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The Survival of Latvian Products and Firms in Export Markets

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Abstract

This paper investigates factors that contribute to the survival of export relationships at the firm and product levels using a large anonymised firm-level database for Latvia. It finds that some characteristics of exporting firms, such as a higher productivity level, larger size, lower indebtedness and higher profitability are associated with longer duration of export relationships. Firms that innovated prior to exporting are also likely to enjoy longer export spells, while participation in an EU-fund support programme did not alter duration. Younger staff and management of the firm are associated with a better survival of a new export product. Furthermore, this paper reveals novel roles of export product characteristics in survival, in particular an interesting tension between the complexity of new export products and their "distance" from the existing export bundle. While aiming high, that is, exporting products that are more complex, pays off as such products are associated with longer-lasting trade relationships, aiming too high, that is exporting new products that are far more complex than the exporter's existing product bundle, tends to lower their survival probability.

Keywords: Exports, economic complexity, trade, productivity, innovation

JEL Codes: F10, F14, P45, H81

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1 Introduction

This paper uses a large anonymised database of Latvian firms to explore the role of export survival in Latvia's export growth and various factors that define the duration of export relationships. Strong export growth can be an important driver of economic recovery in the aftermath of the COVID-19 crisis, especially for small open economies. Previous studies have often stressed the role of entry by new exporters in a country's export growth, while the contribution by incumbent exporters to export growth, in particular through the introduction of new products, was considered to be relatively small (for example, Bernard et al. 2010). Yet, there is room for enhancing a country's export performance and diversification by strengthening the contribution from existing export relationships, both at the level of exporting firms and exported products.

Against this background, a relatively new strand of research highlights the importance of the survival margin of exports on top of the extensive (entry by new exporters) and intensive (larger export sales by existing exporters) margins and aims to identify determinants of the duration of export spells. This study is part of that strand and aims to fill the gap in existing studies by examining how a broad set of firm and product characteristics contributes to export survival. It pays particular attention to the role of export product complexity, which has received little attention so far. For instance, Córcoles et al. (2012) studied the impact of product complexity on export survival in the automotive industry. This paper expands the scope of analysis to all industries and examines the difference in the impact between absolute and relative complexity of new export products, the former representing the complexity of the product per se, with the latter being its position in relation to the firm's existing export bundle. We find that while higher absolute complexity is associated with longer export duration of an export product, higher relative complexity is associated with lower survival.

In Latvia, two out of five new export relationships fail within the first two years following their inception. The pace of product failure is even faster, as Latvian exporters drop almost half of newly introduced export products after the first year. Such a high failure ratio is not unique to Latvia – similar empirical findings have been reported for various countries (see e.g. Albornoz et al. 2016; Kostevc and Kejžar 2020). Nonetheless, it highlights the scope to improve export performance by identifying and boosting core factors that increase export survival. This paper indicates the importance of an incremental strategy to upgrade the export content of firms toward more complex

products in ensuring the survival of more complex exports.

The next section discusses relevant findings from the previous literature. Section 3 provides a decomposition of Latvia's export growth into new entry, exit and export deepening and survival. Section 4 introduces the firm-level database used to calculate export spells and describes the methodology employed to determine the factors affecting export survival. Sections 5 and 6 present the estimation results at the firm and product level, respectively.

2 Literature review

2.1 Theories that might determine export duration

Mainstream trade theories focus mainly on trade creation, i.e. on the extensive margin for explaining why countries trade. The examination of export duration has been relatively scarce so far (Socrates et al. 2020). Nonetheless, a few theoretical models aim to explain it. One such contribution is the product-switching theory that was developed by Bernard et al. (2010) and extended to international trade by Bernard et al. (2011). Both studies identify product switching as an important driver of export growth and emphasise the role of exogenous product-specific demand shocks and firm-specific supply shocks in firms' decision on which products to make and which to drop. High-productivity firms cover the product fixed costs and supply a wider range of products. Product switching is frequent and widespread, as stochastic shocks to consumer tastes generate fluctuations in the profitability of individual products in different markets and result in products being added and dropped. Firms' lower-volume and recently added products are more likely to be dropped as the result of negative supply and demand shocks.

The role of core capabilities in export duration has been recognised in a number of theoretical studies. Bernard et al. (2011) suggest that reductions in trade costs cause all firms to drop their least-successful products, raising the average productivity of products that survive and thus overall firm productivity. In a model where each firm is facing higher marginal costs for products that are further away from their core capabilities, Eckel and Neary (2010) show that competition on foreign markets induces firms to focus on their core-capability goods and drop high-cost items (the so called, cannibalisation effect), which generates a rise in productivity and leads to a fall in product diversity. In the theoretical framework developed by Mayer et al. (2014) firms that face tougher competition experience a downward shift in mark-ups, inducing them to focus on their

best performing exporting products. Manova and Yu (2017) highlight the role of quality-driven reallocations within firms: in the markets where firms offer few products, they systematically focus on their core-capability products and drop low-quality items.

Search and matching models explain export duration by information asymmetry and the quality of the match between an exporting firm and its distributor in the destination market. To engage in international trade firms usually depend on a business partner from the destination market. Excluding cases when that relationship involves a vertical integrated ownership relationship, the quality of that match is unknown, and the two parties start cooperating with small quantities. In this way, firms learn about each other before committing a great deal of resources to the trade relationship. The likelihood of starting to export in small volumes increases with the cost of search for a supplier and decreases with the probability that the current or new supplier can fulfil larger orders after training (Rauch and Watson 2003). The quality of the match is also influenced by whether the two firms belong to the same business or ethnic networks. These search and matching models suggest that export relationships that involve lower search costs are more likely to involve large initial purchases and last longer due to a better match between the exporting firm and the distributor. This theoretical model is consistent with the empirical results from the United States (Besedeš 2008).

2.2 What the literature says about average export duration

The duration of exporting activities varies a great deal across studies, owing partly to the difference in granularity in the classification used. All other things being equal, a more granular definition of exported products leads to a shorter duration, as switching from one exported product to another similar product would be registered as a termination of the existing relationship. Some researchers have found extremely short average duration. For example, Volpe Martincus and Carballo (2011) report median export duration for Peruvian firms of just one year, as 55% of new exporters exit the market in the initial year of exporting. On the other hand, Esteve-Pérez et al. (2007) report a median duration of six years for export spells of Spanish manufacturing firms, with only 25% of all spells ending after the first year. More closely related to the data used in our paper Kostevc and Kejžar (2020) find – based on Slovenian firms – that only 32.5% of the product-destination-specific spells exceed two years. Likewise, Albornoz et al. (2016) obtain a survival rate of only 31% after two years for exporters entering a new export destination.

2.3 Factors affecting the duration of exports

Several empirical studies have examined export survival using firm-level data from different countries. This strand of research has given rise to a number of potential determinants of export duration, such as, for example, productivity, financial stability and GDP of the destination country (Békés and Muraközy 2012). It has been shown that export duration rises with a shorter distance to the destination market, longer prior experience in exporting to that market, sharing the same language with the destination country (Albornoz et al. 2016), greater experience in exporting the same product to other markets or different products to the same market (Brenton et al. 2010), and a larger number of competitors from the same country already serving that market (Cadot et al. 2013). The latter suggests significant positive cross-firm externalities. In addition, it was shown by Kostevc and Kejžar (2020) that foreign-owned firms and firms investing abroad stay longer on the external market. The importance of incumbent exporters already exporting to the same market is stronger for products characterised by higher quality heterogeneity, for which information asymmetries between buyers and producers are potentially more important (Cadot et al. 2013). Finally, and more importantly for this study, higher product complexity (measured by Hausmann's sophistication index and the Hidalgo–Hausmann product complexity index) was shown by Córcoles et al. (2014) to enhance the survival probabilities of export spells, as such exports often correspond to supply of sophisticated inputs to global value chains that are more difficult to be replaced by competitors.

