Discussion paper

Intermittent exporting: unusual business or business as usual?

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Abstract

We construct an empirically supported definition of intermittent and perennial exporting and investigate to what extent intermittent exporters are distinguishable from non-exporters and perennial exporters and which factors explain the switching of export status. Our findings point at a Melitz (2003) type productivity sorting pattern, where perennial exporters are more productive than intermittent exporters which are in turn more productive than non-exporters. However, intermittent exporting seems to be a temporary state for the large majority of the firms, which are, in most cases, on their way to becoming a perennial exporter. The longer it takes to complete this process the slimmer the chances seem to get that the firm succeeds in becoming a perennial exporter. Our results also suggest that in terms of productivity sorting the relatively small group of firms for which intermittent exporting is business as usual most closely resembles perennial exporters. Labor productivity also shows to be an important factor in the process of moving from intermittent exporting to perennial exporting, in addition to trade behavior pointing at integration of the firm in cross-border supply chains. Overall, our empirical findings suggest that firms seem to pass two productivity thresholds before they are able to continuously serve foreign markets; first when breaking into export markets and second when developing into a perennial exporter.

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1 Introduction

The majority of all firms is either always, i.e. every year, or never active on export markets. Nevertheless, empirical research shows that there is also a group of firms that is repeatedly active on foreign markets for a short time and then withdraws again to the domestic market (e.g. Békés and Muraközy (2012); Blum, Claro, and Horstmann (2013)). This phenomenon of repeatedly entering and exiting export markets is difficult to reconcile with trade theory, which is built on the idea that only the more productive firms are able to enter foreign markets. This is derived from the notion that exporting is a complex undertaking that is associated with considerable fixed costs (Melitz, 2003; Bernard, Jensen, Redding, and Schott, 2007). In order to enter foreign markets, substantial investments must be made, for example to find new customers and sales channels or to adapt products to the foreign market. Only the more productive firms are able to bear these costs. Firms need to stay in the export market for a longer period of time in order to recoup this investment, by generating a sufficiently large flow of revenues to make export a profitable endeavour. Exiting and re-entering the foreign market generally implies that these investments have to be made again, at least partially, because export skills and knowledge of foreign markets depreciate rather quickly after a firm stops exporting (Roberts and Tybout, 1997). In other words, after just a few years, a former exporter is no longer distinguishable from a firm that never took the step to foreign markets. This raises the question why firms frequently export intermittently?

To the best of our knowledge, very little attention has been directed to the phenomenon of intermittent exporting in the trade literature. The limited research that has been done roughly distinguishes three possible explanations for this phenomenon. Blum, Claro, and Horstmann (2013) show that one third of the Chilean exporters repeatedly enter and exit export markets, with continuous exporters being on average larger and more capital intensive. The theoretical explanation they offer for this focuses on developments in domestic demand. That is, incidental exporters only export if domestic demand falls, freeing up production capacity, which is supposedly fixed in the short run. If domestic demand picks up again, the incidental exporter withdraws from the foreign market and shifts its focus to the domestic market again. Bernini, Du, and Love (2016) also connect intermittent exporting to the interaction between demand developments on domestic and foreign markets.

An alternative explanation is provided by Békés and Muraközy (2012). They show theoretically and empirically that a combination of firm and destination country characteristics distinguishes incidental export flows from more permanent export flows to a particular destination market. Discriminating

factors in this respect include firm productivity and financial health, but also the proximity to and size of the destination market and the nature of the exported product are important. Albornoz, Pardo, Corcos, and Ornelas (2012) explain the phenomenon of intermittent exporting through a process of experimenting and learning to export, derived from the premise that the degree to which exporting is profitable is only revealed to the individual firm after market entry. In other words, a process of trial and error reveals to the firm which market fits its capabilities and product portfolio. This may require several attempts, which nevertheless justifies repeatedly incurring the necessary entry costs.

The root of intermittent exporting may however also lie with the foreign buyer. For example, foreign buyers may want to offer a continuously changing range of varieties to their customers or they may be dealing with temporary inventory issues that need to be resolved. In addition, buyers may want to place multiple sample orders before they are willing to enter into a more permanent buyer-supplier relationship (Geishecker, Schröder, and Sørensen, 2019).

The main aim of this study is to develop an empirically supported definition of intermittent and perennial exporting by combining insights from existing research of export behavior and to typify intermittent exporters. Our research question can be broken down in three parts:

1. Is intermittent exporting a separate state of being of firms in terms of productivity sorting, in the sense that intermittent exporters are more productive than non-exporters but less so than perennial exporters?

2. To what extent is intermittent exporting a steady state of firms and to what extent do intermittent exporters fall back to non-exporting or develop into perennial exporters?

3. Which factors can be identified that determine the path of development of intermittent exporters? For example, can we identify trade behavior that is more likely to lead to intermittent exporting as a steady state?

Existing research suggests that a Melitz (2003) type productivity sorting mechanism exists that places intermittent exporters between non-exporters and perennial exporters in terms of mean productivity (Békés and Muraközy, 2012). However, the empirical confirmation of this notion is scant. We thus add to the yet limited amount of available literature by digging in to this issue using micro-data concerning firms in the Netherlands, a small and very open economy. Furthermore, our main contribution lies in adding a dynamic component to the analysis of intermittent exporting to gain an understanding

of the factors shaping the development of intermittent exporters. We investigate graphically and descriptively to what extent intermittent exporting is in fact 'business as usual' for firms and to what extent it is a temporary state for firms on their way to becoming perennial exporters or to falling back to domestic markets if its export attempt fails. In the final step of our empirical analysis we further dig into the dynamics of intermittent exporting econometrically in an attempt to identify factors shaping the path of development of intermittent exporters.

Our findings point at the existence of a Melitz (2003) type productivity sorting pattern, where intermittent exporters are positioned in between non-exporters and perennial exporters in terms of productivity. However, intermittent exporting seems to be a temporary state for the large majority of the firms, which are, in most cases, on their way to becoming a perennial exporter. The longer it takes to complete this process the slimmer the chances seem to get that the firm succeeds in becoming a perennial exporter. For a relatively small group of firms intermittent exporting seems to be a natural line of business. Our results suggest that in terms of productivity sorting this group most closely resembles perennial exporters. Labor productivity also shows to be an important factor in the process of moving from intermittent exporting to perennial exporting, in addition to trade behavior pointing at integration of the firm in cross-border supply chains. However, productivity does not turn out to be a factor discriminating between persistently intermittent exporters and intermittent exporters ultimately withdrawing to domestic markets. Taking these results together we argue that firms seem to pass two productivity thresholds before they are able to continuously serve domestic markets; first when breaking into export markets and second when developing into a perennial exporter.

The unravelling of these various stages of maturity of exporters and the firm-level dynamics in this respect also yield an important message for policymakers, much in line with the message of Alvarez (2007). We argue that policy efforts aiming at increasing the export involvement of firms, and SMEs in particular, should take into account that there is considerable heterogeneity among firms within the group of exporters and export potentials. That is, our results indicate that stimulating a non-exporter to take the first step into exporting requires a different kind of support than supporting an intermittent exporter in becoming a perennial exporter. Conventional policy instruments, developed to prepare firms for their first steps on export markets, are generally aimed at reducing market entry costs, whereas supporting firms in cementing their role as an exporter in the longer run may require additional policy efforts aimed at boosting competitiveness, for example by stimulating productivity growth.

