Globalization Drives Strategic Product Switching[1]

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Abstract

Using firm-level panel data for Estonia, we analyse the impact of international competition on firm dynamics, considering both firm closedown and product switches. We contribute to the literature in two important ways: first, this is the first paper to study the determinants of exit and product switching in an emerging market; and second, we consider explicitly the role of export opportunities. Our results indicate that globalization does not affect firm exit significantly but it is an important factor explaining why firms choose a different core product. Previous studies on industrial countries have shown that product switching has been a defensive strategy against low-cost imports. In contrast, our results suggest that Estonian firms change their core products as an offensive strategy to take advantage of the export opportunities created by a globalized economy.

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1. INTRODUCTION

Globalization has led to increasingly integrated markets across the world, changing the competitive environment in which firms operate. In the face of international competition in domestic and foreign markets, the least productive firms may be forced into bankruptcy while the most productive ones will take advantage of new business opportunities in foreign markets. The recent literature (see, for example, Bernard *et al.*, 2008) highlights another channel through which incumbent firms may adjust, i.e. through changing their product mix by adding or dropping products and/or changing their core product line. A core product in this context is defined as the firm's most profitable product accounting for the majority of sales. While the theoretical literature on multi-product firms suggests that trade liberalization induces firms to shed marginally profitable products and to focus on their core products (*e.g.* Eckel and Neary, 2010), recent empirical work has shown that firms also switch their core product quite frequently in response to increased pressures from international trade (Bernard *et al.*, 2006; and Greenaway *et al.*, 2008). However, these papers focus on only one aspect of trade (import competition), ignoring firm dynamics induced by profitable opportunities in export markets. This second aspect is potentially very important for emerging markets, particularly in the aftermath of trade liberalization.

The purpose of this paper is to analyse the impact of international trade on firm dynamics, focusing on how production patterns are adjusted in response to import competition and changing conditions in export markets. Our focus is Estonian manufacturing firms from 1997 to 2005. Estonia is a particularly interesting case because of the firm restructuring and trade liberalization that took place in the aftermath of the transition process and in the run-up to European Union (EU) membership. Buoyed partly by the Association Agreement with the EU, Estonian exports of goods increased by 240 per cent over the sample period.[2] This extraordinary performance was accompanied by an increase in product variety (Kandogan, 2006), an improved comparative advantage in the world's most demanded products (Zhagini, 2003), and a shift towards exports of higher quality and technological intensity (Fabrizio *et al.*, 2007). This seems to suggest that Estonian firms may not have merely responded defensively to increased competition from importers, but also reacted offensively by taking advantage of the opportunities created by increasing globalization.

To identify these effects, we use a longitudinal data set of Estonian manufacturing firms and consider three potential firm strategies: continue its business, change its core product line (henceforth product switching), or close down.[3] To model these strategic alternatives, we

[2] The Association Agreement with the EU was signed in 1995 and entered into force in 1998. The agreement replaced previous treaties with the EU (an Agreement on Trade and Commercial Cooperation, signed in 1992, which was converted into a Free Trade Agreement in 1994). For a more detailed description, see Weber and Taube (1999). Partly as a result, there has been a reorientation of trade away from Russia.

[3] We only have information on a firm's main product line (which is defined by the Registrar's Office based on the activity from which the firm gets the largest share of its sales) but not on its entire product mix or whether a

(continued…)

estimate a multinomial logit model in which the firm decision is a function of firm-level and product market characteristics. Following the previous literature, we include the value of imports, type of trade (intra- or inter-industry), and revealed comparative advantage as measures of trade. To identify the effect of export opportunities, we also include in our estimation the value of exports, the degree of competition in export markets, and the quality of exports relative to direct competitors.

Overall, firm exit is mainly determined by firm characteristics, whereas product switching also depends on conditions in export markets. In particular, firms are more likely to change their core product if they are in sectors without revealed comparative advantage, with fewer exports, or with lower product quality relative to export competitors. One interpretation of this result is that Estonian firms are more willing to incur the sunk costs of changing their core production when the long-term prospects of the current export market for their products are weak, particularly early on in the run-up to the EU when trade flows were increasing rapidly. These results add a new dimension to previous findings on industrial countries which focus on product switching as a defensive strategy against low-cost imports. In contrast to the related literature (Bernard *et al.*, 2006; and Greenaway *et al.*, 2008), import competition plays no significant role in the product switching behaviour of Estonian firms. Interestingly, we find that the conditions on export markets matter predominantly for switches within the same industry or what we call *product* switches.[4] Switches across industries, on the other hand, are determined by firm-level characteristics. These results suggest that restructuring production was a major strategy of Estonian firms faced with increasing trade openness. Finally, we find a positive link between a firm's capital intensity and quality upgrading. However, moving up the quality ladder is not necessarily related to technology upgrading: it occurs mainly within the medium-high-tech sector.

The literature on the relationship between globalization and firm dynamics has expanded rapidly in recent years (see, for example, Bernard *et al.*, 2003; Helpman *et al.*, 2004; and Melitz and Ottaviano, 2008). This literature builds on Melitz's (2003) dynamic industry model with heterogeneous firms, where sunk costs of market entry result in self-selection into export markets. Empirical work, triggered by the work of Bernard and Jensen (1995), has further nourished the understanding of firm-level adjustment to trade liberalization and

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firm is single- or multi-product. This could lead to spurious correlation in the data, resulting from marginal switches (for example, a firm producing two products with market shares of 51 and 49 per cent respectively, changes their relative importance to 49 and 51 per cent). However, as noted by Bernard *et al.* (2006), such marginal changes should bias our results against finding a significant impact of globalization on changes in a firm's core product.

[4] Henceforth, product switches are defined as changes in industry at the four-digit NACE level (General Industrial Classification of Economic Activities within the European Community). Although four-digit codes – broken down in 640 classes – are not true products in the strictest sense of the word, this is the most detailed classification we have in our data. This notation has also been used in Bernard *et al.* (2006) and Greenaway *et al.* (2008).

falling trade costs.[5] More recently, the theoretical literature has shifted its attention to the impact of trade liberalization on firms' product mix (for example, Bernard *et al.*, 2008; and Eckel and Neary, 2010). An important assumption in this literature is that firms possess a "core competence" in the production of a particular variety, while they are less efficient in the production of all other products. This core product is further assumed to account for the majority of the firm's production and sales. In this context, globalization will induce firms to shed its least profitable products (further away from the core) and increase the scale of products closer to the core. Recent empirical work finds support for these theoretical predictions for multi-product firms (see, for example, Aw and Lee, 2009 for Taiwan).

Our paper is more closely related in spirit to the work of Bernard *et al.* (2006) and Greenaway *et al.* (2008). These papers reveal a new dimension of adjustment to increased international competition by illustrating that firms are more likely to change their core competence than to shut down. Controlling for a number of firm and industry characteristics, they find that firms are more likely to switch away from industries where exposure to low-wage countries is high. Bernard *et al.* (2006) note that about 8 per cent of all U.S. manufacturing firms switch their main two-digit industry over a typical five-year census period. They also find that U.S. firms shift towards industries facing less competitive pressure, but with greater capital and skill intensity than the industry of origin. Greenaway *et al.* (2008) broaden the analysis, and consider mergers and acquisitions as a third exit strategy. They report that closure is the least likely exit strategy in Sweden, as most firms merge with or acquire another firm in response to higher levels of international competition.

A primary contribution of our paper relative to these studies is that we consider explicitly the role of export opportunities and point to their importance in explaining firm dynamics. Also, ours is the first paper to examine the impact of globalization on firm dynamics in an emerging market context.[6] Since countries at different stages of development exhibit large differences in terms of firm size distribution, efficiency, and cost structure it is important to explore whether enterprises in emerging markets respond differently to globalization than enterprises in more advanced countries. Finally, our analysis highlights that firms switch their main product line quite frequently, a fact that should be integrated in the theoretical literature investigating the impact of trade liberalization on firms' product scope and scale.