A few empirical studies have emphasised the link between export duration and participation in global value chains (GVCs). Obashi (2010) reveals that, compared to finished machinery products, export duration of machinery parts and components is longer and more stable among East Asian countries. Córcoles et al. (2012) confirm that exports associated with global value chains enjoy higher survival rates and highlight the importance of trust and reliability among trade partners to a stable export of intermediate goods. We contribute to the above literature by paying more attention to product characteristics, in particular product complexity.

3 Latvia's export performance: entry, deepening and survival

We begin by illustrating the contribution of different margins to the dynamics of Latvian exports. For this purpose we use the anonymised firm-level dataset of Latvia's international merchandise

trade[1] for 2005-2019 provided by the Central Statistical Bureau of Latvia (CSB). This dataset contains detailed information on value, volume, product (eight-digit Combined Nomenclature code, CN8) and the destination/source country of export and import transactions at a monthly frequency. We decompose Latvia's export growth, following Besedeš and Prusa (2011), such that the extensive margin is split into the contribution of new export relationships (entry) and failed relationships (exit), while the intensive margin is driven by survival and deepening processes. The contributions from deepened and failed export relationships can be further decomposed by the age of export relationships.[2] We use two definitions of an export relationship: at the firm level and at the firm-product pair level. Although the dataset allows for a more detailed decomposition, we define a product at the level of four-digit Harmonized System (HS) code to minimise the issues related to changes in the CN8 classification. To avoid the noise arising from intermittent exporting we consider a firm to be an entrant to the export market only if it had not been exporting in the past two years. A firm is considered to have exited the export market when it does not export in two consecutive years. We define the entry and the exit of a product to/from the external market in a similar fashion.

3.1 The survival of existing export relationships underpins Latvia's export growth

Figure 1 indicates that a large share of export growth comes from both new and existing exporters. Over the period between 2012 and 2018 Latvia's exports of goods increased by an average of 6.9% per annum, where new exporters contributed about five percentage points to that figure.[3] An additional five percentage points came from existing exporters introducing new products or expanding their exports. However, about half of that figure is derived from export relationships that started only in the course of the previous calendar year.[4] Firms that ceased exporting reduced the value of

[1] The dataset is compiled using custom data (EXTRASTAT) for extra-EU trade, and INTRASTAT for intra-EU trade.

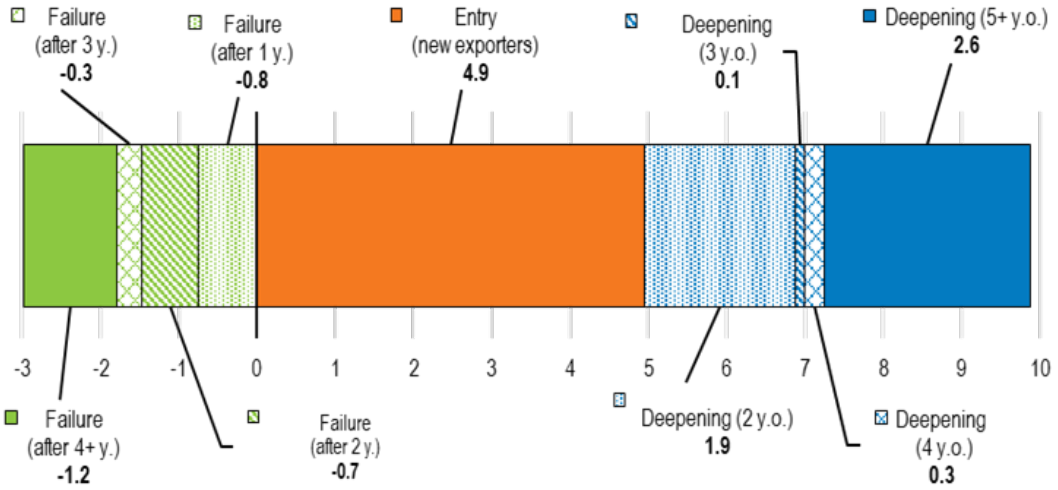
[2] $EX_{t+1} - EX_t = \sum_{z \in Z} \left(\sum_{i=1}^{I} \left(\left(1 - h^i_{z,t+1}\right) n^i_{z,t} \right) \left(v^i_{z,t+1} - v^i_{z,t} \right) - \sum_{i=1}^{I} \left(\left(h^i_{z,t+1} n^i_{z,t} \right) n^i_{z,t} \right) + \epsilon_{z,t+1} v^0_{z,t+1} \right)$ where EX_t denotes the value of exports in year t, z depends on the level of disaggregation: firms, or firm-product pairs, the superscript i represents the number of years the relationship was maintained (age), $h^i_{z,t+1}$ stands for the hazard rate of an export relationship of age i ending between t and $t+1$, $n^i_{z,t}$ is the number of export relationships of age i, $\epsilon_{z,t+1}$ is the number of new relationships introduced in $t+1$, and $v^i_{z,t}$ stands for the average value of a relationship of age i. Thus, $(1 - h^i_{z,t+1})$ represents the percentage of surviving relationships between year t and $t+1$; $(1 - h^i_{z,t+1}) n^i_{z,t}$ indicates the total number of surviving relationships in year $t+1$; $(v^i_{z,t+1} - v^i_{z,t})$ represents deepening of trade for surviving relationships between year t and $t+1$; $(h^i_{z,t+1} n^i_{z,t})$ indicates the number of relationships that end in year t, while $((h^i_{z,t+1} n^i_{z,t}) v^i_{z,t})$ is their total value; and $\epsilon_{z,t+1} v^0_{z,t+1}$ corresponds to the value of new entrants in year $t+1$.

[3] The lowest contribution of 3.5 percentage points was recorded in 2017.

[4] More than 60% entered the foreign markets from July to December.

the export basket by an average of three percentage points (with the largest negative contribution occurring in the years 2014-2016). Existing export relationships accounted for most of the volatility in export growth (see Annex A for the breakdown of export growth by year).

Figure 1: Decomposition of merchandise export growth in Latvia (average % change, 2012-2018), by firm level



Note: While the available data span the period from 2005, we can identify spells of existing exporters with at least five years of experience starting from 2012 (another two years are lost because of the definition of entry). The last year when we can identify failures is 2018. Therefore, the chart reports the decomposition of average export growth in 2012-2018 (6.9%). See Annex A for the breakdown of export growth by year.
Sources: CSB of Latvia, own calculations.