The remainder of this paper is structured as follows. The firm-level microdata employed in our analysis are introduced in Section 2, after which we proceed with a first descriptive look at the data and the patterns emerging from them in Section 3. Our empirical approach is laid out in Section 4 followed by a discussion of our results in Section 5. Section 6 wraps up.

2 Data

The analysis is derived from a merged data set comprising of a combination of four separate data sources: (i) the Registry of Business Demographics (RBD), (ii) the International Trade in Goods Statistics, (iii) Baseline and (iv) the Structural Business Statistics (SBS). Our sample covers the years 2010 through 2018.

The Registry of Business Demographics contains information on every firm located in the Netherlands and provides a number of basic firm characteristics. For example the sector of activity in accordance with internationally harmonized classifications such as NACE and ISIC, firm size in terms of employment, address information etc. An adjacent database is used to identify whether the ultimate controlling institution of the firm is located within the Netherlands or abroad. As such, the RBD is the backbone of firm-level statistics in the Netherlands with which additional information from other sources can be merged. In addition, a key feature of the RBD is the panel dimension in the sense that administrative events such as recodings are registered, enabling us to keep track of individual firms through time. Given our focus on goods exports we concentrate our analysis on firms operating in the business economy, thereby excluding for example agriculture, financial services and the public sector.

The Trade in Goods Statistics database provides information on all goods exports and imports by individual firms registered in the Netherlands including a decomposition in terms of traded product (at the 8-digit Combined Nomenclature level) and origin or destination country. The data additionally enable a distinction between re-exports and exports of Dutch product. Extra-EU trade is recorded by the Customs Authority and always includes product information at the 8-digit Combined Nomenclature (CN) level and specification of origin and destination country of trade. Trade within the EU is recorded by the Dutch Tax Authority. Only firms with intra-EU import and/or export values larger than a total of 1.2 million euro (threshold in 2016) are required to specify their trade transactions in terms of type of product and orginin/destination country through an additional questionnaire from Statistics Netherlands. Below this threshold firms only report the total

import and export value of intra-EU trade. However, since 2013, the export data do comprise of a full decomposition of destination country, also for firms below the reporting threshold, by merging them with the Intra-Community Transactions Declaration data. The trade data available at the firm level cover more than 80% of annual aggregate trade in terms of value in the Netherlands.[1]

The Baseline database contains a wide range of financial information on Dutch firms obtained from corporate tax declarations and income tax declarations. As this data source is characterized by a slight underrepresentation of large firms we combine the financial data from Baseline with information from the Structural Business Statistics which contains information on the production and cost structure of large firms which is derived from a survey.[2] The information from the combined databases is used to operationalize variables such as labor productivity and capital intensity.

3 A first look at the data

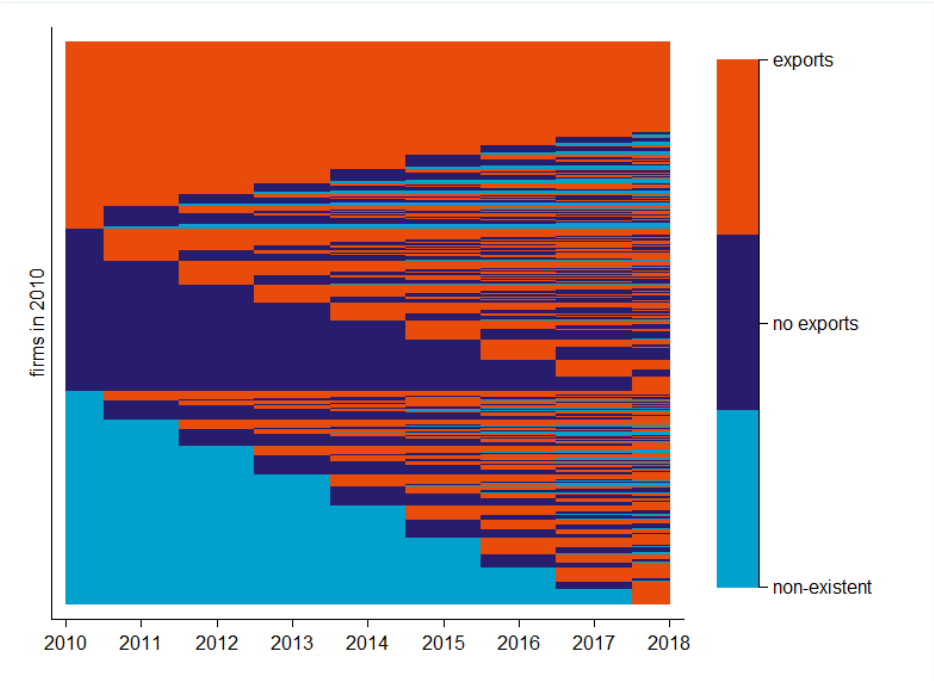
We start our analysis by investigating descriptively to what extent intermittent exporting is prevalent among Dutch exporters. Roughly 1 in 10 Dutch firms are active as a goods exporter in a given year, which is one of the highest percentages in the EU (Boutorat, Franssen, Mounir, and van den Berg, 2019). However, exporting is by no means a steady state. Over the course of 9 years (2010-2018) about 200 thousand unique firms reported goods exports in at least one year. However, only 16 percent of these firms have been active as a goods exporter in each of these 9 years. Figure 1 graphically depicts the export behavior of a random sample of 6,000 firms out of the population of 200 thousand unique firms reporting goods exports at least once in the period of analysis. Two things stand out. First, a considerable number of firms quits the export market within a few years after taking the first step abroad. In some cases firms cease to exist by the time they exit the foreign market (marked by a switch from orange to light blue), but in many cases the former exporter continues to serve the domestic market (marked by a switch from orange to dark blue). Second, there is a considerable group of firms that repeatedly starts and stops exporting: intermittent exporters.

[1]The trade data are recorded on VAT-numbers. Connection to the firm identification key used by Statistics Netherlands leads to a merging loss of about 20% of annual trade values, because of foreign firms trading on Dutch VAT-numbers without a physical representation in the Netherlands. These firms are not registered in the RBD.

[2]We do not combine information from the two sources for individual firms within the sample period. That is, for each firm we take the required information either from Baseline or from the SBS, whichever provides the best coverage for that particular firm.

These observed patterns of repeatedly entering and exiting export markets are at odds with trade theory, which builds on the notion that only more productive firms are able to enter foreign markets. This is derived from the premise that exporting is a complex undertaking that is associated with considerable fixed costs, which only the more productive firms are able to incur. In order to recoup this investment, firms need to generate a sufficiently large flow of revenues recoup this investment. Repeatedly exiting and re-entering the foreign market is difficult to reconcile with this theoretical premise.

Figure 1: Export behavior of individual Dutch firms (n=6000)

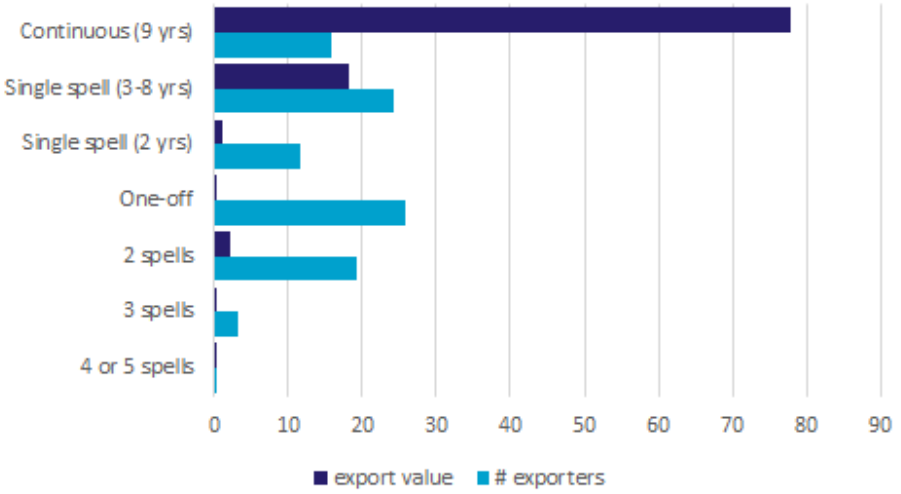


Notes: This figure graphically depicts the export behavior of a random sample of 6,000 firms out of the population of 200 thousand unique firms reporting goods exports at least once in the period of analysis. The figure thus does not provide a random sample of the full Dutch business population in the period 2010-2018, since firms that did not report exports in either of those years are excluded from the sample.

