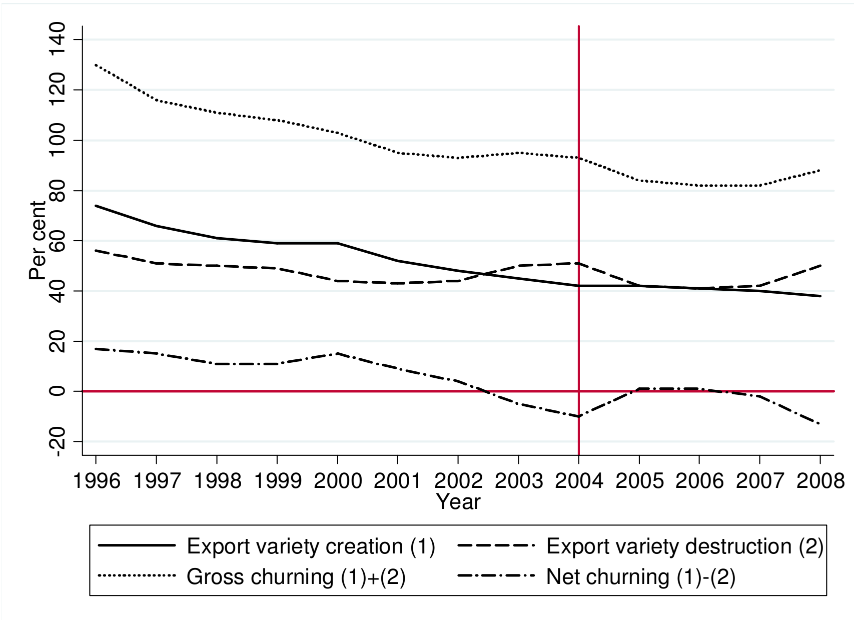

Figure 3. Product churning in the full sample of firms, including the services sector

The average export product churning rates that we demonstrate hide important cross-sector heterogeneity (see Figure 4). The largest export product creation and destruction rates are in the production of electrical and optical appliances (with NACE 2-digit code 30) and the production of transport equipment (NACE code 35). This is not surprising considering the multi-product and rapidly developing nature of these industries in the world. In both sectors the export variety creation and destruction rates are about 60–65 per cent of the previous year's product varieties. A significantly lower level of churning, for example, is found in Estonia's chemical industry (NACE code 24), where one plant often produces a rather limited number of different products.

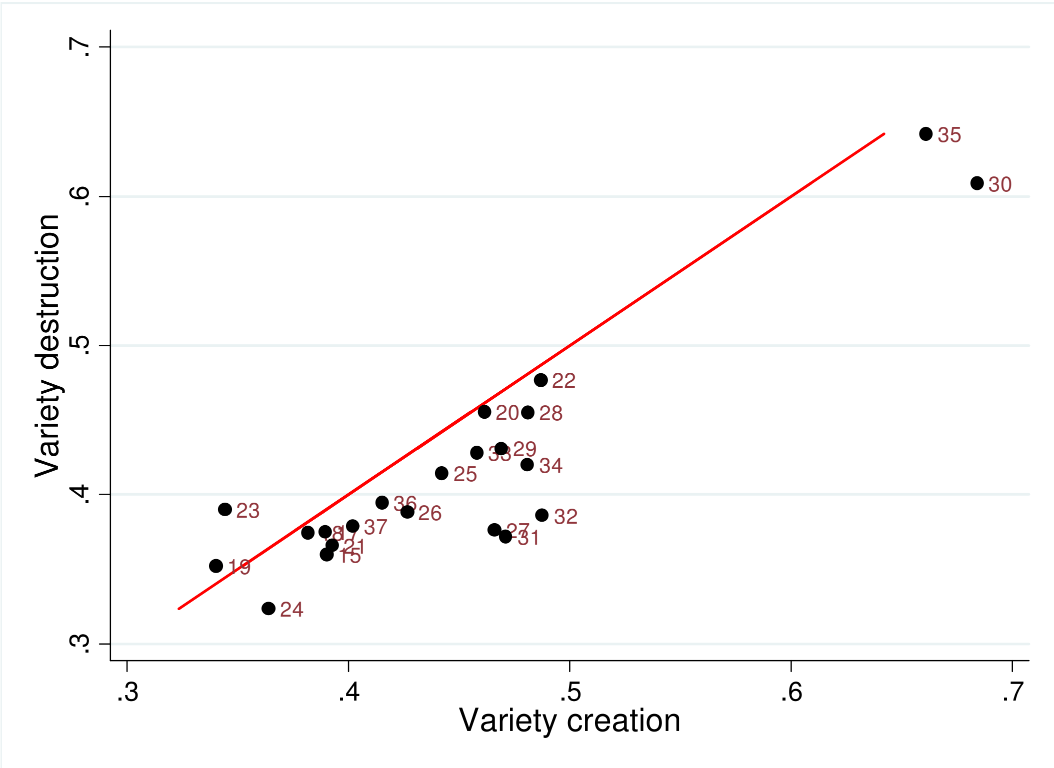

Figure 4. Export variety creation and destruction across manufacturing industries (at 2-digit NACE level), average yearly creation and destruction rates for 1995–2009
Note. The numbers denote the 2-digit NACE Rev 1.1. industry codes. Scale of product churning rates: 0-1.