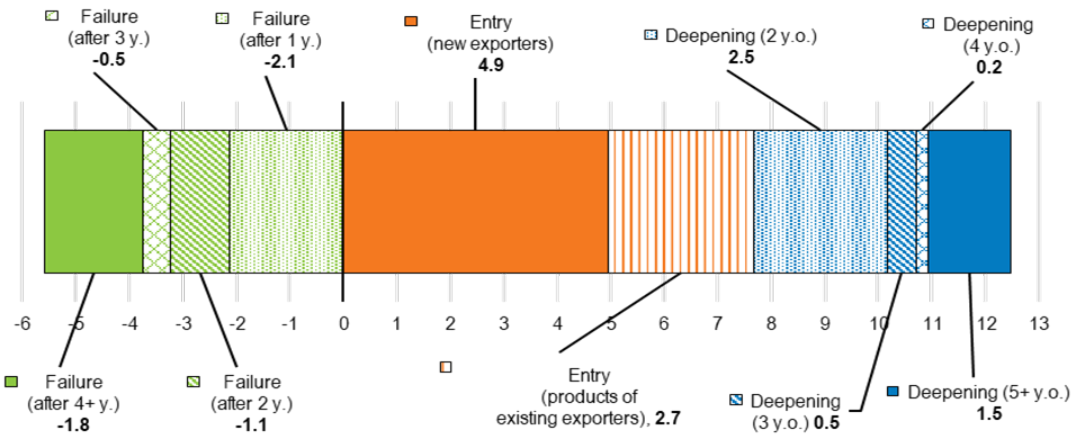
Breaking down export growth also by products highlights the role of the existing exporters and their survival (Figure 2), as firms that export a specific product can enter or exit from a foreign market.[5] Adding new destinations and products by existing firms contributes about 2.75 percentage points to the average annual growth rate, while the negative contribution of firms that cease exporting of some or all products was larger (5.6 percentage points). Expanding exports to new markets and holding on to existing markets are, therefore, crucial for improving export performance.

3.2 Less than half of new export relationships survive beyond the second year

Figure 3 shows the Kaplan-Meier estimates of the survival curve for new export relationships (new exporting firms on the left-hand side and new products of both new exporters and existing exporters on the right-hand side), which indicates the probability that the export relationship in question will

[5]Therefore, the magnitudes of the different components represent in Figure 2 are higher.

Figure 2: Decomposition of merchandise export growth in Latvia (average % change, 2012-2018), by firm-product pair level



Note: While the available data span the period from 2005, we can identify spells of existing exporters with at least five years of experience starting from 2012 (another two years are lost because of the definition of entry). The last year when we can identify failures is 2018. Therefore, the chart reports the decomposition of average export growth in 2012-2018 (6.9%). See Annex A for the breakdown of export growth by year.
Sources: CSB of Latvia, own calculations.

survive beyond the specified number of years.[6] Only about 45% of new exporting firms survive for longer than two years, while less than a quarter survive more than five years. The rate of survival diminishes rapidly in the first few years, remaining relatively stable thereafter. The pace of product dropout is even faster, as only about one third of newly introduced export products survive beyond two years, while only about one in five survive more than five years. As could be expected, the survival of a new product is slightly higher for firms with prior experience on external markets. Overall, the median duration of an export relationship at the firm level is two years (the mean duration is 2.7 years). The median duration of a newly exported product is just one year (the mean is 2.2 years).

4 Analysing survival determinants: data and methodology

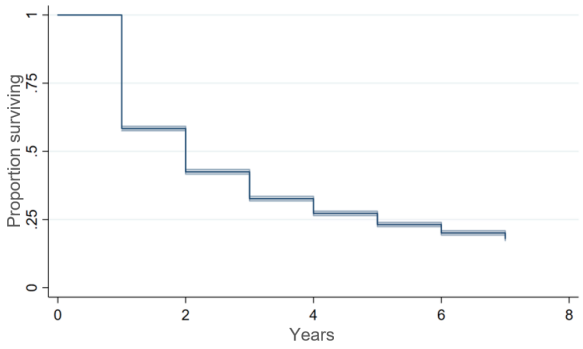
4.1 Data

To analyse the determinants of export survival, we match multiple anonymised firm-level datasets provided by the CSB and State Revenue Service (SRS) with the international merchandise trade dataset. First, we obtain numerous business activity measures from firms' balance sheets and profit

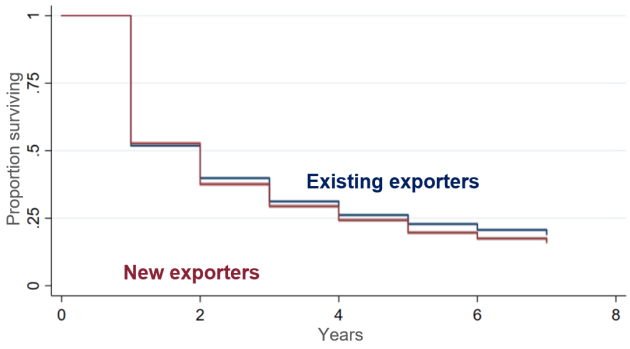
[6]Given our definition of entry and exit we are able to analyse the survival of 15157 new exporters between 2007 and 2017, while 10244 of those entrants did not survive on external markets. As to the new products, our database contains information on 147644 products introduced to the external market between 2007 and 2017 (98242 of them introduced by existing exporters), among which 104202 products failed (68008 for existing exporters).

Figure 3: The survival curve for new export relationships (2007-2017)

(a) New exporting firms



(b) New export products



Note: The shaded area represents a 95% confidence interval.
Sources: CSB of Latvia, own calculations.

and loss statements. Second, we use an employer-employee matched dataset to account for the gender and age structure of firms' employees.[7] The firm-level international trade dataset allows us to account for the firms' potential participation in GVCs (proxied by the share of intermediate product imports in total intermediate inputs) and to detect firms involved in re-export operations.[8] In addition, we use the information on the destination markets of new exporters and newly exported products.

We also control for the participation of Latvia's firms in various EU-funded programmes, which can contribute to export survival by boosting productivity (Benkovskis et al. 2019). Figure 4a indicates that participation in the particular programme aimed at promoting export activities is related to a longer survival of new exporting firms. Finally, we have information on the innovation activities of a smaller subsample of firms included in the Community Innovation Survey.[9] The descriptive evidence from Figure 4b points to a positive effect of innovations on the survival of new exporters.

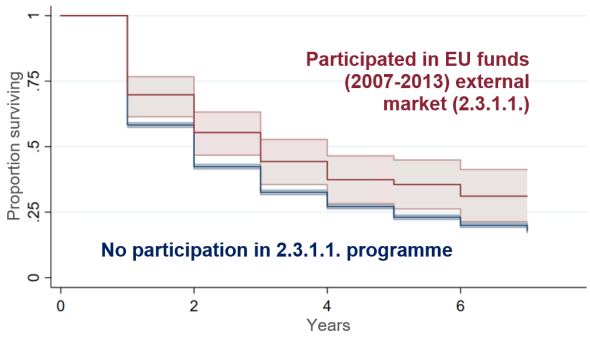
[7] Although the occupation of the firm's employees is not available, we proxy its management by employees whose wages are above the 20th percentile in the respective firm and year. This allows us to control for gender and age structure of firms' management for the sub-sample of firms with at least 10 employees.

[8] We labelled firms as non-re-exporters if the share of re-export operations in total exports was below 25% in all years. For the evaluation of re-exports from firm-level trade data see Benkovskis et al. (2016).