The remainder of this paper is organized as follows. Section 2 describes the industry dynamics in Estonia. Section 3 outlines the estimation strategy used to analyse the impact of international trade on firm dynamics in Estonia. Section 4 presents the results. Section 5 discusses the robustness checks. Section 6 concludes.

[5] For an overview of the empirical literature, see Tybout (2003) and Bernard *et al.* (2007a).
[6] Goldberg *et al.* (2010) analyse the response of Indian firms to trade liberalization but they focus on product churning rather than looking into the firm dynamics per se.

2. FIRM DYNAMICS IN ESTONIA

The data used in this paper are provided by the Estonian Business Registry and cover the years 1997-2005. The data set is an unbalanced panel containing detailed information on balance sheets and income statements of all registered firms in Estonia. The unit of observation is the firm, which can be tracked over time using a unique registration code.[7] As all business entities in Estonia are required to file their annual accounts with the registry, the data set comprises firms from all size classes. Unfortunately there is no information on whether or not a firm is exporting.

For each firm we observe its *primary* sector of activity at the four-digit NACE level. Unfortunately we do not have information on the total number of products per firm and are thus unable to distinguish between single- and multi-product firms. Hence, in the empirical analysis, our primary interest is in the impact of globalization on firms' core product choices. In particular, following the recent theoretical and empirical literature on multi-product firms (see, for example, Eckel and Neary, 2010), we define a change in the company's most important product as a switch away from its *core competence*. We distinguish between *industry* switches at the two-digit ($Switch_{2d,it+1}$) and *product* switches at the four-digit ($Switch_{4d,it+1}$) NACE level. Firm exit ($Exit_{it+1}$) is identified using the firm's official liquidation date, available from the registry.

Given the limited availability of services trade data, we restrict the empirical analysis to the manufacturing sector.[8] Firms switching from manufacturing to other sectors of the economy (services, agriculture) are retained until their last year of activity within the manufacturing sector. The sample used in the empirical analysis consists of 4,844 firms and 16,117 observations with the number of manufacturing entities in the registry more than doubling over the sample period.

(Table 1: Exits and industry switches, 1997-2004)

Table 1 reports the distribution of the sample over time. Out of 4,844 firms, 452 firms exited between 1997 and 2004, and 1,566 firms switched products. Of the latter group, 1,090 firms changed to a different industry and 476 firms switched products within the same industry. Industry and product switches were frequent at the end of the 1990s, but the rates declined steadily towards the end of the sample period. On average, the industry switching rate is 7.7 per cent, compared with a switching rate of 11.9 per cent at the product level. The product switching rate is slightly higher than the figures reported by Bernard *et al.* (2006) and

[7] For a detailed description of the data, see Appendix. Detailed statistics on product switching in Estonia are provided in the IMF Working Paper version of this paper (Moreno Badia *et al.*, 2008).

[8] The OECD database is the only one, to our knowledge, with information on services trade by partners. However, the coverage is incomplete and at relatively aggregated level and, thus, it cannot be used to estimate our model.

Greenaway *et al.* (2008), who find a product switching rate of 7-8 per cent for the United States and Sweden respectively.

A preliminary analysis of product switching patterns reveals broad differences in firm dynamics across sectors. About 35 per cent of all product switches occur within the same two-digit sector; 23 per cent to other two-digit manufacturing sectors; 4 per cent to the primary sector; and 38 per cent to services. The majority of firms in our sample are active in low-tech manufacturing (65 per cent) and most of the product switches take place among firms in this group (see Table 4 in Moreno Badia *et al.*, 2008).[9] However, product switches from medium-high-tech and medium-low-tech industries account for 13.9 per cent and 23.6 per cent of switches respectively which is more than the proportion of observations in these groups (10 per cent and 20 per cent respectively). Meanwhile, about three-fourths of all bankruptcies take place in low-tech manufacturing sectors. Within the manufacturing sector, firms switch mostly to products with similar technology content. This is especially the case for the medium-low-tech to low-tech firms, where half of all firms switch to other sectors in the same technology class. Finally, a significant proportion of manufacturing firms are moving into the less-knowledge-intensive services sector, independently of their original technology intensity.

3. DETERMINANTS OF FIRM DYNAMICS

To model a firm's choice among continuing core activities in the same product line, reorganizing production or closing down, we rely on traditional models of firms dynamics (for example, Jovanovic, 1982). In these models, the firm pays a fixed sunk cost of entry after which it discovers its true profitability. If profitability is below the zero-profitability cut-off (including the sunk entry costs), the firm will immediately exit the market. Otherwise, it will continue to produce and decide at the end of each period whether to continue or exit by comparing its expected future profits to the scrap value of the firm. As long as expected profits are higher than this scrap value, the firm will stay in the market. In addition, if the total expected profits of switching products (taking into account associated costs of switching) exceed those of staying in the same market, the firm will change its core product. To model these strategic alternatives, we estimate a multinomial logit model, as follows (Greene, 2008, p. 844):

$$\Pr\left(\boldsymbol{Y}_{it+1} = \boldsymbol{j} \middle| \overline{\boldsymbol{X}}_{t}\right) = \exp\left(\beta_{j}^{'} \boldsymbol{X}_{it}\right) / \left(1 + \sum_{k=1}^{2} \exp\left(\beta_{k}^{'} \boldsymbol{X}_{it}\right)\right) \qquad (1)$$

where *j* equals 0 for continuing firms, 1 for firms that switch core products/industries, and 2 for exiting firms. The vector of covariates ($\boldsymbol{X_{it}}$) contains a number of one-year lagged firm- and product-level variables, in addition to a constant, year dummies, and two-digit industry

[9] We classify the manufacturing sectors according to technology intensity and services according to knowledge intensity using the Eurostat classification (Eurostat, 2010).

dummies:

Firm level: $\{\ln(Size)_{it}, \ln(Age)_{it}, \ln(Capital)_{it}, \ln(Wage)_{it}, \ln(TFP)_{it}, Foreign_{it}\}$

Domestic market: $\{Sunk_{jt}, Herf_{jt}\}$

International market: $\{\ln(Imports)_{jt}, IIT_{jt}, CA_{jt}, \ln(Exports)_{jt}, Herfex_{jt}, \ln(UVR)_{jt}\}$.

Subscript *i* refers to firms, *j* to products, and *t* to time. All product-level variables are defined at the four-digit NACE level. Following the previous literature, all variables are entered in levels (see, for example, Bernard *et al.*, 2006; and Greenaway *et al.*, 2008). For the definitions of these variables, we refer to the Appendix.

The firm-level determinants of firm and plant closure have been an active area of empirical and theoretical research, with important contributions from Jovanovic (1982), Dunne *et al.* (1988, 1989), and Hopenhayn (1992). Similarly, the impact of trade liberalization on firm and plant closure is relatively well documented, both in terms of theoretical predictions (Krugman, 1979; and Melitz, 2003) and empirical investigations (Colantone and Sleuwaegen, 2010). The literature on product switching, furthermore, is only just starting to emerge and primarily focuses on *multi*-product firms. Since single- and multi-product firms tend to be quite different in terms of size, productivity and other firm-level characteristics (Bernard *et al.*, 2010), and our data does not allow us to distinguish between single- and multi-product firms, the predictions emerging from this literature cannot be directly used for the present analysis.

To model our expectations for product switching we will rely on the more general firm dynamics literature instead, taking into account that product switching is different from firm closure in a number of important respects. In particular, unlike firm closure, product switching does not imply that the firm's production capacity is lost when the firm reorganizes its production. Moreover, while firm closure is a defensive response to trade liberalization (the firm is no longer competitive as a result of increasing globalization), product switching can be seen as a defensive strategy (in response to increasing import competition) or as an offensive strategy, whereby firms proactively search for new opportunities in other product markets in response to globalization.