But a most notable finding about product churning at the sector level is evident in Figure 4 above. It is clear from this graph that export variety creation and destruction are highly correlated across 2-digit industries.[3] The corresponding correlation coefficient is even 0.87. This significant correlation is similar to the result of Bernard et al. (2010) for the US. The strong correlation between these two measures indicates that product level adjustments—adding and dropping products—cannot be explained solely in terms of a reallocation of exports and production from some industry's products to others. They cannot be explained by a specialization to exports of goods from sectors where the country has a comparative advantage. Sectors that actively drop existing products are also very active in introducing new export products. The observations in Figure 4 lie relatively close to the 45-degree line.[4] Of course, this correlation is not perfect: most of the sectors add somewhat more products than they drop each year. For example, some electronics sectors with NACE code 31 and 32 (i.e. radio, TV and communication equipment) have a significantly higher product creation rate than product destruction rate.

As argued in Bernard et al. (2010) and Navarro (2012), different patterns of product level entry and exit could occur because of either product specific, firm specific or firm-product specific explanations. These papers study detailed trade data from USA and Chile. They

[3] The high correlation persists even if we exclude sectors with NACE code 30 (office machinery and computers) and 35 (other transport equipment) that have much higher variety creation and destruction rates than the rest of the manufacturing industries.
[4] The results are similar if we also look at this correlation within the non-manufacturing sectors. Often there the product churning rates were even higher than in the sectors of the manufacturing industry, which is to be expected. Note, however, that these are the churning rates of export products, but not exported services.

outline the importance of the firm-product specific explanations: the idea that firm level shocks may have different consequences for different products and that product level shocks (e.g. changes in demand) have different consequences for different firms. This seems to also be the case in Estonia, as product adding and dropping rates are highly positively correlated and there is a very high share of firms that both add and drop some product varieties during a given year.

Firm specific and product specific shocks seem to be unsuitable explanations for the product churning patterns in Estonia. There is no indication of any dominance of sectors and firms that only add or only drop export products, nor evidence of a negative correlation between product adding and dropping rates at firm or sector level. The prevalence of product level or firm level demand or supply shocks would not be consistent with the positive correlations between product adding and dropping rates (Navarro 2012).

Within each sector, most firms both add and drop new export varieties and also products sold on the domestic market every year (see Table 4). Product 'switching' is widespread and frequent, regardless at which aggregation level of the CN classification it is studied. On average 64 per cent of exporters in Estonia both add and drop export products (CN 8-digit level) in a given year—10 per cent only add new products, 10 per cent only drop old products without adding new ones. In comparison, the corresponding numbers in other studies seem to depend on the country studied and product definitions used. For example, in the study of the US by Bernard et al. (2010) using information on both domestic and exported product varieties, the proportion of firms that added and dropped products was 68 per cent, but in the study of Mexico by Iacovone and Javorcik (2010) it was just 6–8 per cent of firms.

Table 4. Product switching, share of firms

Commodity code	Sector	Firms that add products only, CN 8-digit level	Firms that drop products only, CN 8-digit level	Firms that both add and drop products, CN 8-digit level
Initial	Manufacturing	10.2%	12.2%	63.9%
	Services	9.9%	10.1%	72.9%
	All	9.6%	10.5%	70.9%
Transformed	Manufacturing	10.7%	12.3%	57.4%
	Services	10.2%	10.2%	65.2%
	All	9.7%	10.4%	63.6%

Notes. Initial: product switching if changes in the CN product classification are not accounted for. Transformed: product churning rates that account for changes in the CN product classification for 1995–2009.

Accounting for the changes in the CN classification of goods affects both the churning rates and product switching indicators only to a limited extent (see Table 4) and does not change the qualitative conclusions in this paper. In this paper, all the results, unless otherwise stated, are based on the dataset where the changes in CN codes have been accounted for.