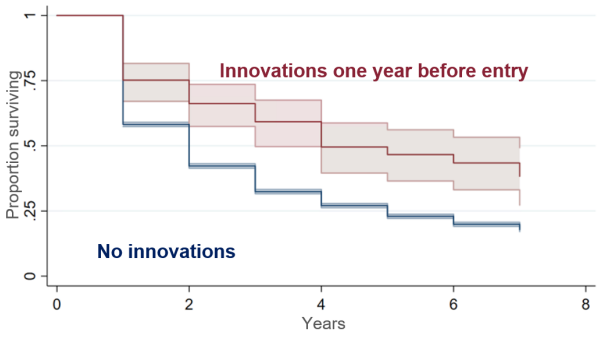
[9] Out of 15157 firms that entered the export market in 2007-2017, only 770 firms participated in the Community Innovation Survey, and we have their answers for the period that precedes their entry. The proportion is higher for new export products introduced by existing exporters (25960 out of 98242), since firms participating in the Survey tend to be larger and more productive.

Figure 4: The survival of new exporters by participation in EU-funded programmes and innovation activities (2007-2017)

(a) Participation in the EU funds external market support programme (2.3.1.1.) one year before entry



(b) Innovations one year before entry



Note: The shaded area represents a 95% confidence interval.
Sources: CSB of Latvia, own calculations.

4.2 Indicators of complexity of export products

As discussed above export duration can be affected by the characteristics of exported products. For instance, products that are more complex are traded longer because they are less easily substituted compared to generic or homogeneous products and their transaction requires non-negligible search costs. In order to explore the relationship between export survival and the complexity of exported products we use the measures of product complexity and proximity developed by Hausmann and Klinger (2006) and Hidalgo and Hausmann (2009).[10] The Product Complexity index (PCI) ranks the diversity and sophistication of the know-how required to produce a product. The categories of products with high PCI values include electronics and chemicals, while the category with the lowest value is raw materials and simple agricultural products. The proximity measure between two products is based on the coincidence of countries having a comparative advantage in the respective products.

The absolute complexity of an export basket of an exporting firm is calculated as a weighted PCI of its export products. We can also compute the relative complexity of new export products introduced by existing exporters against the basket of products these firms exported during the previous two years. In addition, we can also capture the similarity between new export products and the existing basket of exporting firms based on the HS commodity classification.[11]

[10] Available from the Atlas of Economic Complexity.

[11] When both the new product and the product already exported are part of the same HS3 classification, the similarity index obtains the value 3; when the two products are part of the HS2 classification, the index gets the value 2; when the two products are part of the HS1 classification, the value of the index is 1; and if no similar product is

Overall, the PCI of Latvia's export products varies between -3 and 3, with the average complexity amounting to about 0.25. The average complexity of products introduced by firms entering the external market slightly exceeds that of incumbent exporters (0.28 and 0.20, respectively), while the new products of existing exporters have on average the highest complexity (0.35). This ranking pertains in all years, although the differences among them are not statistically significant. Regarding the similarity of new products to the existing product basket, more than a third of new products belong to the same HS3 classification as one of the existing products, while in more than 20% of all cases the new product comes from an entirely new HS1 group.

For the new products of existing exporters, the complexity measures are negatively associated with the survival of the exporting relationship (Figure 5). This observation contradicts that by Córcoles et al. (2014), but could result from the fact that here we do not control for other firm or product characteristics. Further, moving further away from the existing export bundle reduces the survival of the new product irrespective of the distance measure used.

4.3 Estimation model

To explore factors affecting the survival of both an exporting firm in the foreign market and of a product exported by an incumbent exporter, we follow the conventional approach in the empirical literature (see Besedeš and Prusa 2006; Nitsch 2009; and Obashi 2010) and use the Cox proportional hazard model[12], which estimates the probability of an export relationship failing in year τ after entry as the hazard function $h(\tau|x_1,\ldots,x_k)$ is such that:

$$h\left(\tau|x_1,...,x_k\right) = h_0\left(\tau\right)e^{\left(\beta_1 x_1+...+\beta_k x_k\right)},$$

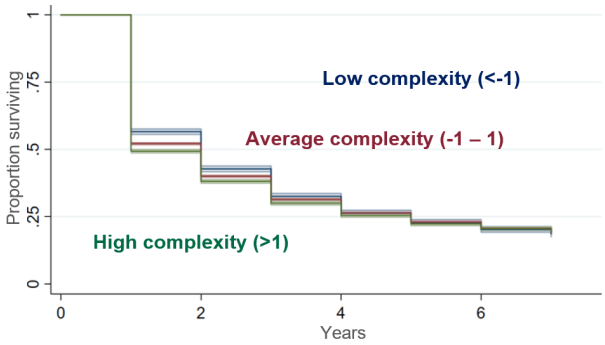
where $h_0(\tau)$ is the baseline hazard at year τ after entry and $x_1,\ldots,x_k$ are explanatory variables affecting the hazard/survival. A negative coefficient β_i on a variable x_i implies that this variable lowers hazard and hence contributes to a higher chance of the export relationship surviving. Based on the previous literature (the results of which are summarised above), we include as explanatory variables: (a) a number of firm-specific indicators, such as, age, size, indicators of productivity,

exported, the index receives the value 0.

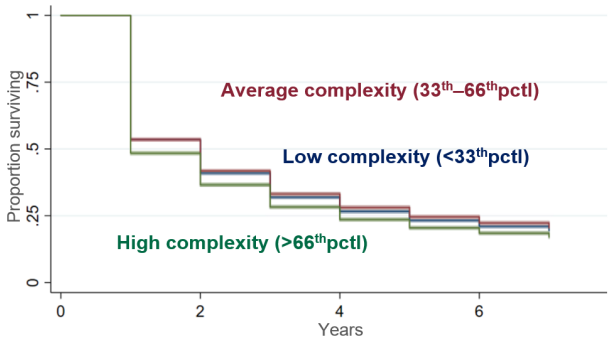
[12]The model assumes that changes in predictors produce proportional changes in the hazard function. We test this assumption using Schoenfeld residuals. While the null hypothesis of proportionality was rejected for the full sample of firm or product entries, this was due to the firm size variable that violates the proportionality assumption. After excluding the small firms with less than 10 employees from the sample (the second and the third specification of our survival model), the Schoenfeld residuals test did not reject the presence of proportionality. Results are available upon request.

Figure 5: Survival curves for new products by existing exporters disaggregated by complexity and distance measures (2007-2017)

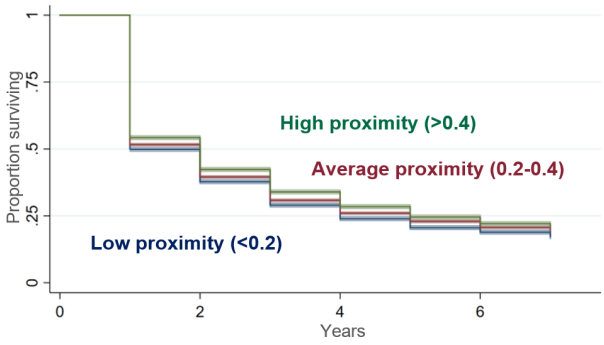
(a) Absolute complexity



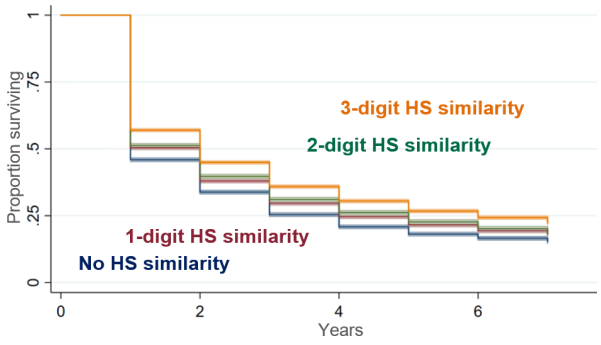
(b) Relative complexity with respect to the export basket in the previous two years