Figure 2 reveals the contribution of various groups of exporters with similar trade patterns over the years 2010-2018 to the population of exporting firms and the total value of exports. The most striking picture emerging is that continuous exporters - reporting goods exports in each of the 9 years observed and accounting for 16 percent of the exporting population - generate about 78 percent of the total value of goods exports. In addition to

continuous exporters there is a considerable group of firms reporting a single spell of two or more consecutive years of exporting. These groups amount to 35 percent of the number of exporters generating about 20 percent of the total value of exports. However, more than half of this group consists of firms with an export spell continuing into 2018, which is the most recent year for which data are available. At least part of this group of firms will most likely develop into continuous exporters.

Figure 2: Share of exporters and export value by trade pattern (%)



Another striking observation is that firms reporting one-off goods exports account for no less than a quarter of the total number of unique exporters in our 9 year period, but jointly generate just half a percent of exports in terms of value. The same applies to intermittent exporters: firms reporting more than one export spell, with a maximum of 5, over the course of 9 years. Intermittent exporters jointly constitute more than 20 percent of the population of exporters, but account for less than 2.5 percent of the total value of goods exports. An interesting piece of anecdotal evidence is provided by the small group of firms reporting the maximum of 5 export spells. A significant part of this group of firms comprises of art dealers. This type of firm provides a natural example of a business model based on a small number of relatively large transactions. Industries characterized by craftsmanship, such as the manufacturing of musical instruments (NACE 32.2) or the cutting, shaping and finishing of stone (NACE 23.7) also emerge as industries with relatively high shares of firms with 3-5 export spells. Intermittent trading comes at no surprise for these types of business. In other words, intermittent

exporting may also be an optimal or natural trading strategy in particular lines of business. Other lines of business that spring to mind in this respect are industries manufacturing capital goods characterized by long production times, such as shipbuilding or the construction of offshore installations. However, digging deep into the NACE-classification does not yield a clear pattern of particular industries consistently characterized by intermittent exporting, suggesting that the main explanation for this phenomenon is to be found elsewhere.

The key takeaway from this first glance at the data is that repeated switching of export status is prevalent among Dutch firms. However, even though a considerable share of the exporting firm population is not active on foreign markets every year, this group accounts for a minor share of Dutch exports in terms of value. In the next sections we further dig in to the phenomenon of intermittent exporting.

4 Empirical approach

Our analytical exercise is divided into three parts along the lines of the research questions laid out in section 1. To this end, we first need to develop a set of definitions distinguishing intermittent exporters from non-exporters and perennial exporters. In order to do so we consider rolling cohorts of 4 consecutive years to determine the export status of each individual firm in each individual year, bundling firms showing similar export patterns. There are two key arguments for considering a four-year period for the determination of the export status. First, existing research shows that from the third year after exiting export markets, former exporters are indistinguishable from firms that have never exported in their chances to (re-)enter the foreign market (Roberts and Tybout, 1997). This implies that the number of years taken into account to determine export status should be no less than three years, since it would not be possible to discriminate exiting exporters from continuing exporters otherwise. Second, considering a three year period is complicated in the accommodation of single year gaps. That is, with the earlier discussion of art dealers and shipbuilders in mind it seems sensible to allow continuous exporters a single year of non-exporting without immediately switching their status from perennial exporter to intermittent exporter. More importantly, in doing so we also implicitly accommodate the lumpiness of exports in the spirit of Conconi, Sapir, and Zanardi (2016). This is however difficult to operationalize employing cohorts of 3 years. Taking these considerations into account we determine the export status of each firm in each year by considering 4 consecutive years. In doing so, firms reporting

goods exports in at least three years in the period *t-3* through t are considered a perennial exporter in year t. Firms reporting exports in at least one and at most 2 of the 4 consecutive years are labelled intermittent exporters.[3] Otherwise the firm is labelled non-exporter.

In the first step we establish econometrically whether intermittent exporting constitutes a separate state of being of firms in terms of productivity sorting. That is, we investigate to what extent intermittent exporters differ from non-exporters and continuous exporters in terms of productivity. We dig into this question using a simple ordinary least squares (OLS) regression inspired by Bernard and Jensen (1999); McCann (2013); Alvarez (2007) with standard errors clustered at the level of the firm:

$$\begin{aligned} lnProd_{fit} = \alpha + \beta(ExpStatus_{fit} + ln(K/L)_{fit} + Size_{fit} \\ + Age_{fit} + ImpStatus_{fit-3,t}) + \delta_{it} + \epsilon_{fit} \end{aligned} \tag{1}$$

β denotes a vector of characteristics of firm f operating in industry i in year t. Labor productivity ($lnProd_{fit}$) is expressed as (the log of) value added per worker. Export status ($ExpStatus_{fit}$) is a dummy variable distinguishing resp. non-exporters, intermittent exporters and perennial exporters. The capital-labor ratio ($ln(K/L)_{fit}$) is approximated by (the log of) the book value of total fixed assets per worker. Both labor productivity and the capital-labor ratio are expressed in real terms using industry level price deflators at varying levels of aggregation. Firm size ($Size_{fit}$) is expressed in size classes in terms of numbers of workers. This variable also accounts for the size of the domestic enterprise group and whether the ultimate control of the firm is located abroad. That is, we define small and medium sized enterprises (SMEs) as firms with up to 250 employees, that also have no more than 249 employees at the highest aggregate domestic enterprise group level of the firm and with the ultimate control located in the Netherlands (see Chong, Hoekstra, Lemmers, Van Beveren, Van Den Berg, Van Der Wal, and Verbiest (2019) for an elaborate discussion). All other firms are bundled in a separate group coined large firms and multinational enterprises (MNCs). Firm age (Age_{fit}) is also expressed in categorical terms. The variable $ImpStatus_{fit}$ indicates whether the firm is also active as an importer of goods. This variable is constructed by observing the same period of four consecutive years as is done for the determination of the export status of the firm. We control for

[3]Non-exporting and non-existence are treated the same in the determination of intermittent exporting and perennial exporting. That is, a firm exporting three out of the most recent four years is considered a perennial exporting irrespective of whether it existed in the fourth year, but did not export, or did not exist as a firm in the fourth year.

industry and year and industry-year fixed effects with δ_{it} so that β_2 shows the marginal differences in productivity for three subsets of firms: non-exporters, intermittent exporters and perennial exporters.