Decomposition of export growth

Before we go into a detailed analysis of the role of export product level entry and exit as a driver of trade dynamics, we present the results of a more general decomposition analysis. Table 5 outlines the relative share of new exporters, continuing exporters' new products and continuing exporters' old (i.e. previously exported) products in total exports for each year for 1997–2009. We confirm that the largest share of exports is due to the products already previously exported by continuing exporters. Depending on the year, these contribute between

76 and 91 per cent of total exports. The share of new exporters fluctuates between 2 and 14 per cent. The share of new products from continuing exporters ranges between 6 and 15 per cent. It is clearly evident that there is a temporary increase in the role of new exporters and new products from continuing exporters in the trade statistics in 2004 when Estonia entered the EU.

Table 5. Decomposition of export volume each year, 1997–2009

Year	New exporters	Continuing exporters, new products	Continuing exporters, old products
1997	0.09	0.15	0.76
1998	0.03	0.15	0.81
1999	0.04	0.14	0.82
2000	0.03	0.09	0.88
2001	0.02	0.07	0.90
2002	0.02	0.17	0.81
2003	0.02	0.07	0.91
2004	0.14	0.11	0.76
2005	0.05	0.06	0.89
2006	0.07	0.14	0.79
2007	0.05	0.16	0.79
2008	0.06	0.06	0.88
2009	0.06	0.09	0.85

*Note: the sum of each row is 1. Small differences are due to rounding.

Next, we move on to the more detailed decomposition analysis, as outlined previously in Equation (1). Again, we see that most of the aggregate export growth is accounted for by continuing exporters and their product level intensive margin: sales of previously exported varieties. These regularities hold both in the manufacturing industry and the full sample of firms that also includes services sector firms. These regularities hold for small (less than 50 employees), medium-sized (50-250 employees) and large firms (not reported in the table in order to save space). They also hold for export growth calculated over a 1, 3 or 5-year period.

Interesting differences between these periods are revealed if we compare the pre-EU period with years after accession to the EU (on 1 May 2004). The net entry of enterprises contributed only 6.3 per cent of the total export growth for 2000–2003. However, after EU accession, net entry (entry and exit of firms) accounted for a very large share for the period 2004–2008: about 40 per cent of the export growth during that period. Over the same period, the relative role of the product level extensive margin in export growth also grew considerably. The product level entry and exit of continuing exporters accounted for 2 percentage points of the full 16 per cent growth in exports for 2000–2003 (i.e. its share in export growth was 12.5 per cent). However, the relative share of product level entry and exit accounted for 20 per cent of total export growth for 2004–2008.

Table 6. Decomposition of change in exports

Subsample	Aggregate growth	Entry and exit into exporting: Net	Entry	Exit	Total conti–nuing exporters	Intensive margin: Net	Growing products	Shrin–king products	Extensive margin: Net	Product entry	Product exit
1	2	3	4	5	6	7	8	9	10	11	12
Manufacturing, over 1 year	0.12	0.01	0.02	-0.01	0.11	0.09	0.29	-0.20	0.02	0.07	-0.05
Manufacturing, over 3 year	0.46	0.06	0.15	-0.09	0.39	0.28	0.51	-0.23	0.11	0.23	-0.12
Manufacturing, over 5 year	0.91	0.18	0.35	-0.17	0.73	0.48	0.70	-0.22	0.25	0.40	-0.15
All, 1996–2000	0.21	0.04	0.08	-0.05	0.17	0.12	0.36	-0.24	0.05	0.18	-0.13
All, 2000–2003	0.16	0.01	0.05	-0.03	0.14	0.13	0.33	-0.21	0.02	0.11	-0.10
All, 2004–2008	0.10	0.04	0.07	-0.04	0.07	0.05	0.28	-0.23	0.02	0.07	-0.05
All, over 1 year	0.15	0.03	0.07	-0.04	0.12	0.09	0.32	-0.22	0.03	0.11	-0.09
All, over 3 years	0.51	0.16	0.31	-0.15	0.36	0.27	0.48	-0.22	0.09	0.27	-0.17
All, over 5 years	0.96	0.36	0.62	-0.27	0.60	0.39	0.58	-0.19	0.21	0.41	-0.19

Note. The table reports the decomposition in the change in aggregate exports. The first column presents the percentage change in aggregate exports. The next 3 columns report the contribution to export growth from firm export entry and exit. Columns 7, 8 and 9 show the contribution to exports growth from the intensive margin of continuing exporters (growing or declining sales per product) and columns 10–12 from the extensive margin (entry into exporting with new products and dropping of products).

An alternative decomposition analysis, based on Equation (2) is provided in Table 7. This shows that the export growth of continuing exporters that also exported in the previous year is almost completely due to firms that have changes in their export product mix. To be more precise, this contribution is from firms that increase their number of export products. Notably, firms with a static export product mix (at CN 8-digit level) contribute almost nothing to aggregate export growth. This result is robust for different periods and firm size groups. These results are consistent with previously reported statistics that the majority of firms both add and drop export varieties each year.