(c) Proximity to the export basket in the previous two years



(d) HS similarity to the export basket in the previous two years



Note: The shaded area represents a 95% confidence interval.
Sources: CSB of Latvia, own calculations.

indebtedness and profit ratios, ownership indicators and employees' characteristics; (b) dummy variables indicating the participation of a firm in different support activities, such as projects co-financed by EU funds as well as innovation activities; and (c) factors related to exporting, such as imports of intermediate goods, participation in re-exporting, export destinations, the number of products and destinations at entry and complexity, as well as, for the product-level regressions, the above discussed measures of product proximity and similarity. In addition, the model includes 2-digit NACE industry fixed effects, and year and month of entry fixed effects, which help to account for world aggregate demand shocks. The survival hazard function is estimated for three different samples: a) for all firms; b) for firms with at least 10 employees that excludes small firms with high data volatility; and c) for firms that participated in the EU Community Innovation Survey, which allows us to control for whether or not a firm has made any innovations. However, this last set of results is based on a relatively small sample size and should be treated with caution.

Most of the firm-level variables refer to the situation one year before entry to avoid possible reverse causality. For example, we use dummy variables on participation in the EU-funded activities, ownership and the level of labour productivity one year prior to establishing the export relation. Some firm variables, however, enter the regression with a one-year lag (some financial variables, size and productivity growth variables). The descriptive statistics on all variables included in the survival analysis can be found in Annex B.[13]

5 Determinants of firm-level export survival

Table 1 reports estimated coefficients on various explanatory variables in the hazard function for new exporters. Column (2) reports the results for all new exporting firms that entered between 2007 and 2017, column (3) those obtained from the sample excluding exporters with less than 10 employees and column (4) those for the much smaller sample of firms that participated in the Community Innovation Survey.

Regarding the conventional firm-level characteristics that are widely acknowledged to affect survival probabilities, we confirm the findings by the previous literature (see e.g. Békés and Muraközy 2012) that large, productive and young firms tend to have prolonged export duration. In contrast to previous studies, we split labour productivity into two components: the level of productivity before entry and the change in productivity in comparison to the year before entry. Both productivity level and its growth are found to correlate with survival positively, but only productivity growth effect is statistically significant. The positive effect of productivity conforms to the theoretical framework suggested by Bernard et al. (2011), where positive firm-specific supply shocks increase the duration of exporting. The productivity effect appears insignificant in the small subsample of firms participating in the Innovation Survey, which can be related to the fact that these firms tend to be larger and more productive in the first place, and that there is less variation in productivity levels among those companies. We also find that young firms have significantly better chances for survival on external markets compared to older firms. Moreover, some of our results point to higher survival rates for less indebted and more profitable exporting firms.

[13] We also exclude outliers by dropping the top and bottom 1st percentile observations in productivity and financial variables.

Table 1: Cox survival model of hazard function for new exporters

Variable	All entries	Firms with at least 10 employees	Firms with at least 10 employees participating in CIS
(1)	(2)	(3)	(4)
Firm-related determinants			
Log of number of employees (t-1)	-0.06***	-0.13***	-0.12
Log of labour productivity (one year before entry)	-0.03	-0.02	0.007
ΔLog of labour productivity (t-1 to one year before entry)	-0.08***	-0.08**	-0.08
Debt to assets (t-1)	0.10***	0.07	0.04
Long-term bank loans to assets (t-1)	0.03	0.03	0.30
Profits to assets (ROA, t-1)	-0.01	-0.10**	-0.07
Age of the firm at entry	0.02***	0.02***	0.01
Owners from EE and LT (one year before entry)	-0.09	-0.04	0.19
Owners from other OECD (one year before entry)	0.24*	0.16	0.44
Owners from non-OECD (one year before entry)	-0.14	0.03	-0.79
Firm re-entered export market	0.06	-0.008	-0.10
Imports of intermediate goods to turn. (one year before entry)	0.01	-0.005	-0.85
Share of young (<35) in total employees (one year before entry)	-0.07	0.14	0.34
Share of women in total employees (one year before entry)	0.004	0.17	0.95*
Share of young (<35) in managers (one year before entry)	-	-0.08	0.03
Share of women in managers (one year before entry)	-	-0.07	-0.41
Firm appears in PRODCOM	-0.13	-0.17	-0.003
Non-re-exporters	0.30***	0.30***	0.39
Firm development activities			
EU fund 2.1.2.2. (new products and tech.) (one year before entry)	0.62	0.19	0.34
EU fund 2.1.2.4. (high VA investments) (one year before entry)	0.20	0.07	-0.62
EU fund 2.3.1.1. (external markets) (one year before entry)	-0.23	-0.26	-0.41
EU fund (other in 2007-2013) (one year before entry)	0.06	0.10	-40.7
Innovations (one year before entry)	-	-	-0.10
Characteristics of entry			
Number of products at entry	-0.01**	-0.008*	-0.02
Number of destinations at entry	-0.11***	-0.15***	-0.12
Complexity at entry	0.03	0.06	0.12
Log of the value at entry year	-0.05***	-0.05***	-0.07
Entry to Baltic countries (dummy)	-0.37***	-0.37***	-0.50**
Entry to neighbouring EU countries (dummy)	-0.49***	-0.47***	-0.36
Entry to other EU countries (dummy)	-0.46***	-0.49***	-0.59***
Entry to RU/BY/UA/MD (dummy)	-0.32***	-0.31***	-0.28*
Fixed effects			
NACE 2-digit fixed effects	Yes	Yes	Yes
Year of entry fixed effects	Yes	Yes	Yes
Month of entry fixed effects	Yes	Yes	Yes
Number of entries / number of exits	6819 / 4254	2803 / 1691	480 / 240

Note: A negative coefficient implies higher survival
Sources: SRS of Latvia, CSB of Latvia, own calculations.

Another robust finding is that firms that are involved in re-export activities have significantly better chances of export survival. This suggests that the risks associated with re-exporting are lower than those of exporting own products.

Since we include industry-level fixed effects, we can compare hazard rates for various industries. It appears that new exporters of food, chemical and pharmaceutical products tend to survive longer

on the export market than firms from other industries.[14]

Participation in EU-funded programmes prior to entry (including programmes that are specifically designed to support enterprises entering external markets and introducing new products and technologies) does not contribute directly to export survival. Similarly, innovation activities one year before entering the external market do not alter the duration of exporting significantly, possibly because industry effects are already controlled for or due to the small sample size. This finding contradicts the evidence from a descriptive analysis that firms participating in EU-funded programmes aimed at supporting exports as well as innovating firms survive longer on the external market (Figure 3). It is likely that such observations are driven by the fact that firms participating in EU-funded programmes as well as innovating firms tend to be larger and more productive (Benkovskis et al. 2019), and are thus more likely to survive. The direct impacts of EU-funded programmes and innovation after controlling for these firm characteristics are not statistically significant.[15]

Concerning entry characteristics, we find that multi-product and multi-destination entries to external markets improve survival, perhaps because entry diversification reduces the probability for a firm to be hit by a large negative demand shock. Moreover, multi-product and multi-destination entry may reveal that the firm operates at a more advanced technological level. In addition, a higher value of exports at entry increases the survival of a newly exporting firm because it signals the firm's confidence in the entry. The geographical destination of entry is also found to be important for the survival of a newly exporting firm. Thus, a firm would experience the longest survival on the external market if it enters an EU country outside the Baltics, which is striking, given that Lithuania and Estonia are Latvia's closest neighbours and main trading partners. The lowest survival, keeping everything else equal, is observed for distant non-EU destinations.