3.1. Firm Characteristics

A common feature of the theoretical models on heterogeneous firms is the negative relationship between failure rates and a firm's age and size (Jovanovic, 1982; Hopenhayn, 1992; and Ericson and Pakes, 1995). This selection effect is driven by the interaction of economies of scale and an idiosyncratic learning process, and is confirmed by a large empirical literature (see, for example, Caves 1998). To capture this scale effect, we include a firm-size variable—measured by employment in year *t* ($Size_{it}$). Additionally, Dunne *et al.* (2005) demonstrate that a firm's past experience positively affects its survival rate. We control for this experience effect by including the age of the firm (Age_{it}). A priori, we expect

exit to be negatively related to size and age. However, the effect of these variables on product switching is ambiguous: small and young firms have greater flexibility to switch but larger and older firms have more experience and resources to switch. In fact, Greenaway *et al.* (2008) do not find significant effects of age and size on industry switching, whereas Bernard *et al.* (2006) find a positive coefficient for size and a negative coefficient for age (both significant).

A further implication of the theoretical models on firm dynamics is the link between the productivity of a firm and its survival. If firm productivity is so low that profits are below the zero profitability cut-off, the firm will immediately exit the market. Hence, we expect a negative relationship between firm-level productivity and exit, a finding which is confirmed by the empirical literature (see, for example, Fariñas and Ruano, 2005).

Switching products could be a form of exit, where unproductive companies that cannot face competition turn to a market with a lower degree of competition. Yet, as hypothesized above, entering a new industry or product market might require the firm to incur additional adjustment costs, related to the reorganization of production. If these sunk costs are substantial, only the more productive firms will be able to switch products. Firm-level productivity can therefore be either negatively or positively related to product switching, depending on the importance of entry barriers. Productivity is defined as total factor productivity (TFP_{it}).

The expected effect of labour costs ($Wage_{it}$) on firm dynamics is ambiguous. To the extent that higher labour costs reflect higher skill intensities and associated sunk costs at the firm level (related to investments in firm-specific human capital), higher wages can, ceteris paribus, act as a barrier to exit from a particular product market. Audretsch and Mahmood (1995) find a negative relationship between wages and the propensity to exit in a study on the performance of 12,000 U.S. manufacturing plants. However, it is not clear whether this relationship will continue to hold when productivity at the firm level is taken into account. If firms pay higher wages for a given level of productivity, this could signal lower competitiveness and, hence, increase their exit probability (Konings, 2005).

Firms with higher capital intensity ($Capital_{it}$) are expected to face higher sunk costs, which will act as an exit barrier both at the product and firm level. Firms with larger capital stock can also expect larger future returns for a given level of current productivity and, hence, will continue operating at lower productivity levels (Olley and Pakes, 1996). Therefore, we expect capital intensity to be negatively related to firm exit. In the case of product switching, the overall effect is ambiguous. Even though capital intensity can be interpreted as a form of sunk costs, an opposite force may be at work. Instead of being passive or defensive when faced with increasing competitive pressures, a firm can actively look for the new opportunities offered by globalization. The production of these new goods requires additional investment to enter into the new product market, which can be more easily incurred by capital-intensive firms that liquidate or transfer their assets into the new sector.

Several empirical studies have found that foreign multinational enterprises are more footloose than domestic firms, that is, they are more likely to exit the market than domestic firms of comparable size, productivity, and wages (Görg and Strobl, 2003; Bernard and Sjöholm, 2003; and Van Beveren, 2007). However, foreign multinationals typically lack in-depth knowledge of the host market and need to overcome substantial disadvantages when entering foreign markets, causing them to incur higher sunk costs and hence reducing their exit probabilities. Moreover, since they usually have more diversified sources of income, they can withstand larger shocks before being forced to exit the market. Hence, the effect of foreign ownership ($Foreign_{it}$) on exit is ambiguous. Nevertheless, since multinationals are usually more flexible than purely domestic firms, they can respond more quickly to adverse shocks in the host country and reinvent themselves through product switches. Hence, we expect to find a positive relationship between foreign ownership and product switching.

3.2. Product Market Characteristics: Domestic Market

Besides firm structure, the characteristics of the product market in which a firm operates also affect its evolution. While international competition may exert a strong influence on firm dynamics, conditions in the domestic market can also play an important role. This is especially true in a transition country where the domestic market may still be undergoing substantial changes as state monopolies are broken up and a new private sector emerges. Hence, in our empirical model on exit strategies, we incorporate the product market characteristics of both the home and foreign markets in which Estonian firms are active.

Hopenhayn (1992) illustrates how an increase in sunk entry costs lowers the entry rate and, hence, also the probability of exit since incumbent firms face less competition through new entry. Intuitively, the argument is as follows. High initial investment costs to enter a product market will act as a natural deterrent to entry, since only the most promising firms will be able to start production. A lower entry rate implies less competition for incumbent producers and will induce fewer firms to exit. In addition, the high initial investment costs will act as an exit barrier, forcing inefficient firms to stay in the market to recover at least some of the initial sunk costs. We expect to find a negative relationship between sunk costs at the product level ($Sunk_{jt}$) and both types of exit in our empirical analysis, since higher sunk costs are associated with both higher entry and exit barriers at the product level.

A central prediction of the stochastic dynamic model in Asplund and Nocke (2006) is that the level of firm turnover is positively related to the size of the domestic market. The smaller average mark-up in larger markets, resulting from tougher competition, implies that the marginal surviving firm has to be more efficient in larger than in smaller markets. To capture this competition effect, we include the Herfindahl—Hirschman index for the domestic market ($Herf_{jt}$). The impact of industry concentration on firm turnover is ambiguous. On the one hand, higher concentration is associated with wider price-cost margins, which will increase the survival chances of firms. However, behaviour by aggressive rivals in a concentrated market can actually raise exit probabilities. In fact, Görg and Strobl (2003) find

a positive relationship between industry concentration and exit using data on the Irish manufacturing sector between 1973 and 1996. Hence, the impact of concentration on firm exit (whether through firm closure or product switching) can be negative or positive, depending on the behaviour of the firm's rivals in the domestic market.

3.3. Product Market Characteristics: International Competition

Increased international trade implies higher competitive pressure in the domestic market. This pressure may force firms to improve their efficiency or to exit from the market. However, greater economic openness also creates new business opportunities in foreign markets. With improved access to the international markets, firms can raise their sales and expand their production capacity to benefit from economies of scale or explore new product markets with better prospects. To analyse the impact of increasing globalization, we include a number of variables capturing various aspects of international trade.

Theoretically, the impact of trade on exit is driven by both import competition, through smaller mark-ups (Melitz and Ottaviano, 2008), and export intensity (Melitz, 2003). On the latter, Melitz argues that the most successful firms self-select into the export market and continue to grow by capturing new market opportunities abroad. This raises the average efficiency level and increases the pressure on factor prices in the home market, thereby crowding out the least efficient firms. The empirical literature has mainly focused on the first aspect (import competition), which is associated with higher exit and switching rates (Bernard *et al.*, 2006; Coucke and Sleuwaegen, 2006; and Greenaway *et al.*, 2008). A recent study by Colantone and Sleuwaegen (2010) draws attention to the significance of the second aspect of international competition: export intensity. To capture both aspects of increasing international competition, we include imports ($Imports_{jt}$) and exports ($Exports_{jt}$), both defined at the four-digit product level, in our empirical model. We expect imports to have a positive effect on exit and product switching, while the impact of exports on either decision is ambiguous. In particular, higher export opportunities decrease the likelihood of leaving the sector for the most productive firms that are able to take advantage of the auspicious export market, but it may increase the likelihood of exit and switching for the least productive firms.

Controlling for imports and exports, higher intra-industry trade signals an increased number of products supplied in a market (Krugman, 1980; Helpman and Krugman, 1985). The existence of different varieties may allow less successful firms to survive competition through product differentiation (for example, by supplying cheaper and lower quality versions of the same good). As such, a higher degree of intra-industry trade—as measured by the Grubel—Lloyd index (IIT_{jt})—is expected to mitigate the effect of increasing import competition on firm exit and product switching, and to reduce both types of firm dynamics.