Table 7. Decomposition of change in exports among continuing exporters according to changes in product mix

Subsample	Aggregate growth	Total continuing exporters	No change in product mix	Change in product mix	Number of products: More products	Less products	Equal number
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Manufacturing, over 1 year	0.12	0.11	0.00	0.11	0.10	-0.01	0.01
Manufacturing, over 3 years	0.46	0.39	0.01	0.38	0.32	0.03	0.03
Manufacturing, over 5 years	0.91	0.73	0.01	0.73	0.56	0.11	0.05
All, 1996–2000	0.21	0.17	0.00	0.16	0.19	-0.04	0.01
All, 2000–2003	0.16	0.14	0.00	0.14	0.16	-0.04	0.02
All, 2004–2008	0.10	0.07	0.01	0.05	0.06	-0.01	0.00
All, over 1 year	0.15	0.12	0.01	0.11	0.13	-0.03	0.01
All, over 3 years	0.51	0.36	0.01	0.34	0.31	-0.01	0.04
All, over 5 years	0.96	0.60	0.01	0.59	0.48	0.06	0.05

Note. The table reports the decomposition in the change of aggregate exports. The 2nd column presents the percentage change in the aggregate exports. The 3rd column presents the total growth of exports for continuing exporters. Column 4 presents the contribution to export growth from firms that did not change their product mix. Column 5 presents the contribution to export growth from firms that changed their product mix. Columns 6 to 8 present the contribution to export growth from firms that increased, decreased or did not change their number of products. Columns 6 to 8 add up to the values at column 5, small differences are due to rounding.

In addition to the decomposition analysis, we provide statistics on the role that adding and dropping export products plays in the productivity of firms. The statistics in the upper part of Table 8 show the levels of the log of labour productivity after a change in the firm's export product mix for i) exporters that only add new export products (compared to the rest of the firms), ii) exporters that only drop export products (compared to the rest of the firms), and iii) exporters that both add and drop export products (compared to the rest of the firms). The indicators are measured for different periods after a change in the firm's export mix at year *t*.

An important finding is that the highest level of (log) labour productivity is reached by firms that both add and drop export products. As we showed before, this is also the largest category of exporters. However, the average differences between the main categories of firms in Table 8 are small. Obviously, these unconditional means hide a lot of heterogeneity across firms. The statistics in Table 8 do not account for other factors, such as firm size, number of exported products, sector specific effects and so on.

Table 8. Export variety churning and productivity of firms

Productivity variable	Group value (0/1)	CN 8-digit product code Product adding only (0/1)	 Product dropping only (0/1)	 Product adding and dropping (0/1)
Log Productivity at time t+1	0	12.04	12.05	11.98
	1	12.05	12.00	12.09
Log Productivity at time t+2	0	12.07	12.07	11.99
	1	12.07	12.07	12.11
Log Productivity at time t+3	0	12.09	12.09	12.01
	1	12.08	12.07	12.14
Log Productivity at time t+4	0	12.10	12.11	12.02
	1	12.12	12.09	12.16
Growth over 1 year	0	4.01	4.49	3.74
	1	6.81	2.45	4.59
Growth over 2 years	0	6.36	6.51	6.45
	1	8.48	7.11	6.64
Growth over 3 years	0	6.58	6.88	6.79
	1	9.09	6.39	6.85
Growth over 4 years	0	6.58	6.91	6.79
	1	9.40	6.42	6.91

Note: Log value added per employee. Productivity growth indicators are measured from the year of adding/dropping of products. Group value (0/1) indicates, depending on the column, firms that only add products (1) and others (0), firms that only drop products (1) and others (0), firms that both add and drop products (1) and others (0). *t* -denotes year of change in export product mix. Period: 1995–2009. The sample also includes firms that do not change their export product mix.

Note that the higher level of productivity in firms that both add and drop export products (i.e. are more active in testing the markets) may be due to the causal effect of export product churning, but it may also be simply an indicator of selection effects—that only the relatively productive firms are able to cover the sunk costs of product churning. Also, there might possibly be other (unobserved) factors that affect both the level of productivity and the decisions about the product level entry/exit or the breadth of the export product mix. One such factor could be the production and exporting experience of the managers of the firm. Such variables may introduce a positive correlation between product level entry/exit and decisions and the firm's productivity even if there is no causal relationship between these two.

If we turn our attention to the growth of labour productivity, the highest growth rates are found on average for the category of exporters that add new products but do not drop any old ones. The next in terms of productivity growth are exporters who both add and drop export products in a year. The firms that achieve the lowest average productivity growth rates are those that drop their export products, but do not add new products. This could be due to badly performing firms losing markets to better performing firms.