Finally, the (weighted) absolute complexity of the products exported by a newly exporting firm does not affect the survival of the exporting relationship. This finding is at odds with that by Córcoles et al. (2014) but not necessarily surprising. Although complex products are likely to be highly differentiated and not easily replaced by competing products, such exports are likely to fail nonetheless if exporting firms do not possess sufficient technological capabilities to ensure high quality. As a result, the overall effect on survival is neutral. An exporting firm's survival would

[14] In particular, the hazard of exporters from food manufacturing tends to be lower by 32% comparing with exporters from agriculture (the benchmark group). For chemical and pharmaceutical products, the hazard is lower by 45% and 86%, respectively. Results are available upon request.

[15] EU-funded support programmes or innovation activities may nevertheless enhance firms' export survival indirectly by boosting productivity (Benkovskis et al. 2019).

therefore hinge on the complexity of its exports relative to its capabilities. While we do not have information on the product basket of Latvian firms that would allow us to infer their technological capabilities, we are able to leverage the information contained in their overall export basket. The next section explores this aspect in the context of product-level export survival.

6 Determinants of product-level export survival

This section focuses on the product dimension of survival, analysing the entry of new products (at the HS 4-digit level) by incumbent exporters. The reason why we focus on existing exporters is twofold: first, the survival of new exporters was already covered in the previous section; second, by focusing on existing exporters we can compare the characteristics of new products with those of the previous basket of export products. Table 2 reports the results of the Cox survival model for new products of incumbent exporters using the same sub-samples as in Table 1. The set of survival determinants remains similar to that used in the previous section, but we use the wider list of entry characteristics and control for product fixed effects (at the 2-digit HS level).

The estimation results at the product level mostly confirm our findings at the firm entry level. In particular, survival is positively affected by firms' size, productivity, profitability and age. Similarly, new products introduced by firms that are not involved in re-exporting have a lower probability of survival. The survival of new products is also positively related to the structure of a firm's labour force – a higher share of younger (below 35 years) and female employees is associated with better product survival.

While participation in EU-funded programmes is still not associated with differences in survival, innovation activities increase the export duration of a new product. This may flag the importance of innovations for the development of incumbent exporters and the necessity of innovations for the introduction of competitive new products. Entry characteristics such as diversification of destination markets and growth in product-specific world demand (calculated as a weighted average growth of the imports of that product across countries) are associated with higher survival. Similarly, a larger export value at entry implies higher survival.

Table 2: Cox survival model of hazard function for new products of existing exporters

Variable	All entries	Firms with at least 10 employees	Firms with at least 10 employees participating in CIS
(1)	(2)	(3)	(4)
Firm-related determinants			
Log of number of employees (t-1)	-0.05***	-0.06***	-0.037***
Log of labour productivity (one year before entry)	-0.01**	0.001	0.06***
ΔLog of labour productivity (t-1 to one year before entry)	-0.04***	-0.03***	0.06***
Debt to assets (t-1)	0.03**	0.039**	0.02
Long term loans from bank to assets (t-1)	-0.03	-0.06	-0.13
Profits to assets (ROA, t-1)	-0.08***	-0.12***	-0.24***
Age of the firm at entry	0.003***	0.002**	-0.006***
Owners from EE and LT (one year before entry)	-0.004	-0.002	-0.004
Owners from other OECD (one year before entry)	0.02	0.005	-0.08***
Owners from non-OECD (one year before entry)	0.05	0.09**	0.14***
Imports of intermediate goods to turn. (one year before entry)	-0.01	-0.07**	-0.07
Exports to turnover (one year before entry)	-0.07***	-0.10***	-0.02
Number of exported products (one year before entry)	-0.00***	-0.003*	-0.001***
Number of exported destinations (one year before entry)	0.004***	0.004***	0.002***
Share of young (<35) in total employees (one year before entry)	-0.10***	-0.07	-0.12
Share of women in total employees (one year before entry)	-0.08***	-0.08*	-0.06
Share of young (<35) in managers (one year before entry)	-	0.01	-0.16**
Share of women in managers (one year before entry)	-	0.03	0.03
Firm appears in PRODCOM	0.04*	0.04*	0.08**
Share of re-exports < 25%	0.43***	0.43***	0.39***
EU fund 2.1.1.1. (science and innovation) (one year before entry)	0.29	0.22	0.22
EU fund 2.1.2.2. (new products and tech.) (one year before entry)	0.07	0.07	0.08
EU fund 2.1.2.4. (high VA investments) (one year before entry)	0.07	0.07	0.13*
EU fund 2.3.1.1. (external markets) (one year before entry)	-0.02	0.001	-0.06*
EU fund (other in 2007-2013) (one year before entry)	-0.09	-0.09	0.05
EU fund 1.2.1. (investments into R&D) (one year before entry)	0.09	0.06	0.005
EU fund 3.1.1. (SME developments) (one year before entry)	-0.53	-0.54	-0.55
EU fund (other in 2014-2020) (one year before entry)	0.05	0.02	0.01
Innovations (one year before entry)	-	-	-0.10***
Characteristics of entry			
Absolute complexity at entry	-0.06***	-0.07***	-0.05**
Relative complexity at entry	0.05***	0.07***	0.04***
Proximity at entry	-0.29***	-0.26***	-0.12
HS similarity at entry	-0.01***	-0.01**	-0.01
World demand for a product (t-1)	-0.19***	-0.13***	-0.25***
Log of the value at entry year	-0.02***	-0.01***	-0.026***
Re-entry of a product	0.06***	0.08***	0.07***
Number of destinations at entry	-0.17***	-0.19***	-0.15***
Entry to Baltic countries (dummy)	-0.37***	-0.40***	-0.41***
Entry to neighbouring EU countries (dummy)	-0.43***	-0.44***	-0.35***
Entry to other EU countries (dummy)	-0.35***	-0.35***	-0.32***
Entry to RU/BY/UA/MD (dummy)	-0.39***	-0.41***	-0.46***
Fixed effects			
NACE 2-digit fixed effects	Yes	Yes	Yes
HS 2-digit product effect	Yes	Yes	Yes
Year of entry fixed effects	Yes	Yes	Yes
Month of entry fixed effects	Yes	Yes	Yes
Number of entries / number of exits	74249 / 46058	54303 / 33429	21640 / 12482

Note: A negative coefficient implies higher survival
Sources: SRS of Latvia, CSB of Latvia, own calculations.

Concerning product complexity, we can now distinguish between the absolute complexity of a product and its complexity relative to the previous export product basket. Table 2 indicates that the

absolute complexity of the product tends to increase the survival of a new product. These findings are now brought into line with results by Córcoles et al. (2014). The positive effect of product complexity could be driven both by demand factors (complex products face more stable demand) and supply factors (complex products require better firm-level technology and competencies). In any case, these results suggest that shifting the composition of exports towards more complex products may improve their survival, positively affecting both extensive and intensive margins of export growth. In other words, they indicate that "aiming high" can be a useful strategy for enterprises. At the same time, Table 2 reports a negative relationship between product complexity relative to the existing export product basket and the survival of new products. Such a finding is in line with a view that firms face higher marginal costs for products further away from their core capabilities (Eckel and Neary 2010). Both measures of the distance – proximity and HS similarity – point in the same direction, as can be observed from Table 2. These results are also in line with Eckel and Neary (2010) and call for gradual changes in the composition of export products, as well as firms' capabilities.