We investigate to what extent intermittent exporting is a steady state of firms descriptively and graphically, by mapping developments in the export status of the 2013-cohort of firms. As we laid out in section 2 our panel runs from 2010 to 2018. Since we determine the export status of the firm from its export behavior in the four most recent years, 2013 is the first year in which we can determine the export status of each firm and track the development of its status in subsequent years up to 2018. This enables us to focus on the subset of firms that is identified as intermittent exporter in 2013 and follow the development of their export endeavors in subsequent years in order to assess if intermittent exporting is foremost a steady state or a temporary state of new exporters on their way to becoming a perennial exporter or on their way to falling back to serving solely domestic markets.

In the final step of our analysis we investigate which factors correlate with the observed development paths. That is, which factors are associated with the development of an intermittent exporter into a perennial exporter or a non-exporter? To this end, we run a series of Probit-regressions of the following forms, with standard errors again clustered at the firm-level:

$$\begin{aligned} Pr(perennial_{fit+n} = 1 | intermittent_{fit} = 1) = \alpha + \beta(lnProd_{fit} \\ + ln(Solv)_{fit} + ExpShare_{fit-3,t} + ShareExpEU_{fit-3,t} + ImpStatus_{fit-3,t} \\ + (ShareExpInt_{fit-3,t} \times ImpStatus_{fit-3,t}) + Size_{fit} + Age_{fit} + \delta_{it} + \epsilon_{fit} \end{aligned} \tag{2}$$

$$\begin{aligned} Pr(nonexporting_{fit+n} = 1 | intermittent_{fit} = 1) = \alpha + \beta(lnProd_{fit} \\ + ln(Solv)_{fit} + ExpShare_{fit-3,t} + ShareExpEU_{fit-3,t} + ImpStatus_{fit-3,t} \\ + (ShareExpInt_{fit-3,t} \times ImpStatus_{fit-3,t}) + Size_{fit} + Age_{fit} + \delta_{it} + \epsilon_{fit} \end{aligned} \tag{3}$$

The dependent variable in these regressions is the probability that a firm is a perennial exporter (equation 2) or a non-exporter (equation 3) in year $t + n$, as opposed to still being an intermittent exporter in $t + n$, given it is an intermittent exporter in year t. In order to be able to consider various time horizons of changing export behavior, n ranges from 3 to the maximum of 5 due to the length of our panel. In addition to a set of explanatory variables similarly defined as in equation 1, we include a number of variables characterizing the export portfolio of the firm, as prescribed by Békés and

Muraközy (2012). The variable $ExpShare_{fit-3,t}$ expresses the share of exports in total sales, $ShareExpEU_{fit-3,t}$ the share of EU-destinations in total goods exports and $ShareExpInt_{fit-3,t}$ the share of intermediate inputs in total goods exports according to the aggregation into *Broad Economic Categories* as proposed by the United Nations. Since a firm that is categorized as an intermittent or perennial exporter in a particular year may in fact not record any exports in that same year we take the mean of the respective export shares over the years $t-3$ through t for the latter three explanatory variables, in line with the time frame employed to assess the export status of the firm. In addition, the variable $ShareExpInt_{fit-3,t}$ is interacted with the dummy variable reflecting the import status of the firm. We consider this interaction a very rough measure of the involvement of the firm in international supply chains and hypothesize that firms engaging in the exporting of intermediate goods and simultaneous importing are more likely to become perennial exporters, since their integration in supply chains is not easily reversible. To conclude, in line with Békés and Muraközy (2012), we include (the log of) the solvency ratio ($ln(Solv)_{fit}$) as a control variable which is defined as the ratio of equity capital to total capital. Békés and Muraközy (2012) employ a measure of solvency as a proxy for the cost of capital and argue that firms facing high capital costs are more likely to remain intermittent exporters. We argue that our measure of solvency may also negatively correlate with the probability of becoming a perennial exporting if firms are more inclined to finance new export endeavors with debt capital. Earlier research among Dutch firms showed that export starters have significantly lower solvency ratio's than non-exporters and established exporters, indicating that this may indeed be the case (Mounir and van den Berg (2017), in Dutch).

5 Results

Intermittent exporting and productivity sorting

The regression model laid out in equation 1) reveals a clear pattern of productivity sorting among firms by export status, as theoretically first laid out in Melitz (2003). The results, as presented in Table 1, consistently point out that exporters are significantly more productive than non-exporters. In addition, within the group of exporters an additional dimension of firm heterogeneity shows to persist. That is, firms that are persistently active on foreign markets as a perennial exporter are significantly more productive than firms that export intermittently. Our preferred specification includes

a proxy for capital intensity, which is an intuitively straightforward factor to consider in a regression model with productivity as the dependent variable. However, since this variable shows to be a very dominant factor in our preferred specification, and as it has a relatively large number of missing observations, we also present the results without this explanatory variable to be able to assess its impact on the regression results. In our OLS-specification excluding a control variable accounting for the capital intensity of the firm (model 1), the productivity premia of intermittent and perennial exporters are considerable, with intermittent exporters being 18,5 percent more productive than non-exporters and perennial exporters in turn being 20,8 percent more productive than intermittent exporters.[4] However, once we also control for capital intensity, these estimated productivity premia reduce to 13 and 16 percent respectively in our preferred specification (column 2).

An alternative regression model incorporating firm fixed effects (model 3) yields qualitatively similar results regarding productivity sorting by export status. The estimated coefficients are however considerably smaller. This makes sense empirically, since the firm-individual intercept will capture the effect of export status on productivity for those firms that do not switch export status in the observed period. In that sense, a model including firm fixed effects essentially answers a slightly different question than the one we aim to answer, rendering model (2) our preferred specification.

In addition to estimating model (2) on the full sample of firms covering the Dutch business economy we also split the sample between two subsets of firms, focusing on manufacturing sectors (section C of the NACE industry classification, model 4) and wholesale and retail trading (section G of the NACE industry classification, model 5). It makes sense to also shift the attention to these industries, particularly because the business economy also includes several typical service industries which do account for a non-negligible share of goods exports, but are in essence atypical goods traders as such. The results remain qualitatively the same; we observe identical productivity sorting patterns in both sectors, with the estimated productivity premia being slightly larger in wholesale and retail trading.

Each control variable in the various model specifications presented in Table 1 returns a significant coefficient with the expected sign. In general, larger, internationally embedded, older, importing and more capital intensive firms are more productive all else equal. With respect to age there seems to be a non-linearity in its relationship with productivity. Firms aged 3-5 years experience a negative productivity premium relative to younger firms after which the productivity premium turns positive again with increasing ages.

[4] Productivity premia are calculated as $100(exp(\beta) - 1)$.

The only notable exception to this is provided by older manufacturing firms. Our results indicate that manufacturing firms aged 10 years or older are significantly less productive than the youngest firms in the same industry.