Table 9. OLS productivity regressions: the correlation between adding and dropping products and firm level productivity

	(1)	(2)	(3)	(4)
Product adding	0.126 (0.150)***	0.180 (0.029)***	0.184 (0.039)***	0.110 (0.024)***
Product dropping	-0.105 (0.026)***	-0.150 (0.032)***	-0.120 (0.035)***	-0.132 (0.024)***
Adding and dropping	0.120 (0.027)***	0.123 (0.020)***	0.157 (0.025)***	0.096 (0.017)***
No. of products (-1)	0.016 (0.001)***	0.008 (0.001)***	0.018 (0.005)***	
Product adding × Number of products (-1)			-0.004 (0.007)	
Product dropping × Number of products (-1)		0.010 (0.004)***	-0.001 (0.006)	
Adding and dropping× Number of products (-1)			-0.011 (0.005)**	
Size	-0.111 (0.031)***	-0.107 (0.031)***	-0.108 (0.031)***	-0.108 (0.026)***
Size squared	0.014 (0.005)***	0.016 (0.005)***	0.016 (0.005)***	0.022 (0.004)***
Age	-0.313 (0.089)***	0.396 (0.089)***	0.397 (0.089)***	0.193 (0.048)***
Age squared	-0.136 (0.024)***	-0.137 (0.024)***	-0.137 (0.024)***	-0.079 (0.014)***
Sector dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Number of obs.	10,457	10,457	10,457	12,557
R-squared	0.283	0.283	0.284	0.267

Note. All regressions have been estimated using 3-digit NACE industry dummies and year dummies. The dependent variable is the log of the value added per employee at year $t+1$. Standard errors in parentheses. Sample of all exporters in the manufacturing industry for 1995–2009.

The estimated OLS productivity Equation (3) is given in Table 9. It shows the conditional correlation between indicators for adding and dropping products and the firm's productivity in the following year. The estimation accounts for several firm level variables and sector and time specific fixed effects. The results are given here for product churning at the 8-digit CN product code level. The results are qualitatively the same and similar in their magnitude if one uses the broader 6-digit CN product level instead.

We also include the number of products that the firm had in the previous year as a control variable. Therefore, the differences in the number of previous export products (export scope) are taken into account in these regression models. Note, however, that dropping and adding products may be correlated with productivity differently in the case of a large or small number of existing export products. It is important to stress again that these results are simple descriptive statistics, showing the correlation between productivity at firm level and the decision to add and/or drop products, conditional on other observed confounding key factors of firm level productivity.

Our results suggest clearly that adjustments to the export product mix are correlated with differences in productivity levels. Other controls that we have accounted for include sector specific fixed effects, time effects, firm age, firm size and the number of products exported by the firm in the preceding year. As evident from column (1) in Table 9 (in the case of firms with a similar number of products in the preceding year) adding new export products at the 8-digit CN code level is associated with approximately 13 per cent higher productivity than when the export product mix is unchanged. At the 6-digit CN code level, the same ‘premium’ is about 11 per cent. We also find that firms that drop old export products but do not introduce new ones have significantly lower productivity levels than the rest of the firms. They have about 11 per cent lower productivity than firms that do not change their export mix.

The productivity ‘premium’ for firms that experiment with different export products, by adding some products and withdrawing other previously exported products from their foreign markets, is about 10–15 per cent (depending on the different set of controls in Table 9) compared to firms that do not change their export product mix. However, compared to firms that only add new products, their productivity level is lower. A general conclusion is that there is some evidence of a positive relationship between export product level churning and firm productivity.

The specification of the regression model with an interaction term between the number of export products and the product dropping category dummy is provided in Column 2 of Table 9. In this way, it is possible to differentiate between the ‘effects’ of product dropping for firms that have a large number of export products and firms that have a small number of products. The effect may be different between these two groups. The coefficient of the product dropping category dummy in column 2 is -0.15. The coefficient of the interaction term is 0.01. Hence, we find a clear negative relationship between product dropping and productivity for firms that have up to 15 export products. But for firms with a large variety of export products (more than 15), we find that product dropping is associated with higher productivity in the following year. Therefore, there is some evidence to support the idea that benefits are possible from dropping export products and concentrating on a smaller number of (core) products, as expected based on the trade theory model by Eckel and Neary (2010). However, for firms with a small or moderate number of different export products (the vast majority of firms), giving up an export product is associated with lower productivity, it is either the result or the cause of low productivity.