7 Concluding remarks

This study identified several characteristics of exporting firms and exported products that contribute to longer survival of trade relationships. As with other countries, average export duration of Latvian firms is short. Average spells are about two years, with only one out of four export relationships lasting more than five years.

By exploiting a rich firm-level dataset this paper shows that exporters with a higher productivity level, larger size, lower debt levels and higher profitability are more likely to survive, as well as those exporting many products or exporting to neighbouring countries. We also find that exporting complex products improves the survival of trade relationships. However, exporting products that are more complex or distant from the firm's previous export bundle reduces the chances of survival. These findings indicate the risk of "aiming too high" by exporting complex products that go beyond firms' technological and non-technological capabilities. They point to an "aim high but shoot low" strategy where firms increase the complexity of the export basket gradually within their capabilities, so that the survival of complex exports is not endangered.

More generally, even though this paper lacked access to such data, it is likely that upgrading

the skills and knowledge of exporters' employees about export markets would help Latvia ensure the continuity of trading relationships and progress towards exporting more complex products with greater technical requirements. Our finding that firms with larger share of young employees enjoy higher survival on the external market can be treated as an indication of the importance of skills and knowledge, which in Latvia's case are more plentiful in younger cohorts. Two relevant policy measures are export promotion activities and training, including managerial training. Relatively few Latvian firms are run by professional managers (rather than by family members); this can hinder the adoption of modern managerial approaches and hurt productivity. Additionally, low-skilled managers might not have the most up-to-date information regarding trends in global demand, a factor that influences export duration significantly. Another possible way to accelerate the flow of relevant knowledge is through export promotion measures. Small firms often struggle to bear the upfront costs of entering and surviving on foreign markets, which involve learning about market conditions, identifying distribution channels and searching for foreign partners. For this reason, export promotion measures disproportionately benefit smaller firms' export performance. As the share of small firms in Latvia is large, the pooling of resources and building a community of exporters that learn from one another could also help to increase the durability of export relationships.

References

Albornoz, F., S. Fanelli, and J. C. Hallak (2016). Survival in Export Markets. *Journal of International Economics 102*(C), 262–281.

Benkovskis, K., S. Berzina, and L. Zorgenfreija (2016). Evaluation of Latvia's Re-Exports Using Firm-Level Trade Data. *Baltic Journal of Economics 16*(1), 1–20.

Benkovskis, K., O. Tkačevs, and N. Yashiro (2019). Importance of EU Regional Support Programmes for Firm Performance. *Economic Policy 34*(98), 267–313.

Bernard, A. B., S. J. Redding, and P. K. Schott (2010). Multiple-Product Firms and Product Switching. *American Economic Review 100*(1), 70–97.

Bernard, A. B., S. J. Redding, and P. K. Schott (2011). Multiproduct Firms and Trade Liberalization. *The Quarterly Journal of Economics 126*(3), 1271–1318.

Besedeš, T. (2008). A Search Cost Perspective on Formation and Duration of Trade. *Review of International Economics 16*(5), 835–849.

Besedeš, T. and T. J. Prusa (2006). Product Differentiation and Duration of US Import Trade. *Journal of International Economics 70*(2), 339–358.

Besedeš, T. and T. J. Prusa (2011). The Role of Extensive and Intensive Margins and Export Growth. *Journal of Development Economics 96*(2), 371–379.

Brenton, P., C. Saborowski, and E. von Uexkull (2010). What Explains the Low Survival Rate of Developing Country Export Flows? *World Bank Economic Review 24*(3), 474–499.

Békés, G. and B. Muraközy (2012). Temporary Trade and Heterogeneous Firms. *Journal of International Economics 87*(2), 232–246.

Cadot, O., L. Iacovone, M. D. Pierola, and F. Rauch (2013). Success and Failure of African Exporters. *Journal of Development Economics 101*(C), 284–296.

Córcoles, D., C. Díaz-Mora, and R. Gandoy (2012). Export Survival in Global Value Chains. Working Papers 12-03, Asociación Española de Economía y Finanzas Internacionales.

Córcoles, D., C. Díaz-Mora, and R. Gandoy (2014). Product Sophistication: A Tie That Binds Partners in International Trade. *Economic Modelling 44*(S1), 33–41.

Eckel, C. and J. P. Neary (2010). Multi-Product Firms and Flexible Manufacturing in the Global Economy. *Review of Economic Studies 77*(1), 188–217.

Esteve-Pérez, S., J. A. Máñez-Castillejo, M. E. Rochina-Barrachina, and J. A. Sanchis-Llopis (2007). A Survival Analysis of Manufacturing Firms in Export Markets. In J. M. Arauzo-Carod and M. C. Manjón-Antolín (Eds.), *Entrepreneurship, industrial location and economic growth*, Chapter 16, pp. 313–332. Elgar.

Hausmann, R. and B. Klinger (2006). Structural Transformation and Patterns of Comparative Advantage in the Product Space. CID Working Papers 128, Center for International Development at Harvard University.

Hidalgo, C. A. and R. Hausmann (2009). The Building Blocks of Economic Complexity. *Proceedings of the National Academy of Sciences 106*(26), 10570–10575.

Kostevc, C. and K. Z. Kejžar (2020). Firm-level Export Duration: The Importance of Market-Specific Ownership Linkages. *The World Economy 43*(5), 1277–1308.

Manova, K. and Z. Yu (2017). Multi-Product Firms and Product Quality. *Journal of International Economics 109*(C), 116–137.

Mayer, T., M. J. Melitz, and G. I. P. Ottaviano (2014). Market Size, Competition, and the Product Mix of Exporters. *American Economic Review 104*(2), 495–536.

Nitsch, V. (2009). Die Another Day: Duration in German Import Trade. *Review of World Economics (Weltwirtschaftliches Archiv) 145*(1), 133–154.

Obashi, A. (2010). Stability of Production Networks in East Asia: Duration and Survival of Trade. *Japan and the World Economy 22*(1), 21–30.