Table 1: Productivity sorting by export status

	business economy (1)	business economy (2)	business economy (3)	manufacturing (4)	wholesale & retail (5)
Export status					
non-exporter	-0.170***	-0.122***	-0.048***	-0.130***	-0.197***
	(-42.20)	(-31.77)	(-12.47)	(-12.60)	(-30.50)
intermittent exporter	baseline	baseline	baseline	baseline	baseline
perennial exporter	0.189***	0.148***	0.013***	0.114***	0.159***
	(41.53)	(34.13)	(3.59)	(11.25)	(23.18)
Firm size					
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	0.259***	0.139***	-0.314***	0.192***	0.236***
	(80.94)	(45.60)	(-72.87)	(18.41)	(40.12)
SME (10-49 employees)	0.435***	0.281***	-0.495***	0.343***	0.392***
	(111.58)	(76.06)	(-81.49)	(29.44)	(56.75)
SME (50-249 employees)	0.311***	0.162***	-0.637***	0.398***	0.245***
	(39.31)	(23.07)	(-54.41)	(25.17)	(21.95)
large firms and MNCs	0.651***	0.466***	-0.576***	0.487***	0.725***
	(82.81)	(52.79)	(-30.42)	(25.38)	(54.87)
Firm age					
less than 3 years	baseline	baseline	baseline	baseline	baseline
3-5 years	-0.041***	-0.021***	0.068***	-0.053***	-0.024**
	(-10.90)	(-5.31)	(20.14)	(-3.62)	(-2.95)
5-10 years	0.080***	0.055***	0.159***	0.027	0.062***
	(19.23)	(13.10)	(35.90)	(1.71)	(7.11)
more than 10 years	0.154***	0.027***	0.182***	-0.040**	0.064***
	(37.44)	(6.40)	(34.06)	(-2.70)	(7.78)
Import status					
non-importer	baseline	baseline	baseline	baseline	baseline
importer	0.094***	0.024***	0.022***	0.043***	0.081***
	(32.09)	(8.78)	(8.47)	(4.52)	(14.02)
Fixed assets per employee (ln)		0.187***	0.099***	0.182***	0.181***
		(242.05)	(101.54)	(74.58)	(135.73)
Specification	OLS	OLS	FE	OLS	OLS
Standard errors	clustered	clustered	clustered	robust	clustered
No. of observations	1.669.728	1.404.359	1.404.359	131.998	411.417
Adjusted R^2	0.157	0.240	0.055	0.280	0.283

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

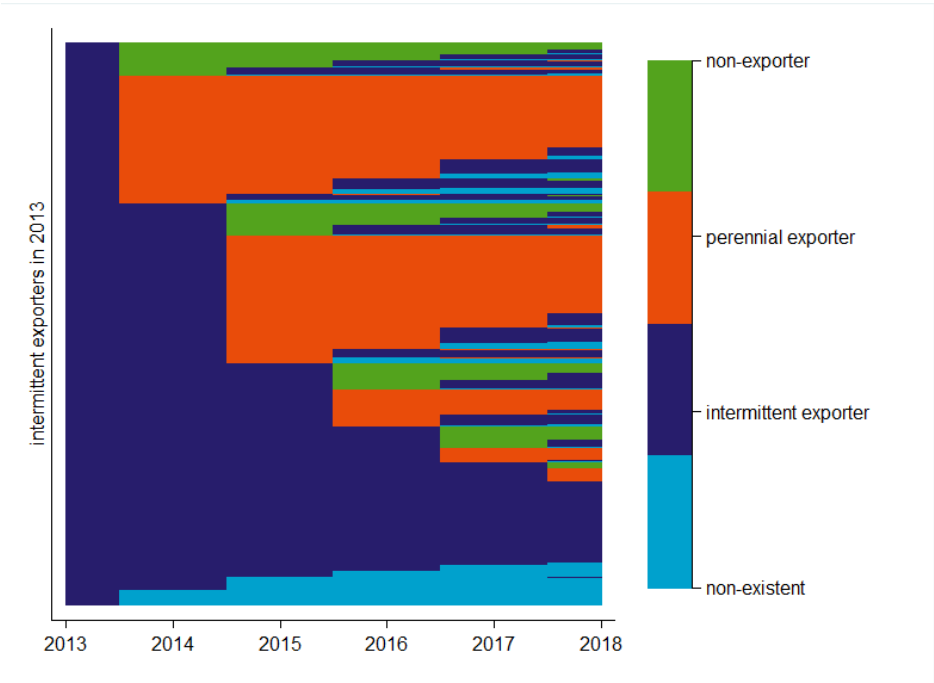
Overall, our findings convincingly suggest a pattern of productivity sorting exists in which firms exporting intermittently are positioned between firms that consistently non-export and firms that consistently do. This empirical regularity aligns with earlier findings concerning incidental exporting

of for example Alvarez (2007); Békés and Muraközy (2012); Bernini, Du, and Love (2016). According to the Melitz (2003) model firms need to be sufficiently productive in order to be able to bear the fixed costs associated with entering export markets. The partitioning between exporters and non-exporters is strict in this model: once firms pass the productivity threshold, they all export by definition (see e.g Brakman, Garretsen, van Maarseveen, and Zwaneveld (2020). Our empirical findings suggests that in addition to firms needing to be sufficiently productive to be able to break into export markets, they need to be even more productive in order to be able to stay there. That is, firms seem to have to pass two productivity thresholds before they are able to continuously serve foreign markets. This observation, which corroborates the findings of Alvarez (2007), justifies our follow-up research questions: to what extent intermittent exporting is a temporary status and which determinants can be identified that shape the future trajectory of current intermittent exporters.

Intermittent exporting as a steady state?

We now turn to the question whether intermittent exporting is a steady of firms descriptively and graphically. We discussed in section 3 that the phenomenon of repeatedly entering and exiting export markets may simply be an aspect of the line of business of a firm, implying that intermittent exporting would be a steady state, or it may be a temporary state for beginning exporters discovering along the way if they are able to cement their position as an exporter or fall back to serving domestic markets.

Figure 3: Development of the export status of the 2013-cohort of intermittent exporters

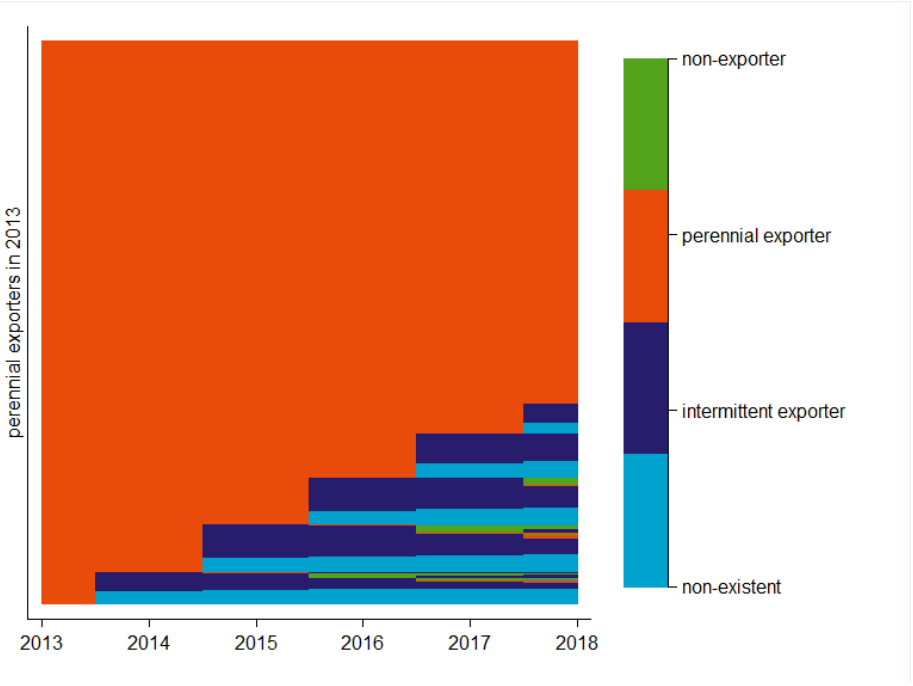


Notes: The export status of each firm in each year is determined by considering 4 consecutive years. Firms reporting goods exports in at least three years in the period *t-3* through *t* are considered a perennial exporter in year *t*. Firms reporting exports in at least one and at most 2 of the 4 consecutive years are labelled intermittent exporters.