Earlier related research based on US data in Bernard et al. (2010) suggests that product churning (adding some products and dropping others) in US firms plays a positive role in the reallocation of economic activity within firms towards more productive uses. In addition, De Nardis and Pappalardo (2009) show, based on detailed export data from Italy, that the high frequency of product switching behaviour within exporting firms was significantly positively correlated with firm-level productivity growth, and that this contributed to a reallocation of economic activity within firms to more productive uses. Based on their estimated OLS regressions, De Nardis and Pappalardo (2009) found that simultaneous product adding and dropping increased productivity one period later, while the effects of only adding products were insignificant. Notably, product dropping (only dropping) on average had a positive significant relationship with productivity and also increased output.

6. CONCLUSIONS

Recent empirical papers stress the role of multi-product firms in determining trade flows, and that firm level decisions about the number of export products or markets represent an important margin of adjustment to globalization and changes in economic conditions. This study investigates the role that firm level decisions about the export product mix play in aggregate export dynamics and productivity growth. To that end we use the decomposition and regression analysis of product and export market level data for the total population of Estonian firms. One contribution this paper makes is also accounting for changes in the CN classification product codes for 1995–2009.

We find that both the relative importance of firms entering the export market and the role of product level entry significantly increases in the total export volume for Estonia after EU accession in 2004. Before this event, the relative role of export product churning as a component of trade growth was significantly lower. We also show that export product adding and both adding and dropping by the firm is associated with higher firm productivity, compared to firms that keep their export mix unchanged or decrease their export mix. Last but not least, export product dropping (that may indicate concentrating on core competence products) is associated with higher subsequent productivity only in the case of firms that have a relatively large number of exported products. For these firms we therefore find evidence in accordance with some recent trade models (i.e. the model by Eckel and Neary 2010), where heterogeneous firms improve their productivity through concentrating on core competence products, which in these models result from a fall in trade costs and tougher competition from abroad.

Our results imply that firm and product level export dynamics are important factors of productivity and exports growth. For policy-makers, it implies that both changes in export variety on the part of incumbent exporters and the entry of new exporters deserve attention, with possible adjustments to correct for market failures, for example, if the entry of new exporters and the expansion of export product scope suffer from financial constraints. In terms of managerial implications the result illustrates that adjustments in firm-level export product portfolio and the optimal size of the product portfolio are vital for productivity, and that experimenting with adding and dropping export products may possibly enhance a firm’s productivity.

Note that the econometric results here represent simple correlations between product churning and firm performance in the following period. In order to identify the causal effect of export market experimentation (both adding and dropping export products) on productivity, a natural experiment based approach would be useful. Also, it has to be acknowledged that the effects of product market experimentation are very likely to depend on the type and size of the particular foreign market that is entered or exited. The effects of experimenting with entry to different export markets and the knowledge and experience acquired through this process could also be expected to depend on the absorptive capacity of firms (Cohen and Levinthal 1990). These issues require further investigation using a more detailed approach than that applied here.

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Appendix 1. Transformations of the 8-digit CN product codes

The following 4 different kinds of transformations of the CN product codes (with examples) are identified in the CN classification for 1995–2009:

One-to-one relationship

OLD CODE	NEW CODE
04031022 →	04031011

Action: replace old code with new code.

Merger

OLD CODE	NEW CODE
04031022 →	04031011
04031004	
04031024	

Action: replace old code with new code

Split

OLD CODE	NEW CODE
04031022 →	04031011
	04031013
	04031019

Action: replace new code with old code.

Non-unique transformations

OLD CODE	NEW CODE
04031022 →	04031011
04031004	04031013
04031024	04031019

Action: set the code missing everywhere because it is not possible to determine what the sequence or continuity of some of the particular export product definitions *i* was in the next periods in the CN classification.

Appendix 1 (*continued*)

The table below describes the frequency of the various transformations, both in the file of transformations of the CN code, and in the Estonian data file. As we can see, transformations in the CN code influence roughly about 10 per cent of the product codes, 5 per cent of the product varieties and 5–10 per cent (depending on the period) of the export volumes.

Corrections

For the practical implementation of corrections, a Stata do-file was written. A new product code was derived by going through these two steps.

1st step: correct for split and one-to-one changes. Start with the last year (e.g. 2009), then merge product code with transactions in year 2009 and make the corrections, then repeat it for 2008, etc. until the first year in the dataset (i.e. 1995). This is done separately for different years, because the same code could be changed in different years. For example, there could be a one-to-one change in the code in 2008, but a split in 2005.

2nd step: correct for merger and one-to-one changes. Start with the first year (e.g. transformations in 1995) and move forward until the last year in the dataset (i.e. 2009). Analogously to the previous step, the year-by-year correction accounts for the possibility that the same code could be changed in different years. Thus, in most cases the new code is the one valid in 2009 (while in the case of splits that could also occur in one of the earlier years). Alternatively, one may want to choose also a different end year (for example if studying only data before the EU enlargement in 2004).