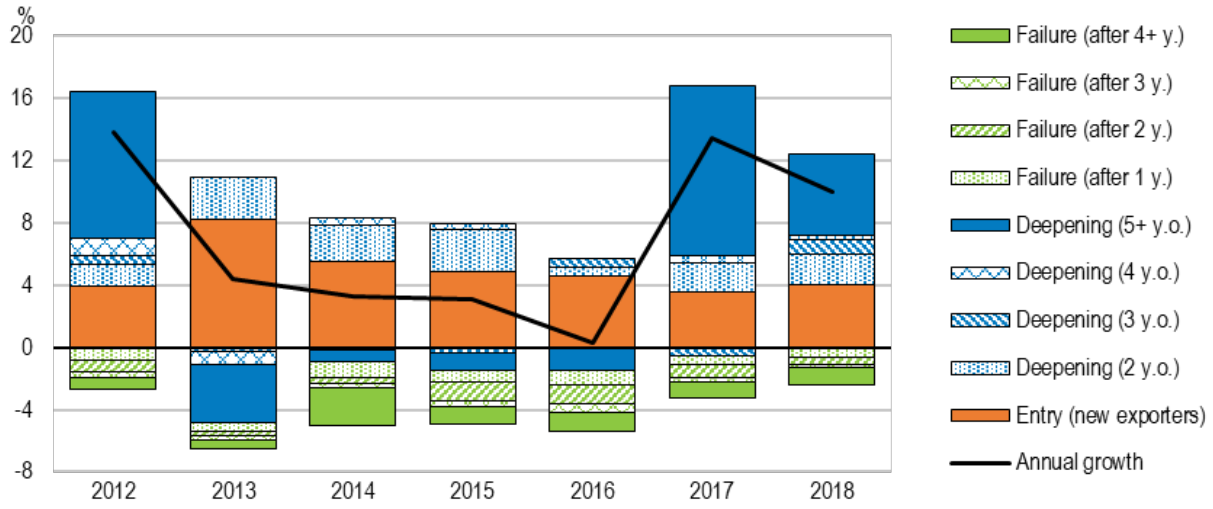
Rauch, J. E. and J. Watson (2003). Starting Small in an Unfamiliar Environment. *International Journal of Industrial Organization 21*(7), 1021–1042.

Socrates, M. K., E. Moyi, and K. Gathiaka (2020). Explaining Export Duration in Kenya. *South African Journal of Economics 88*(2), 204–224.

Volpe Martincus, C. and J. Carballo (2011). Survival of New Exporters in Developing Countries: Does it Matter How They Diversify? IDB Publications (Working Papers) 2494, Inter-American Development Bank.

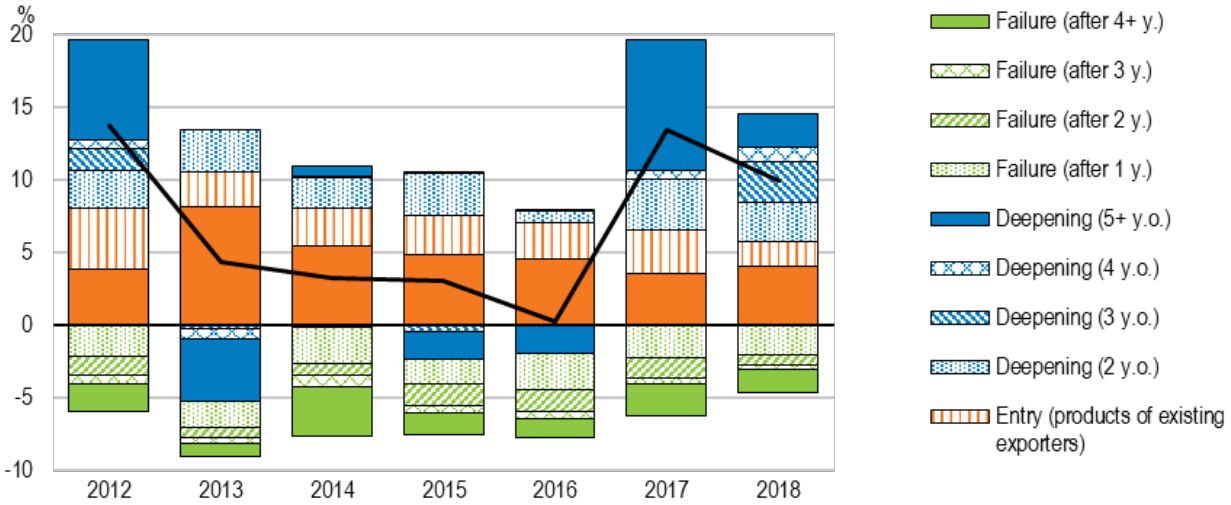
Annex A. Decomposition of merchandise export growth in Latvia (average % change, 2012-2018)

Figure A.1: Decomposition at the exporting firm level



Note: While the available data span the period from 2005, we can identify spells of existing exporters with at least five years of experience starting from 2012 (another two years are lost because of the definition of entry). The last year when we can identify failures is 2018. Therefore, the chart reports the decomposition of average export growth in 2012-2018 (6.9%). See Annex A for the breakdown of export growth by year.
Sources: CSB of Latvia, own calculations.

Figure A.2: Decomposition at exporting firm-product pair level



Note: While the available data span the period from 2005, we can identify spells of existing exporters with at least five years of experience starting from 2012 (another two years are lost because of the definition of entry). The last year when we can identify failures is 2018. Therefore, the chart reports the decomposition of average export growth in 2012-2018 (6.9%). See Annex A for the breakdown of export growth by year.
Sources: CSB of Latvia, own calculations.

Annex B. Descriptive statistics of survival determinants

Table B.1: Descriptive statistics for new exporting firms (2007-2017)

Variable	No. of obs.	Mean	Std. Dev	Min	Max
Log of number of employees (t-1)	33560	1.96	1.43	-2.30	8.8
Log of labour productivity (one year before entry)	20688	9.42	1.26	0.56	14.7
ΔLog of labour productivity (t-1 to one year before entry)	18179	0.126	1.18	-7.8	8.1
Debt to assets (t-1)	32727	0.878	0.69	0	7.8
Long term loans from bank to assets (t-1)	32727	0.0327	0.09	0	0.6
Profits to assets (ROA, t-1)	32727	0.283	47.2	-98	8520
Age of the firm at entry	33842	7.51	6.1	1	27
Owners from EE and LT (one year before entry)	26521	0.01	0.10	0	1
Owners from other OECD (one year before entry)	26521	0.02	0.13	0	1
Owners from non-OECD (one year before entry)	26521	0.01	0.08	0	1
Firm re-entered export market	35080	0.12	0.32	0	1
Imports of intermediate goods to turn. (one year before entry)	26059	0.07	0.17	0	1.1
Share of young (¡35) in total employees (one year before entry)	23120	0.38	0.30	0	1
Share of women in total employees (one year before entry)	23119	0.34	0.29	0	1
Share of young (¡35) in managers (one year before entry)	10655	0.34	0.29	0	1
Share of women in managers (one year before entry)	10655	0.32	0.30	0	1
Firm appears in PRODCOM	35080	0.02	0.16	0	1
Non-re-exporters	35080	0.57	0.49	0	1
EU fund 2.1.2.2. (new products and tech.) (one year before entry)	35080	0.001	0.04	0	1
EU fund 2.1.2.4. (high VA investments) (one year before entry)	35080	0.001	0.03	0	1
EU fund 2.3.1.1. (external markets) (one year before entry)	35080	0.010	0.10	0	1
EU fund (other in 2007-2013) (one year before entry)	35080	0.002	0.04	0	1
Innovations (one year before entry)	1650	0.22	0.42	0	1
Number of products at entry	35080	3.85	10.1	1	432
Number of destinations at entry	35080	1.86	2.01	1	52
Complexity at entry	35080	0.22	0.87	-3.2	2.4
Log of the value at entry year	35080	10.7	2.32	0	18.2
Entry to Baltic countries (dummy)	35080	0.55	0.50	0	1
Entry to neighbouring EU countries (dummy)	35080	0.44	0.50	0	1
Entry to other EU countries (dummy)	35080	0.54	0.50	0	1
Entry to RU/BY/UA/MD (dummy)	35080	0.52	0.50	0	1

Sources: SRS of Latvia, CSB of Latvia, own calculations.