In product markets in which Estonia has a revealed comparative advantage (CA_{jt}), successful firms can profit from good export opportunities and will therefore be less likely to exit the sector. Yet, Bernard *et al.* (2007b) show that the creative destruction of firms is higher in comparative-advantaged sectors as productivity growth in those sectors is higher. The impact

on exit and product switching is thus ambiguous.

Finally, we want to check how firms' strategies are related to changes in the quality embedded in Estonian exports. A substantial amount of theoretical work predicts that quality systematically affects the direction of international trade, a finding that is confirmed by some recent empirical papers (see, for example, Hallak, 2006).[10] As a measure of product quality, we use a composite index of the unit value of Estonia's exports in a given geographic market relative to the unit value of all exporters in that market *(UVR_{jt})*. On the premise that a higher relative price reflects higher quality than direct competitors', UVR_{jt} acts as a proxy for product quality. However, concerns remain that this measure could be picking up factors other than quality. This is especially the case if local monopolies exist and competition does not arbitrage away differences in quality-adjusted prices. To control for this effect of mark-ups on the unit value of exports, we include the Herfindahl—Hirschman index of the export market ($Herfex_{jt}$).

Table 2 gives a first indication of the differences in characteristics across the exit strategies by summarizing a number of firm- and product-level characteristics for three groups separately: (1) all firms in the sample; (2) firms undergoing either an industry switch (two-digit) or product switch (four-digit); and (3) exiting firms.

(Table 2: Summary statistics)

Compared with continuing firms, enterprises that exit or switch industries are significantly smaller and younger. Firms that switch industries are on average more capital intensive than continuing firms, while both exiting firms and product switching firms have a significantly lower labour costs and productivity. Turning to product characteristics, we find that industry switchers tend to be active in industries with a higher level of sunk costs, while the opposite is true for exiting firms. Switchers also tend to come from sectors with significantly higher market power, as indicated by the Herfindahl—Hirschman index for the domestic market. Sectors characterized by higher imports, less intra-industry trade and lower exports display a higher rate of industry and product switching than other sectors. Prior to switching, these firms tend to be in sectors with relatively lower revealed comparative advantage. Enterprises that permanently exit the market, however, are active in sectors with lower imports and higher exports. They also tend to be more present in industries with revealed comparative advantage than do continuing firms.

4. RESULTS

4.1. Baseline Results

In this section we report the results from a multinomial logit regression in which we analyse

[10] For a theoretical background of trade and quality, see, among others, Falvey and Kierzkowski, (1987), Flam and Helpman (1987), and Murphy and Shleifer (1997). Empirical papers on this topic include Schott (2004), Hummels and Klenow (2005), and Hallak and Schott (2008).

the determinants of three alternative strategies at the firm level: (1) stay active in the same product market (the baseline category); (2) change its core product; or (3) exit entirely from the market. Table 3 reports the coefficients and standard errors as well as the marginal effects of the variables on the probability of product switching and exit. These marginal effects are calculated at the mean of the independent variables to provide some guidance on the magnitude of the effects (reported in italics in the tables). We pool observations across years for all firms in the sample, and we include year and two-digit industry fixed effects to control for aggregate variation in industry dynamics. Standard errors are clustered at the firm level.

(Table 3: Baseline specification)

The results on the firm characteristics confirm our priors on firm dynamics as discussed in Section 3. Controlling for size at the firm level, exiting firms are on average younger, less productive and have lower capital intensity. These results suggest that the performance of these firms is not good enough to keep up with the dynamics in the market. The probability of product switching is significantly decreasing with plant size and age, while significantly increasing with firm productivity and capital intensity. Moreover, only the more productive and capital-intensive firms switch to different product markets. This is a first indication that switches are not necessarily driven by a lack of competitiveness but are rather the outcome of firms' own choices.

Controlling for the firm-level characteristics discussed above, foreign ownership of the firm has no significant impact on either product switching behaviour or exit. A possible explanation for this can be found in the motives of foreign firms to invest in central and eastern European countries. Although cost advantages play a role, Bevan and Estrin (2004) and Carstensen and Toubal (2004) illustrate the importance of high market potential as an incentive for foreign firms to enter these markets. This suggests that these investments are partly strategic and forward looking and that foreign firms will not necessarily exit the market more rapidly than domestic firms when faced with short-run adverse shocks.

With respect to the conditions in the domestic market, the sunk costs variable is never significant, whereas the coefficient on the Herfindahl—Hirschman index only has a positive and significant sign for product switching. As noted by Caves (1998), concentration and sunk costs of a particular industry are simultaneously determined since the forces of exit and entry will influence the equilibrium number of firms in an industry. Hence, including both variables together as independent variables may be the reason for the insignificant coefficients on sunk costs. As a robustness check, we ran the empirical model including either only the Herfindahl—Hirschman index or only the sunk costs measure in our basic specification, but the results are equivalent to those shown in Table 3. The positive coefficient on the Herfindahl—Hirschman index for product switching tells us that firms are more likely to switch away from the more concentrated industries.

Contrary to our initial expectations, we do not find that international competition is driving firm exit in Estonia: none of the international product market characteristics is significant for

firm exit in Table 3. These results suggest that firm closure in Estonia is mainly determined by firm-level as opposed to product-market characteristics. On the other hand, international product market characteristics do act as significant drivers of firms' core product switches. First, controlling for firm and domestic market characteristics, Estonian firms are less likely to leave industries in which export opportunities abound, or put differently, firms tend to switch away from sectors characterized by weak export performance.[11] Second, as hypothesized in Section 3, higher intra-industry trade (IIT) seems to mitigate competition in the domestic market and reduces the likelihood of switches away from IIT-intensive product markets (ceteris paribus). Third, turning to the unit value variable, we find that the lower the quality of the products, the more likely firms will change their core products. Fourth, the comparative advantage coefficient indicates that firms have a 2.1 percentage point lower probability to switch away from products in which Estonia has a revealed comparative advantage, that is, products for which exports are larger than imports. Finally, and in contrast to earlier studies, our results suggest that import competition plays no significant role in determining firms' core product switches.

Existing empirical work, in particular Bernard *et al.* (2006), focuses on the impact of imports coming from low-wage countries. The authors provide evidence, using data on the U.S. manufacturing sector, that a higher degree of import penetration from low-wage countries is associated with a higher probability of exiting and switching products. However, in the case of Estonia, the origin of imports does not seem to play a role in the strategic decisions taken by firms.[12]

Overall, we notice that the determinants of product switching are very different from the determinants of firm closure. On the one hand, the insignificant coefficients for all domestic and international product market characteristics for firm exit suggest that bankruptcy in Estonia is entirely driven by the firm's own behaviour rather than by a reaction to external factors. On the other hand, the results for our trade variables suggest that Estonian firms are exploiting opportunities in global markets by reorganizing their production in search for better opportunities. These findings imply that product switching might be more than just an alternative way of escaping increasing competition. Both firm and industry characteristics point towards an active policy of looking for new and better opportunities. Rather than switching products out of defence, firms seem to be changing their core products out of choice. In the following section, we will investigate this hypothesis in more detail.

4.2.Self-Selection into New Markets

Our results suggest that firms systematically self-select into new product markets on the basis

[11] Melitz (2003) shows that developments in the export markets of firms have repercussions on the domestic market. Although we cannot control for the export status of the firm in our data set, our findings are consistent with this argument.

[12] Results are not reported here for brevity, but can be obtained from the authors upon request.

of their performance in and knowledge about the market. This focus is relatively new as the existing empirical literature has restricted its attention to the import side of international competition. In contrast to previous studies' findings that firms in industrial countries change their product lines out of defence against low-cost competition, our results suggest that Estonian firms follow an offensive strategy by actively exploring new markets. In this subsection we want to dig deeper into this new facet of product switching. We start by exploring potential differences between product switching and industry switching. Afterward, we look more closely at the characteristics of the product markets or industries to which firms switch.