The lower level (i.e. 6-digit) codes are derived from the new 8-digit CN code. If the 6-digit code involves 8-digit products, for some of which the new code is missing (as there were some transformations for which the continuity of a particular product could not be identified), the new 6-digit code is also set as missing.

The Stata do-file is available upon request. If you use it, then please cite this paper.

Table A1. Share of different kinds of transformations of the CN commodity code in the data

Period	Transformation	Number of observations in the transformations files	Number of observations in the exports files	Share of observations in the transformations files	Share of observations in the exports files	Share of exports in the exports files
2003-2009	1-to-1	412	4482	0.9%	0.3%	0.6%
2003-2009	Merge	1766	16264	3.9%	1.2%	1.7%
2003-2009	Non-unique	2007	37778	4.5%	2.8%	6.1%
2003-2009	No transaction	40499	1259063	90.0%	94.9%	90.8%
2003-2009	Split	294	9731	0.7%	0.7%	0.8%
1999-2003	1-to-1	318	3436	1.0%	0.5%	1.3%
1999-2003	Merge	772	4659	2.4%	0.7%	0.5%
1999-2003	Non-unique	1189	14618	3.7%	2.1%	2.7%
1999-2003	No transaction	29986	669893	92.1%	96.2%	95.1%
1999-2003	Split	298	3460	0.9%	0.5%	0.4%
1995-2000	1-to-1	439	1275	1.2%	0.2%	0.1%
1995-2000	Merge	1112	4613	3.1%	0.8%	0.9%

1995-2000	Non-unique	897	9066	2.5%	1.7%	1.4%
1995-2000	No transaction	32640	521872	90.9%	95.4%	96.4%
1995-2000	Split	834	10166	2.3%	1.9%	1.3%
1995-2009	1-to-1	1161	9178	1.2%	0.4%	0.9%
1995-2009	Merge	2992	21085	3.2%	1.0%	1.2%
1995-2009	Non-unique	3885	58937	4.1%	2.7%	5.0%
1995-2009	No transaction	84785	2063764	90.0%	94.9%	92.0%
1995-2009	Split	1384	22445	1.5%	1.0%	0.8%

Appendix 2. Export data

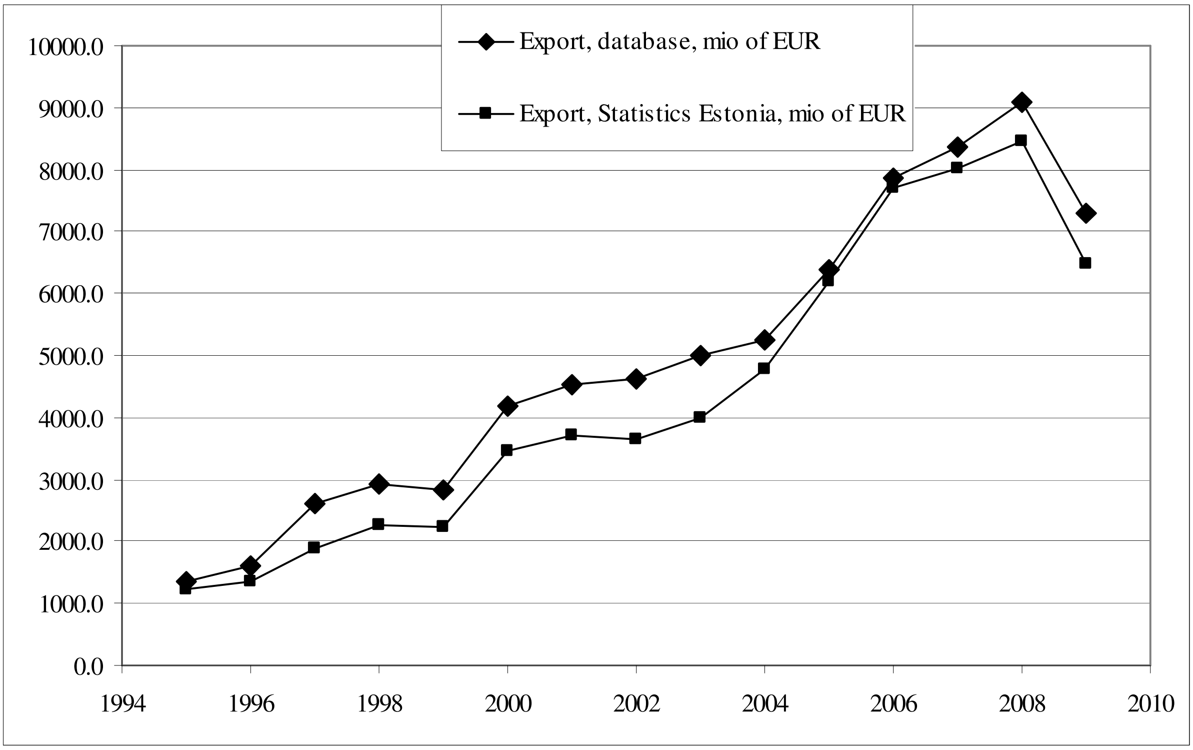

Figure B1. Total exports in the data and the aggregate data of Statistics Estonia