Figure 3 reveals the development of the export status of the 2013-cohort of intermittent exporters. The majority of these firms is still marked as an intermittent exporter in 2014. However, in 2015 the number of intermittent exporters is considerably further reduced. Ultimately, about 15 percent of the intermittent exporters in 2013 has been identified as such in each year all the way through to 2018. This indicates that intermittent exporting is a steady state for only a small fraction of firms, particularly considering the fact that a much larger fraction of the 2013-cohort of perennial exporters is consistently marked as such (about 64 percent, see Figure 4). Another interesting pattern emerging from Figure 3 is that the largest part of the firms leaving the intermittent exporting status moves to the status of perennial exporter. For example, after at least two years of intermittent exporting in 2013 and 2014, 33 percent of the firms moves into perennial exporting in 2015 and a mere 8 percent into non-exporting. It thus seems that the majority of this group identifies the beginning exporter for which intermittent

exporting is a temporary phase on their trajectory to becoming a perennial exporter. A striking observation is that it seems to be the case that the probability of moving from intermittent to perennial exporting decreases, the longer the firm has been marked an intermittent exporter. After one year of intermittent exporting in 2013, 23 percent of the firms switches its export status to perennial exporting, whereas this percentage is about 10 percent after four years of intermittent exporting. This may be an indication that the longer it takes a firm a to take this 'next step' the more difficult it gets. It may however also simply reflect the increasing relative importance of the group of firms for which intermittent exporting is business as usual, such as the art dealers discussed in Section 3.

Figure 4: Development of the export status of the 2013-cohort of perennial exporters



Notes: The export status of each firm in each year is determined by considering 4 consecutive years. Firms reporting goods exports in at least three years in the period *t-3* through *t* are considered a perennial exporter in year *t*. Firms reporting exports in at least one and at most 2 of the 4 consecutive years are labelled intermittent exporters.

Summarizing the findings derived from Figures 3 and 4 we argue that intermittent exporting seems to be a temporary state for the large majority of the firms. In most cases, firms are marked as an intermittent exporter temporarily while they are, in most cases, on their way to becoming a perennial

exporter. However, the longer it takes to complete this process the slimmer the chances get that the firm succeeds in becoming a perennial exporter.

Determinants of development of intermittent exporters

Tables 3 and 4 present the results of the model discussed in equation 2 and 3. As we discussed in Section 4, we focus on the subset of firms that is classified as an intermittent exporter in year t and investigate which factors shape the development of these firms into perennial exporters (Table 3) and non-exporters (Table 4) in $t+3$, $t+4$ and $t+5$. That is, in both Probit-models the dependent variable has value zero if the firm is classified as an intermittent exporter at both points in time. In addition to this, we also split this subset of firms in a group that has consistently been exporting intermittently in all intermediate years between t and $t+n$ and a group of firms that returns a switching export status in the relevant time frame. We separate these two groups in order to be able to gain an understanding of the factors shaping the group of firms for which intermittent exporting seems to be business as usual. The resulting numbers of observations available for the regressions are presented in Table 2.

Table 2: Numbers of observations by group and time horizon

	$t, t+3$	$t, t+4$	$t, t+5$
from intermittent to non-exporter	10,341	6,717	2,744
from intermittent to perennial	43,863	25,881	12,029
from intermittent to intermittent	46,816	26,717	12,547
of which:			
- no switching	36,363	14,404	4,666
- switching	10,453	12,313	7,881

Labor productivity shows to be an important factor in the process of moving from intermittent exporting to perennial exporting. All specifications in Table 3 yield a significant and positive coefficient, indicating that the most productive intermittent exporters are able to develop into perennial exporters. This finding aligns nicely with the productivity sorting pattern observed in Table 1. An interesting observation is that the significance of the productivity premium vis-a-vis the subset of firms that is continuously classified as an intermittent exporter, without switching export status, seems to slowly fade when we extend the time horizon of the analyses. This may be an indication that firms for which intermittent exporting follows naturally from

their line of business are qualitatively comparable to perennial exporters. That is, when extending the time horizon, the experimenting exporters are excluded from the sample to an increasing extent, and the intermittent exporters by nature remain. Additional support for this hypothesis is provided if we rerun model (2) as presented in Table 3 on the subset of firms from model (8) from that table. The t-statistic of labor productivity in model (2) shows to be substantially lower if we limit our sample of firms to include only intermittent exporters in the longer run. Unfortunately, data constraints prevent us from even further extending the time horizon to put this hypothesis to the test.

As expected, the composition of the export portfolio of the firm correlates with the probability of an intermittent exporter becoming a perennial exporter. Straightforwardly, the larger the share of turnover the firm already derives from foreign markets, the higher the probability the firm will become a perennial exporter. In addition, this pattern also shows to be tied to the composition of exports. The share of exports derived from EU-markets and the share of intermediate goods exports are both positively tied to becoming a perennial exporter, however, for the latter variable this only holds for firms that also simultaneously import. That is, in addition to a significantly positive correlation with being an importer as such as well. With our earlier discussion in mind of this interaction term being a rough proxy for supply chain involvement and the notion that supply chains are to an important extent regionally organized - with the Netherlands being deeply linked with the German economy as a key element of what Baldwin and Lopez-Gonzalez (2015) coin 'Factory Europe' -, our findings seem to confirm the hypothesis that firms deeply integrated in cross-border supply chains are more likely to evolve from intermittent exporters into perennial exporters. In addition, our findings also corroborate the notion of Békés and Muraközy (2012), who argue that larger and closer markets can be better served through a perennial export strategy due to the relatively low variable costs and high expected profits.

Concerning the additional control variables we generally see the expected patterns emerging. In line with earlier work concerning Dutch exporters (Mounir and van den Berg, 2017) the solvency ratio shows to be negatively correlated with firms becoming a perennial exporter, indicating that it may indeed be the case that firms are more inclined to finance the expansion of their export activities with debt capital. In addition, larger firms and younger firms are more likely to take the step from intermittent to perennial exporting. Apparently, once firms have reached a certain level of maturity and have not become perennial exporters yet chances are slim that they ultimately will do so. This may be either due to the nature of its business

or due to difficulties with overcoming the complexities of selling in foreign markets.

Tables A1 and A2 in the Appendix present the same set of regressions as Table 3 but then on the subset of firms belonging to either manufacturing sectors or wholesale and retail trading sectors. The findings are qualitatively similar to the results discussed above. The observed patterns are however somewhat less pronounced, which seems to be mainly tied to a considerably smaller number of available observations in both cases.

Table 3: Continuously intermittent exporting versus switching to perennial exporting