4.2.1. Industry versus product switching

In order to compare the determinants of industry and product switches, we split the group of product switches into: first, product switches that are not observed at the two-digit level, that is, firms that change their main four-digit product line but stay within the same two-digit industry; and second, industry switchers, that is, those firms that switch to a new product line in a different two-digit industry. Using this distinction, we estimate the same multinomial logit model as before, except that the dependent variable now takes on four different values (rather than three): 0 for firms that stay in the same product market, 1 for firms that switch products but not industries, 2 for firms that change two-digit industries, and 3 for exit.

(Table 4: Product switching versus industry switching)

Table 4 shows a striking difference between the determinants of industry switching and those of product switching. International trade does not seem to play a significant role in the dynamics behind industry switching. Firms change to a different two-digit industry in response to changes in their own performance and the domestic market, but not on account of international trade aspects. We also find that, while more productive and more capital-intensive firms are more likely to switch industries, the effect of these variables on product switches is insignificant. This implies that the results obtained earlier on these variables are driven by industry switches rather than product switches. The insignificant effect of the trade variables on industry switches, along with the negative link between exports and unit values on the one hand and product switching on the other, further suggests that the switching pattern in Estonia is determined by product differentiation. Enterprises observe changes within their sector and respond by modifying their core products to take part in the growth process.

In our sample, 7 per cent of the 1,244 industry switches are to the primary sector, 35 per cent stay within the manufacturing sector, and 58 per cent of industry switches are to the services sector. Each of these dynamics is likely to be driven by diverging underlying causes. Given the growing importance of the services sector in Estonia's domestic economy, the switches to services are of particular interest to us. We therefore define a new dependent variable that equals zero for two-digit switches within manufacturing and 1 for switches to services, and run a logit regression (Table 5). In this case, we do not compare stayers with switchers, but

instead explore dissimilarities *among* the switchers. Similar to our previous regressions, we include time and two-digit industry fixed effects, and cluster the standard errors at the firm level. This regression reveals that larger firms and foreign firms are more likely to switch within the manufacturing sector. Conversely, the more productive firms tend to leave the manufacturing sector and enter the services sector. A closer look at the destinations reveals that about 54 per cent of those switches are to the "wholesale trade" and "retail trade" sectors.

(Table 5: Industry switching: Manufacturing versus services)

Turning to the trade variables, we see that a higher concentration in exporting markets drives firms into the services sector while import growth is associated with industry switches within manufacturing. Further data analysis reveals that the increase in switching to services is entirely driven by switches to the distribution sector.[13] These results could suggest that firms tend to move from the production side to the distribution sector if the export market is highly concentrated. This does not necessarily mean, however, that a firm stops producing what it used to be its core product but that the core product line is now different. We also find that, if higher imports reduce the likelihood of moving into the distribution sector.

Hence, Estonian firms that are switching in response to changes in the international trade environment either move into the distribution of goods (some of which they might have produced in the past or are currently still producing in smaller volumes) or switch towards other manufacturing industries. Which switching strategy they adopt depends on whether the changes in the global environment are manifested through imports or instead driven by the concentration in export markets. These results suggest that Estonian companies are aware of the prospects in the global market and are trying to exploit these opportunities by proactively changing their business plans.

4.2.2. Quality upgrading versus technology upgrading

Our baseline results show that Estonian companies tend to leave low-quality exporting sectors. The question now is to which sectors these firms are moving. Do they switch to products with an even lower relative unit value because they are not able to compete within the price quality range of the export market, or do they switch to sectors with a higher relative unit value because they see opportunities at the higher end of the quality array? Fabrizio *et al.* (2007) document an impressive shift in product quality and technology intensity of exports for Estonia over the past decade. In this section, we explore the direction of switches and accompanying firm characteristics in detail.

Almost half of the product switches within manufacturing results in quality upgrading. In the first column of Table 6, we check the firm-level characteristics behind this shift up the

[13] If we exclude the wholesale and retail sectors from the analysis, no significant results are obtained for the export variables.

quality ladder. To do so, we calculate for each firm that switches within manufacturing the log difference in the export unit value ratio between its origin and destination industry, at the four-digit level. More specifically, a positive value for the log difference stands for a switch to a product with a higher unit value, and thus of higher quality. These log differences in export unit value ratios are then regressed on a number of firm characteristics using ordinary least squares (OLS), while controlling for market power in the export market, as well as for industry and time fixed effects. The results indicate a positive link between a firm's capital intensity and quality upgrading. Among the firms that alter their product line, only the more capital-intensive firms are able to move into higher-quality product markets. Controlling for other characteristics, these firms tend to be smaller than the average Estonian switching firm.

(Table 6: Unit value difference between industry of origin and destination)

To explore whether this quality upgrading is related to technology upgrading, we define two dummies to capture the change in technological intensity. The dummy *Technology upgrading* equals 1 if a firm moves towards a sector with a higher intensity of technology (this is the case for 97 observations), whereas the dummy *Technology downgrading* equals 1 if a firm moves down the technology ladder (123 observations). As can be seen in the second column of Table 6, quality upgrading is not necessarily related to technology upgrading. Yet this finding is not completely unexpected, as the majority of the product changes happen along the same level of technology (877 observations).

To understand at which technological level this quality upgrading is taking place, we return to our original specification, used in column 1 of Table 6, while adding three dummies identifying the technological intensity of the industry of destination for product switches. The results in column 3 of Table 6 should be interpreted relative to the base category—the low-tech industry. The positive and significant coefficient on the medium-high-tech industry dummy shows that Estonian companies are moving up the quality ladder mainly within the medium-high-tech sectors.

4.3.Results by Size Class

Because of data constraints, the empirical literature has focused on the switching behaviour of relatively large firms. The U.S. Longitudinal Research Database used by Bernard *et al.* (2006) includes only firms with a minimum of 10 employees, while Greenaway *et al.* (2008) study Swedish manufacturing firms with at least 50 employees. An important advantage of our data is the absence of any size thresholds. This allows us to draw conclusions for the entire population of manufacturing firms in Estonia and also reveals important insights in the dynamics of the smallest among them, namely, microenterprises employing fewer than 10 employees. This feature is particularly important for a transition country: while a small number of large enterprises dominated the economic landscape of Estonia during the Soviet era, the transition period has been characterized by the emergence of many small and medium-sized enterprises. In fact, about 50 per cent of manufacturing firms in our sample are micro-enterprises and more than three fourths of the firms employ fewer than 50 employees.

These micro-businesses are also more dynamic (Table 1, Panel B). Compared with the sample average (Table 1, Panel A), we notice that micro-businesses modify their product lines more frequently (13.4 per cent in the micro sample versus 11.9 per cent in the full sample) and have a higher exit rate than the average Estonian firm (3.3 per cent versus 2.8 per cent).

(Table 7: Determinants of firm dynamics across size categories)

To analyse differences in determinants across size categories, we run our baseline specification for small and big firms separately. Table 7 shows the results for firms with fewer than 10 employees (product switching in column 1 and exiting in column 2) versus the rest of the sample (columns 3 and 4). The results for the firm-level characteristics are very similar to our baseline results in Table 3, except for labour costs which turns out to be a significant determinant of both product switching and exiting for firms with 10 employees or more. In particular, larger firms with relatively high wages are more likely to go bankrupt but less likely to change their product line. If the labour costs of a firm are too high compared to its competitors for a given level of productivity, the firm will not be able to compete in the market and will face bankruptcy. For firms with a large pool of employees the efficient use of its labour force becomes more crucial than for small firms where labour costs are not a determinant of its strategies. Yet, to the extent that higher wages reflect higher skill intensities, investments in product-specific human capital become a sunk costs acting as a barrier to change to a different product market. These sunk costs are substantially lower for smaller firms since fewer employees will have to be re-trained for the production of new products. This is reflected in the insignificance of the coefficient on labour costs for the smallest firms whereas a marginal change in this variable implies a decrease in the probability of product switching of 2.4 percentage points for larger firms.