Appendix 3. Export sales by products

Table C1. Mean distribution of sales by the number of products

Rank in exports	Number of products exported, 4-digit CN code									
	1	2	3	4	5	6	7	8	9	10
1st	1.00	0.89	0.87	0.82	0.83	0.83	0.78	0.75	0.84	0.74
2		0.11	0.12	0.14	0.13	0.12	0.14	0.16	0.09	0.17
3			0.02	0.04	0.03	0.04	0.05	0.05	0.04	0.05
4				0.01	0.01	0.01	0.02	0.02	0.02	0.02
5					0.00	0.00	0.01	0.01	0.01	0.01
6						0.00	0.00	0.00	0.00	0.01
7							0.00	0.00	0.00	0.00
8								0.00	0.00	0.00
9									0.00	0.00
10										0.00
	Number of products exported, 5-digit CN code									
	1	2	3	4	5	6	7	8	9	10
1st	1.00	0.90	0.82	0.78	0.77	0.80	0.74	0.73	0.71	0.75
2		0.10	0.14	0.16	0.16	0.13	0.16	0.16	0.17	0.14
3			0.03	0.05	0.05	0.05	0.06	0.07	0.06	0.06
4				0.01	0.01	0.02	0.03	0.03	0.03	0.02
5					0.00	0.01	0.01	0.01	0.02	0.01
6						0.00	0.00	0.01	0.01	0.01
7							0.00	0.00	0.00	0.00
8								0.00	0.00	0.00
9									0.00	0.00
10										0.00
	Number of products exported, 6-digit CN code									
	1	2	3	4	5	6	7	8	9	10
1st	1.00	0.89	0.81	0.78	0.76	0.79	0.69	0.73	0.68	0.69
2		0.11	0.15	0.16	0.18	0.14	0.18	0.15	0.18	0.17
3			0.03	0.05	0.05	0.05	0.07	0.07	0.07	0.07
4				0.01	0.01	0.02	0.03	0.03	0.03	0.03
5					0.00	0.01	0.01	0.01	0.02	0.02
6						0.00	0.01	0.01	0.01	0.01
7							0.00	0.00	0.00	0.00
8								0.00	0.00	0.00
9									0.00	0.00
10										0.00

Note. Each cell shows the average share of a product in the firm's total exports in descending order. The numbers are averages over firms and time. Only firms exporting up to 10 products are shown in the table.

Kokkuvõte

Eksporttoodete sortimendi muudatuste seos ekspordi ja tootlikkuse kasvuga Eestis

Rahvusvahelise kaubanduse teemalised empiirilised uurimused on hakanud rõhutama, et ettevõtte tasemel tehtavad otsused eksporttoodete ja eksportturgude osas on oluliseks kanaliks, mille kaudu toimub majanduse kohanemine globaliseerumisega ja üldse muutustega erinevates majandustingimustes. Käesoleva töö eesmärgiks on uurida, kuidas ettevõtete otsused eksporttoodete portfelli osas on seotud agregeeritud taseme ekspordi dünaamika ja ettevõtete tootlikkusega. Selleks kasutatakse analüüsis kõigi eksportivate Eesti ettevõtete toote- ja sihturu taseme andmeid, s.t. iga ettevõtte kohta on teada ekspordi maht detailselt defineeritud tootegrupi koodi ja sihtturgude (riikide) kaupa. Ekspordi kasvu dekomponeerimisanalüüs näitas, et nii eksportturule sisenevate ettevõtete kui ka juba eksportivate ettevõtete poolt uute toodete lisamise ja olemasolevate toodete sortimendist kustutamise suhteline tähtsus agregeeritud ekspordi kasvus suurenes Eestis oluliselt peale Euroopa Liiduga ühinemist 2004. aastal. Leidsime ka, et samaaegselt nii uute eksportoodete lisamine kui ka olemasolevatest loobumine konkreetse ettevõtte tasemel oli seotud ettevõtte kõrgema tootlikkusega, seda võrreldes eksportööridega, kelle ekspordiportfell ei muutunud või kes vähendasid eksporttoodete arvu. Ettevõtte jaoks vähemtähtsatest eksporttoodetest loobumine omas positiivset seost kõrgema tootlikkusega ainult suhteliselt suure eksportoodete arvuga ettevõtete puhul.