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Labor productivity (ln)	0.059***	0.055***	0.059**	0.086***	0.070**	0.094***	0.089***	0.072*	0.090***
	(4.47)	(3.82)	(3.27)	(4.72)	(3.16)	(4.38)	(3.63)	(2.26)	(3.31)
Export share in sales	1.661***	1.954***	0.763***	1.486***	2.188***	0.884***	1.519***	2.557***	1.092***
	(14.00)	(13.40)	(4.76)	(9.87)	(8.36)	(5.45)	(7.62)	(6.33)	(5.28)
Share of EU-destinations in exports	0.326***	0.399***	0.091	0.186***	0.288***	0.055	0.043	0.151	-0.040
	(8.74)	(9.77)	(1.67)	(3.88)	(5.00)	(0.92)	(0.69)	(1.88)	(-0.56)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	0.274***	0.296***	0.188***	0.335***	0.353***	0.311***	0.406***	0.443***	0.379***
	(9.63)	(9.40)	(4.88)	(9.26)	(8.08)	(7.22)	(8.86)	(7.49)	(7.38)
Share of intermediate goods in exports × import status									
non-importer	0.148	0.135	0.226	0.405*	0.395*	0.419*	0.737***	0.652*	0.752**
	(1.12)	(0.96)	(1.05)	(2.41)	(1.96)	(2.00)	(3.40)	(2.25)	(3.07)
importer	0.193**	0.243***	0.042	0.214**	0.299**	0.098	0.122	0.215	0.049
	(3.25)	(3.71)	(0.48)	(2.91)	(3.27)	(1.06)	(1.32)	(1.68)	(0.46)
Solvability ratio (ln)	-0.035**	-0.031*	-0.042*	-0.034*	-0.020	-0.048*	-0.037	-0.019	-0.045
	(-2.70)	(-2.11)	(-2.29)	(-2.12)	(-1.00)	(-2.44)	(-1.78)	(-0.70)	(-1.90)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	0.158***	0.170***	0.103*	0.191***	0.211***	0.147**	0.144**	0.185**	0.117
	(5.21)	(5.14)	(2.40)	(4.69)	(4.32)	(3.03)	(2.70)	(2.67)	(1.96)
SME (10-49 employees)	0.187***	0.208***	0.105*	0.235***	0.252***	0.191***	0.240***	0.260***	0.216**
	(5.34)	(5.41)	(2.16)	(5.07)	(4.55)	(3.46)	(4.02)	(3.42)	(3.23)
SME (50-249 employees)	0.159**	0.174**	0.090	0.208**	0.197*	0.192*	0.106	0.160	0.076
	(2.71)	(2.68)	(1.13)	(2.88)	(2.24)	(2.23)	(1.16)	(1.36)	(0.74)
large firms and MNCs	0.158***	0.179***	0.073	0.202**	0.192*	0.193**	0.233**	0.185	0.257**
	(3.33)	(3.35)	(1.12)	(3.28)	(2.52)	(2.61)	(3.02)	(1.80)	(2.94)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	-0.575***	-0.489***	-0.715***	-0.445***	-0.418***	-0.415***	-0.367***	-0.335***	-0.349***
	(-16.87)	(-13.25)	(-14.22)	(-9.75)	(-7.68)	(-7.39)	(-5.62)	(-3.83)	(-4.77)
5-10 years	-0.712***	-0.611***	-0.893***	-0.540***	-0.461***	-0.545***	-0.397***	-0.344***	-0.374***
	(-20.62)	(-16.06)	(-17.80)	(-12.42)	(-8.63)	(-10.30)	(-7.24)	(-4.66)	(-6.04)
more than 10 years	-0.848***	-0.764***	-0.966***	-0.639***	-0.584***	-0.613***	-0.512***	-0.464***	-0.485***
	(-27.47)	(-22.65)	(-21.10)	(-16.56)	(-12.48)	(-12.92)	(-10.71)	(-7.24)	(-8.94)
No. of observations	23,763	20,925	14,652	13,742	10,710	10,127	6,603	4,625	5,440
pseudo R^2	0.128	0.130	0.109	0.106	0.114	0.092	0.103	0.108	0.095

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Focusing on the group of firms falling back from intermittent exporting to non-exporting compared to continuing intermittent exporters yields some interesting additional insights. First of all, labor productivity does not seem

to play a role in this process; all regressions in Table 4 yield a coefficient regarding labor productivity that does not significantly differ from zero. In general, the patterns emerging are much less pronounced than when we pit persistent intermittent exporters against firms becoming perennial exporters. Firm size and the capital structure of the firm also show to be insignificant in discriminating persistent intermittent exporters from firms switching to non-exporting. Again we see that firm age significantly negatively correlates with the expansion of export activities. Again, Tables A3 and A4 in the Appendix present the same set of regressions as Table 4 but then on the subset of firms belonging to either manufacturing sectors or wholesale and retail trading sectors. The findings are qualitatively identical to the findings derived from the full sample.

Apparently counterintuitive is our finding that the larger the share of exports in sales, the higher the probability that the intermittent exporter falls back to non-exporting. This holds particularly vis-a-vis persistently intermittent exporters (no switching). Recall however that the share of exports in total sales is averaged over the years $t-3$ through t and our analysis of switching export status concerns the years t and $t+n$. This may provide two complementary explanations for the observed pattern. First, the group of firms moving from intermittent exporting to non-exporting will most likely comprise mainly of former perennial exporters which are slowly retracting from foreign markets by reducing the share of exports in their sales. This may mean that they are coming off of higher shares of exports in sales in the years t through $t-3$ than continuously intermittent exporters. Second, it seems likely that firms for which intermittent exporting is business as usual are characterized by modest export shares in sales, since the focus of their activities is on domestics markets by nature. For example, retail trading emerges as a sector characterized by frequent intermittent exporting, which suggests a business model where the firms main focus is on serving domestic clients while passively tending to the occasional foreign client. This explanation would also corroborate the importance of EU-destinations for intermittent exporters: the higher the share of EU-destinations in exports, the higher the probability that a firm persists in intermittent exporting over exiting foreign markets. This empirical regularity also fits a narrative of - for example - a retailer completing the occasional order from a client just across the border.

Table 4: Continuously intermittent exporting versus switching to non-exporting

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
Labor productivity (ln)	-0.010	-0.006	-0.010	-0.021	-0.024	-0.006	-0.030	-0.005	-0.039
	(-0.50)	(-0.31)	(-0.38)	(-0.77)	(-0.77)	(-0.20)	(-0.70)	(-0.10)	(-0.84)
Export share in sales	0.608**	0.846***	0.177	0.142	0.790*	-0.270	0.675	1.697**	0.516
	(2.92)	(3.61)	(0.65)	(0.49)	(2.17)	(-0.80)	(1.67)	(2.69)	(1.22)
Share of EU-destinations in exports	-1.048***	-1.005***	-1.357***	-1.530***	-1.494***	-1.738***	-1.935***	-1.943***	-2.084***
	(-26.97)	(-23.96)	(-24.09)	(-30.16)	(-25.42)	(-27.77)	(-26.74)	(-22.35)	(-24.73)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	0.019	0.042	-0.023	-0.021	0.015	-0.006	0.056	0.096	0.128
	(0.51)	(1.01)	(-0.46)	(-0.43)	(0.27)	(-0.10)	(0.78)	(1.12)	(1.55)
Share of intermediate goods in exports × import status									
non-importer	0.234*	0.234*	0.355	0.275	0.327	0.298	0.341	0.369	0.430
	(2.10)	(1.98)	(1.76)	(1.77)	(1.81)	(1.46)	(1.66)	(1.35)	(1.75)
importer	0.007	0.038	-0.088	-0.016	0.092	-0.124	-0.071	0.086	-0.121
	(0.11)	(0.58)	(-0.95)	(-0.20)	(0.98)	(-1.24)	(-0.67)	(0.64)	(-0.98)
Solvability ratio (ln)	0.026	0.030	0.006	0.014	0.016	0.004	0.034	0.042	0.025
	(1.36)	(1.44)	(0.23)	(0.55)	(0.57)	(0.12)	(0.96)	(0.96)	(0.62)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	-0.052	-0.044	-0.064	-0.084	-0.077	-0.076	-0.073	-0.077	-0.034
	(-1.17)	(-0.92)	(-1.07)	(-1.41)	(-1.13)	(-1.04)	(-0.81)	(-0.71)	(-0.33)
SME (10-49 employees)	-0.121*	-0.100	-0.162*	-0.158*	-0.135	-0.150	-0.149	-0.145	-0.108
	(-2.43)	(-1.84)	(-2.40)	(-2.33)	(-1.73)	(-1.82)	(-1.45)	(-1.17)	(-0.93)
SME (50-249 employees)	-0.054	-0.036	-0.040	-0.143	-0.116	-0.100	-0.114	-0.069	-0.076
	(-0.68)	(-0.42)	(-0.36)	(-1.40)	(-1.00)	(-0.80)	(-0.79)	(-0.40)	(-0.46)
large firms and MNCs	-0.033	0.010	-0.069	-0.157	-0.110	-0.141	0.058	0.158	0.120
	(-0.48)	(0.13)	(-0.72)	(-1.65)	(-1.01)	(-1.20)	(0.43)	(0.96)	(0.77)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	0.650***	0.720***	0.527***	0.107	0.096	0.156	0.196	0.131	0.206
	(7.84)	(8.35)	(4.48)	(1.12)	(0.89)	(1.37)	(1.22)	(0.67)	(1.18)
5-10 years	0.879***	0.973***	0.748***	0.264**	0.287**	0.282**	0.432**	0.426*	0.471**
	(10.47)	(11.10)	(6.36)	(3.01)	(2.88)	(2.76)	(3.01)	(2.43)	(3.04)
more than 10 years	1.009***	1.092***	0.931***	0.439***	0.467***	0.464***	0.497***	0.501**	0.503***
	(12.44)	(13.00)	(8.15)	(5.36)	(5.08)	(4.82)	(3.69)	(3.10)	(3.45)
No. of observations	14,677	11,857	5,769	8,436	5,426	4,889	3,877	1,945	2,723
pseudo R^2	0.164	0.166	0.204	0.260	0.265	0.297	0.366	0.383	0.396