Another major difference between small and larger firms is the effect of international openness on their switching behaviour. Product switching among microenterprises does not seem to be driven by the level of exports per se, but is fairly sensitive to changes in the relative unit values of Estonia's export products. The opposite is true for product switching among larger firms, which seems to be affected only by the level of exports.

5. CONCLUSIONS

This paper provides new evidence on the link between globalization and firm dynamics, focusing on the case of Estonia. We contribute to the literature in two important respects. First, this is the first paper to study the determinants of exit and product switching in an emerging market. Second, we consider explicitly the effect of export market conditions on firm dynamics. For that purpose, we include three product-level measures in our estimation: (1) the value of exports; (2) the degree of competition in exports markets; and (3) the quality of exports relative to direct competitors.

Our results indicate that firms change their core product lines quite frequently. Moreover, globalization is generally not an important driver of firm exit, while it emerges as an important factor explaining product switching. What matters for exit are firm characteristics: younger firms and those with lower productivity and capital intensity are more likely to exit. Meanwhile, product switching is also affected by conditions in export markets. In particular, firms are more likely to switch if they are in non-comparative advantage sectors, where the total value and quality of exports are relatively low. This result is in contrast with previous studies on industrial countries which have found that firms change their product line as a defensive strategy against low-cost imports. Finally, we find that firms switching to relatively higher quality products are more capital intensive. However, these switches are not related to technology upgrading.

Our findings raise a number of questions worthy of further research. First, changes in core products are more common than assumed in theoretical models of multi-product firms. Also, there is little theory explaining the determinants of product switching versus industry switching, occurring both within the manufacturing sector. Thus, additional models need to be developed to gain better insights in these dynamics. Second, it would be interesting to know whether the effect of intra-industry trade on product switching is related to trade in different products (vertical intra-industry trade) or similar products (horizontal intra-industry trade). Finally, it would be important to explore whether the quality of exports matters for the product switches irrespective of the exporting status of the firm.

APPENDIX. DEFINITIONS OF VARIABLES

The firm-level data used in this paper are provided by the Estonian Business Registry and cover the period 1997-2005. The trade data are from the UN Comtrade (commodity trade statistics) database and consist of the trade values and quantities of import flows at the six-digit product level, according to the Harmonized System (HS) classification 1988/92. See Moreno Badia *et al.* (2008) for details about the data cleaning process.

A. FIRM-LEVEL VARIABLES

All monetary variables are expressed in real terms. Output and intermediate input deflators, as well as the gross capital formation price index, were obtained from the Statistical Office of Estonia. Deflators are available for 16 sectors corresponding to the International Standards Industrial Classification (ISIC Rev.3.1) at the one-digit level.

$Exit_{it+1}$ Dummy variable, equal to 1 in period t if the firm exits in period t+1. Firm exit is defined based on the official date of liquidation from the Commercial Register. If a firm disappears from the data set and has an official liquidation date, it is considered to exit in the last year of observation. Liquidation due to a merger, acquisition or re-registration in the registry is not considered an exit.

$Switch_{2d,it+1}$ Dummy variable, equal to 1 in period *t* if the firm switches two-digit NACE industries in period *t*+1. An industry switch is defined as a change in the firm's primary sector of activity. Firms in Estonia are asked only about their primary sector of activity. This implies that, if a firm reports a particular industry/product code in one year and a different code in the next, it has changed its main sector of activity.

$Switch_{4d,it+1}$ Dummy variable, equal to 1 in period *t* if the firm changes four-digit NACE products in period *t*+1. A product switch is defined as a change in the firm's main product line.

Age_{it} Age of the firm in period *t*, defined as the number of years the firm has been in the registry (using the registry entry date).

$Size_{it}$ Firm size, measured by the number of employees in period *t*.

$Wage_{it}$ Average real labour costs, defined as total firm-level labour costs divided by the number of employees.

$Capital_{it}$ Capital intensity, measured as real capital per employee. Capital is defined as the sum of tangible and intangible assets, net of goodwill at the firm level.

TFP_{it} Total factor productivity at the firm level, estimated at the two-digit industry level using the methodology of Levinsohn and Petrin (2003) while taking into account industry switches over time. For a detailed description of the methodology employed to estimate TFP using the current data set, we refer to Moreno Badia and Slootmaekers (2009).

$Foreign_{it}$ Foreign ownership dummy, equal to 1 if at least 50 per cent of the firm's shares are foreign owned.

B. PRODUCT-LEVEL VARIABLES

All product-level variables are defined at the four-digit NACE level.

$Sunk_{jt}$ Sunk costs variable, defined as the natural logarithm of the median of real sales in each particular four-digit industry *j* at time *t*.[14]

$Herf_{jt}$ Herfindahl—Hirschman index for the domestic market, defined as the sum of squared market shares. Market shares are defined as firm-level real sales over product-level total real sales. It ranges from 0 to 1 as it moves from a very

[14] This measure is known as the minimum efficiency scale (MES). We prefer the MES based on sales to a MES based on median employment since the latter does not capture the fixed costs of capital-intensive industries adequately. Alternatively, we could have used the minimum of industry entry and exit rates as in Greenaway *et al.* (2008). However, in practical terms this would have been equivalent to using exit rates, creating endogeneity problems.

large amount of very small firms to a single monopolistic producer.

$Imports_{jt}$ Total imports of product *j* at time *t*, measured in Estonian Krooni (EEK).

IIT_{jt} Intra-industry trade variable, defined as the Grubel—Lloyd index, that is, $\left[1-\left(\left|X_{jt}-M_{jt}\right|/\left(X_{jt}+M_{jt}\right)\right)\right]$, where X_{jt} and M_{jt} are respectively exports and imports of product *j* at time *t*.

CA_{jt} Revealed comparative advantage dummy, equal to 1 if $X_{jt} > M_{jt}$, i.e. if exports are larger than imports for product *j* at time *t*.

$Exports_{jt}$ Total exports of product *j* at time *t*, measured in Estonian Krooni (EEK).

$Herfex_{jt}$ The Herfindahl—Hirschman index for the export market is calculated at the Harmonized System (HS) six-digit level. Conversion to NACE Rev. 1.1. at the four-digit level is achieved using a concordance table provided by Eurostat. We define a market as a pair consisting of a geographic destination and a product. We calculate the index of concentration in market *m* as

$$H^{j}_{m,t} = \sum_{\forall Exporter} s^{2}_{n,t} ,$$

where $s_{n,t}$ is the market share of exporter *n* in market *m* at period *t*.

Aggregating across all export markets for product *j*, we obtain the overall index of market concentration for exports of product *j*:

$$Herfex_{jt} = \sum_{\forall m} H^{j}_{m,t} * \beta^{j}_{m,t} ,$$

where $\beta^{j}_{m,t}$ is the share of market *m* in total exports of product *j* in period *t*.

UVR_{jt} Average relative unit values index for Estonian export products, taking into account Estonia's main competitors. In particular, we compute the unit value for product *j* in market *p* by dividing the export value of each exporter by the export quantity. Relative unit values for product *j* in market *p* are then calculated dividing the unit value of Estonia by the weighted average of the unit values of its competitors in that market. The overall relative unit value for product *j* is the weighted sum of the relative unit values across all markets, with weights equal to export shares.

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Table 1. Exits and Industry Switches, 1997-2004[a]
(Per cent, unless otherwise indicated)

Year	Number of Observations	Industry Switch	Product Switch	Exit
Panel A: Distribution of the Full Sample				
1997	1,196	14.8	21.7	5.1
1998	1,398	9.5	14.5	4.9
1999	1,621	11.0	16.5	4.4
2000	1,930	8.9	12.8	3.1
2001	2,175	6.6	11.4	3.3
2002	2,396	6.2	9.9	2.2
2003	2,634	6.0	9.3	1.8
2004	2,767	4.8	7.3	0.7
Total (observations)	16,117	1,244	1,912	452
Total (firms)	4,844	1,090	1,566	452
Panel B: Distribution for Microenterprises[b]				
1997	515	19.6	26.8	6.8
1998	616	12.2	16.6	6.3
1999	765	12.7	17.9	5.2
2000	944	11.2	14.4	3.2
2001	1,100	8.6	13.5	4.5
2002	1,232	8.4	11.5	2.5
2003	1,423	7.6	11.1	2.0
2004	1,553	6.2	8.4	0.8
Total (observations)	8,148	782	1,092	267
Total (firms)	3,214	709	949	267

Sources: Estonian Business Registry database; and authors' calculations.
[a] Industry (product) switches are identified at the two-digit (four-digit) NACE level.
[b] Microenterprises are defined as enterprises employing fewer than 10 employees.

Table 2. Summary Statistics

Variable	All	Industry Switch	Product Switch	Exit
Number of observations	16,117	1,244	1,912	452
Per cent of total	100.0	7.7	11.9	2.8
Size	28.1	21.6***	26.9	20.7***
(Number of employees)	(100.4)	(73.9)	(131.4)	(46.2)
Age	6.9	6.1***	6.3***	5.7***
(Years)	(3.5)	(3.3)	(3.3)	(3.1)
Capital	104.7	119.7**	109.7	91.4
(Thousands of Krooni)	(270.8)	(307.6)	(266.6)	(455.6)
Wage	60.3	60.3	58.4*	50.7**
(Thousands of Krooni)	(66.6)	(71.7)	(63.0)	(112.9)
TFP	61.2	60.4	58.3**	41.3***
(Thousands of Krooni)	(99.6)	(85.8)	(80.8)	(130.2)
Foreign	0.1	0.1	0.1**	0.1**
(Ownership dummy)	(0.3)	(0.3)	(0.3)	(0.3)
Sunk	14.7	14.7*	14.8	14.7
(Minimum Efficient Scale)	(0.7)	(0.7)	(0.7)	(0.6)
Herf	0.1	0.1***	0.1***	0.1**
(HHI domestic market)	(0.2)	(0.2)	(0.2)	(0.2)
Imports	417,270	489,774***	448,386**	337,168***
(Imports, thousands of Krooni)	(583,623)	(707,494)	(644,580)	(349,766)
IIT	0.5	0.5***	0.5***	0.5**
(Intra-industry trade)	(0.3)	(0.3)	(0.3)	(0.2)
CA	0.6	0.5***	0.5***	0.6***
(Comparative advantage)	(0.5)	(0.5)	(0.5)	(0.5)
Exports	766,759	715,993**	692,268***	807,780
(Exports, thousands of Krooni)	(1,046,466)	(1,050,674)	(1,019,043)	(973,382)
Herfex	0.2	0.2*	0.2	0.2
(HHI export market)	(0.1)	(0.1)	(0.1)	(0.1)
UVR	1.3	1.2	1.3	1.3
(Relative unit values)	(3.3)	(2.7)	(4.1)	(3.8)

Sources: Estonian Business Registry database; and authors' calculations.
Notes: Reported values are means (except for the first row), with the standard deviations in parentheses. Significance levels (*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$) refer to one-tailed test on the difference between the means for the exit strategy considered (exit, industry switch, or product switch) and the baseline category (continuing firms).

Table 3. Baseline Specification

	Product Switch		Exit	
ln*(Size)*	-0.143***	*-0.014*	-0.036	*0.000*
	(0.026)		(0.054)	
ln*(Age)*	-0.178***	*-0.017*	-0.300***	*-0.005*
	(0.044)		(0.072)	
ln*(TFP)*	0.092**	*0.010*	-0.367***	*-0.007*
	(0.041)		(0.066)	
ln*(Capital)*	0.051**	*0.005*	-0.220***	*-0.004*
	(0.020)		(0.036)	
ln*(Wage)*	-0.08	*-0.008*	0.169	*0.003*
	(0.049)		(0.108)	
Foreign	-0.088	*-0.008*	0.044	*0.001*
	(0.094)		(0.185)	
Herf	0.253*	*0.025*	-0.23	*-0.004*
	(0.144)		(0.334)	
Sunk	0.008	*0.000*	0.139	*0.002*
	(0.057)		(0.093)	
ln*(Exports)*	-0.064*	*-0.006*	0.063	*0.001*
	(0.038)		(0.068)	
Herfex	0.007	*0.002*	-0.739	*-0.013*
	(0.386)		(0.679)	
ln*(UVR)*	-0.102*	*-0.010*	0.07	*0.001*
	(0.055)		(0.105)	
ln*(Imports)*	0.014	*0.001*	-0.011	*0.000*
	(0.049)		(0.091)	
IIT	-0.212*	*-0.020*	-0.135	*-0.002*
	(0.128)		(0.235)	
CA	-0.218**	*-0.021*	-0.011	*0.000*
	(0.106)		(0.207)	

Number of observations: 16,043
Pseudo *R*-square: 0.054

Sources: Estonian Business Registry database; and authors' calculations.
Notes: This table reports the result from a multinomial logit (0=continuing; 1=switching products; 2=closing). Robust standard errors are in parentheses below coefficient estimates. The numbers in italics next to the coefficient estimates represent the marginal probability change at the mean of the independent variable or the discrete change of a dummy variable from 0 to 1. Though not reported, all regressions include a constant, two-digit industry, and time fixed effects. Standard errors are clustered at the firm level. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variables are defined in the Appendix.

Table 4. Product Switching Versus Industry Switching

	Product Switch Within the Same Industry		Industry Switch		Exit	
ln*(Size)*	0.070*	*0.003*	-0.258***	*-0.016*	-0.036	*0.000*
	(0.040)		(0.033)		(0.054)	
ln*(Age)*	-0.201***	*-0.006*	-0.166***	*-0.010*	-0.300***	*-0.005*
	(0.071)		(0.053)		(0.072)	
ln*(TFP)*	0.058	*0.002*	0.104**	*0.007*	-0.368***	*-0.007*
	(0.063)		(0.050)		(0.066)	
ln*(Capital)*	0.01	*0.000*	0.070***	*0.005*	-0.220***	*-0.004*
	(0.035)		(0.024)		(0.036)	
ln*(Wage)*	-0.091	*-0.003*	-0.069	*-0.004*	0.169	*0.003*
	(0.078)		(0.059)		(0.108)	
Foreign	-0.169	*-0.005*	-0.045	*-0.003*	0.045	*0.001*
	(0.151)		(0.117)		(0.185)	
Herf	0.194	*0.005*	0.275*	*0.017*	-0.229	*-0.004*
	(0.251)		(0.165)		(0.335)	
Sunk	0.003	*0.000*	0.003	*0.000*	0.14	*0.002*
	(0.109)		(0.062)		(0.094)	
ln*(Exports)*	-0.156***	*-0.005*	0.002	*0.000*	0.064	*0.001*
	(0.058)		(0.046)		(0.068)	
Herfex	-0.738	*-0.023*	0.426	*0.029*	-0.743	*-0.013*
	(0.697)		(0.436)		(0.679)	
ln*(UVR)*	-0.277**	*-0.008*	-0.009	*0.000*	0.071	*0.001*
	(0.111)		(0.060)		(0.105)	
ln*(Imports)*	-0.026	*-0.001*	0.042	*0.003*	-0.011	*0.000*
	(0.074)		(0.060)		(0.091)	
IIT	-0.149	*-0.004*	-0.262	*-0.016*	-0.136	*-0.002*
	(0.191)		(0.160)		(0.236)	
CA	-0.268*	*-0.008*	-0.209	*-0.013*	-0.011	*0.000*
	(0.162)		(0.129)		(0.208)	

Number of observations: 16,043
Pseudo *R*-square: 0.059

Sources: Estonian Business Registry database; and authors' calculations.
Notes: This table reports the results from a multinomial logit regression (0=continuing; 1=product switching within the same industry; 2=industry switching; 3=closing). Robust standard errors are in parentheses below coefficient estimates. The numbers in italics next to the coefficient estimates represent the marginal probability change at the mean of the independent variable or the discrete change of a dummy variable from 0 to 1. Though not reported, all regressions include a constant, two-digit industry, and time fixed effects. Standard errors are clustered at the firm level. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variables are defined in the Appendix.

Table 5. Industry Switching: Manufacturing versus Services

ln*(Size)*	-0.461***	*-0.111*
	(0.063)	
ln*(Age)*	0.072	*0.017*
	(0.103)	
ln*(TFP)*	0.182**	*0.044*
	(0.083)	
ln*(Capital)*	-0.021	*-0.005*
	(0.045)	
ln*(Wage)*	0.135	*0.033*
	(0.107)	
Foreign	-0.401*	*-0.098*
	(0.208)	
Herf	0.244	*0.059*
	(0.312)	
Sunk	0.133	*0.032*
	(0.118)	
ln*(Exports)*	0.058	*0.014*
	(0.096)	
Herfex	2.380**	*0.572*
	(1.026)	
ln*(UVR)*	-0.009	*-0.002*
	(0.124)	
ln*(Imports)*	-0.221*	*-0.053*
	(0.123)	
IIT	-0.173	*-0.042*
	(0.308)	
CA	0.312	*0.075*
	(0.266)	
Number of observations: 1,244		
Pseudo *R*-square: 0.091		

Sources: Estonian Business Registry database; and authors' calculations.
Notes: Results reported are from a logit estimation comparing (two-digit) industry switches to other manufacturing sectors (dependent variable equal to 0) with industry switches to services (dependent variable equals 1). Robust standard errors are in parentheses below coefficient estimates, the numbers in italics next to the coefficient estimates represent the marginal probability change at the mean of the independent variable or the discrete change of a dummy variable from 0 to 1. Though not reported, all regressions include a constant, two-digit industry dummies, and time dummies. Standard errors are clustered at the firm level. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variables are defined in the Appendix.

Table 6. Unit Value Difference Between Industry of Origin and Destination

	(1)	(2)	(3)
ln*(Size)*	-0.032*	-0.027	0.005
	(0.018)	(0.018)	(0.020)
ln*(Age)*	0.028	0.024	0.001
	(0.031)	(0.031)	(0.034)
ln*(TFP)*	0.052	0.052	-0.044
	(0.042)	(0.043)	(0.029)
ln*(Capital)*	0.048***	0.048***	0.043**
	(0.018)	(0.018)	(0.019)
ln*(Wage)*	-0.017	-0.025	0.016
	(0.046)	(0.047)	(0.044)
Foreign	0.022	0.007	0.022
	(0.070)	(0.070)	(0.069)
Herfex	-0.453	-0.473	-0.625**
	(0.33)	(0.330)	(0.250)
Technology upgrading	...	0.085	...
		(0.094)	
Technology downgrading	...	-0.186**	...
		(0.079)	
Destination H-tech	...	...	-0.119
			(0.150)
Destination MH-tech	...	...	0.202**
			(0.091)
Destination ML-tech	...	...	0.069
			(0.049)
Industry fixed effects (two-digit)	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes
Number of observations:	1,097	1,097	1,097
R-square	0.097	0.103	0.036

Sources: Estonian Business Registry database; and authors' calculations.
Notes: The dependent variable is the log difference in export unit value ratio between the origin industry and destination industry, at the four-digit level. The dummy technology up- (down-) grading equals 1 if the firm moves up (down) one category of technology intensity. The dummies *H-tech*, *MH-tech*, and *ML-tech* destination equal 1 if a firm moves to respectively a high-tech, medium-high-tech or medium-low-tech sector. The regressions are estimated using OLS, and robust standard errors are in parentheses below the coefficient estimates. Coefficients for the constant and industry and year dummies are suppressed. Standard errors are clustered at the firm level. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variables are defined in the Appendix.

Table 7. Determinants of Firm Dynamics Across Size Categories

	Firms With Fewer Than 10 Employees (N=8,125)				Firms With 10 Employees or More (N=7,918)			
	Product switch (N=1,092)		Exit (N=267)		Product switch (N=820)		Exit (N=185)	
ln*(Size)*	-0.182***	*-0.019*	-0.111	*-0.002*	-0.031	*-0.003*	0.239**	*0.003*
	(0.055)		(0.113)		(0.055)		(0.096)	
ln*(Age)*	-0.168***	*-0.018*	-0.191**	*-0.003*	-0.160**	*-0.013*	-0.434***	*-0.005*
	(0.053)		(0.090)		(0.075)		(0.120)	
ln*(TFP)*	0.091*	*0.010*	-0.280***	*-0.006*	0.113	*0.010*	-0.660***	*-0.008*
	(0.048)		(0.070)		(0.076)		(0.150)	
ln*(Capital)*	0.067***	*0.008*	-0.218***	*-0.004*	0.025	*0.002*	-0.254***	*-0.003*
	(0.025)		(0.047)		(0.035)		(0.057)	
ln*(Wage)*	-0.001	*0.000*	0.07	*0.001*	-0.282***	*-0.024*	0.490**	*0.006*
	(0.058)		(0.115)		(0.094)		(0.246)	
Foreign	-0.067	*-0.009*	0.557**	*0.014*	-0.074	*-0.006*	-0.378	*-0.004*
	(0.147)		(0.247)		(0.121)		(0.266)	
Herf	0.262	*0.028*	-0.088	*-0.002*	0.242	*0.021*	-0.401	*-0.005*
	(0.199)		(0.445)		(0.218)		(0.521)	
Sunk	0.109	*0.011*	0.286**	*0.005*	-0.092	*-0.008*	-0.077	*-0.001*
	(0.078)		(0.125)		(0.093)		(0.162)	
ln*(Exports)*	-0.014	*-0.002*	0.126	*0.002*	-0.131**	*-0.011*	-0.053	*0.000*
	(0.050)		(0.091)		(0.059)		(0.102)	
Herfex	0.243	*0.028*	-1.015	*-0.020*	-0.238	*-0.020*	-0.36	*-0.004*
	(0.506)		(0.939)		(0.610)		(1.038)	
ln*(UVR)*	-0.141**	*-0.015*	0.104	*0.002*	-0.034	*-0.003*	0.013	*0.000*
	(0.071)		(0.124)		(0.088)		(0.198)	
ln*(Imports)*	-0.043	*-0.004*	-0.068	*-0.001*	0.086	*0.007*	0.062	*0.001*
	(0.065)		(0.122)		(0.074)		(0.142)	
IIT	-0.236	*-0.025*	-0.056	*-0.001*	-0.152	*-0.013*	-0.299	*-0.003*
	(0.169)		(0.305)		(0.201)		(0.388)	
CA	-0.367***	*-0.039*	-0.359	*-0.006*	-0.029	*-0.003*	0.622*	*0.007*
	(0.142)		(0.265)		(0.161)		(0.353)	
Pseudo *R*-square	0.055				0.061			

Sources: Estonian Business Registry database; and authors' calculations.

Notes: This table reports the results from a multinomial logit regression (0=continuing; 1=switching products; 2=closing), for two groups: firms with fewer than 10 employees (columns 1 and 2) and firms with 10 employees or more (columns 3 and 4). Robust standard errors are in parentheses below coefficient estimates. The numbers in italics next to the coefficient estimates represent the marginal probability change at the mean of the independent variable or the discrete change of a dummy variable from 0 to 1. Though not reported, all regressions include a constant, two-digit industry and time fixed effects. Standard errors are clustered at the firm level. Significance level: *** p<0.01, ** p<0.05, * p<0.1. Variables are defined in the Appendix.