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The empirical findings presented here point at a narrative of stepwise partitioning between non-exporters, intermittent exporters and perennial exporters. That is, firms seem to have to pass two productivity thresholds before they can serve foreign markets year in year out. In line with the theoretical premise emerging from the Melitz (2003) model firms need to be sufficiently productive to be able to bear the one-off fixed cost associated with an export start. Once they have taken that first step they can be considered an intermittent exporter. This would also explain why productivity is not a significant factor in explaining which firms persist in intermittent exporting and which switch back to non-exporting, since the latter group has been able to pass the first productivity threshold as well. However, in order to survive and thrive as a perennial exporter, an additional productivity premium is

required to be sufficiently competitive on international markets.

6 Conclusion and discussion

Intermittent exporting, the phenomenon of repeatedly entering and exiting export markets, is difficult to reconcile with trade theory. Theoretical models dealing with firm heterogeneity, with Melitz (2003) as the most prominent example, are generally built on the idea that only the more productive firms are able to enter foreign markets, under the assumption that exporting is a complex undertaking that is associated with considerable fixed costs. A theoretical inference of these models is that once firms pass this productivity threshold, they all export. However, even though the majority of the firms are either always or never active on export markets, empirical research shows that there is also a group of firms that is repeatedly active on foreign markets for a short time and then withdraws again to the domestic market.

We confirm this empirical regularity using micro-data of firms in the Netherlands and proceed with the development of an empirically supported definition of intermittent and perennial exporting. Putting our delineation of intermittent and perennial exporters to the empirical test, our findings point at the existence of a Melitz (2003) type productivity sorting pattern, where intermittent exporters are positioned in between non-exporters and perennial exporters in terms of productivity. These results corroborate earlier findings concerning incidental exporting of for example Alvarez (2007); Békés and Muraközy (2012); Bernini, Du, and Love (2016). They are also in line with the path of sequential exporting described by Albornoz, Pardo, Corcos, and Ornelas (2012). In what follows lies the main contribution of our paper: adding a dynamic component to the analysis of intermittent exporting to gain an understanding of the factors shaping the development of intermittent exporters.

Graphical analysis of the micro-data reveals that intermittent exporting seems to be a temporary state for the large majority of the firms, which are, in most cases, on their way to becoming a perennial exporter. However, the longer it takes to complete this process the slimmer the chances seem to get that the firm succeeds in becoming a perennial exporter. For a relatively small group of firms - such as art dealers and manufacturers of musical instruments - intermittent exporting seems to be a natural line of business. Our results suggest that in terms of productivity sorting this group most closely resembles perennial exporters. Labor productivity also shows to be an important factor in the process of moving from intermittent exporting to perennial exporting. However, productivity does not turn out to be a factor

discriminating between persistently intermittent exporters and intermittent exporters ultimately withdrawing to domestic markets.

The extent to which firms are integrated in foreign markets and the composition of their trade portfolio are also tied to the dynamics of intermittent exporting. The larger the share of exports in sales, the larger the share of exports derived from EU-markets and the larger the share of intermediate goods in exports, the higher the probability the firm will become a perennial exporter. However, for the latter aspect this only holds for firms that simultaneously import. This points to a narrative in which firms deeply integrated in cross-border supply chains are more likely to evolve from intermittent exporters into perennial exporters.

The empirical findings presented in this paper point at a narrative of stepwise partitioning between non-exporters, intermittent exporters and perennial exporters. That is, firms seem to have to pass two productivity thresholds before they can serve foreign markets year in year out. In line with the theoretical premise emerging from the Melitz (2003) model firms need to be sufficiently productive to be able to bear the one-off fixed cost associated with an export start. Once they have taken that first step they can be considered an intermittent exporter. However, in order to survive and thrive as a perennial exporter, an additional productivity premium is required to be sufficiently competitive on international markets.

The unravelling of these various stages of maturity of exporters and the firm-level dynamics in this respect also yield an important message for policymakers, much in line with the message of Alvarez (2007). We argue that policy efforts aiming at increasing the export involvement of firms, and SMEs in particular, should take into account that there is considerable heterogeneity among firms within the group of exporters and export potentials. That is, our results indicate that stimulating a non-exporter to take the first step into exporting requires a different kind of support than supporting an intermittent exporter in becoming a perennial exporter. As Alvarez (2007, p. 390) puts it spot on:

> "...export promotion policies may not be very successful if they are not accompanied by complementary policies aimed to improve firm characteristics, such as productivity. Then, government designing instruments aimed to improve export performance should have in mind that the effectiveness of such instruments (e.g., trade fairs, marketing studies, and prospective missions) would depend importantly on structural factors that are not directly affected by this type of intervention. These traditional instruments are useful in reducing exporting entry costs, thus facilitating entry of

> new firms, but they may not be enough to sustain firm competitiveness in foreign markets".

Our empirical results regarding Dutch exporters provide further support for this message to policymakers.

Several avenues for further research emerge from this empirical analysis. A particularly fruitful direction would be to trace the development of productivity levels of individual firms along their 'export journey' moving between non-export, intermittent and ultimately perennial exporting. Particularly the productivity dynamics of intermittent exporters would be interesting to track. Are they already as productive as perennial exporters before they reach that stage? In other words, do intermittent exporters self-select into perennial exporting? Do we see that intermittent exporters that fall back to non-exporting indeed are not able to match the productivity performance of persistent perennial exporters? Is there a group of intermittent exporters that is persistently too 'good' to be non-exporter, but not good enough to become a perennial exporter? How does the productivity trajectory of exiting intermittent exporters align with that of continuous non-exporters? Do we see, in the spirit of Roberts and Tybout (1997), that former intermittent exporters are indistinguishable from continuous non-exporters after a few years? Does it matter if the former exporter used to be a perennial exporter or if it is coming off a very brief export experiment? In other words, would export skills and experience depreciate equally quickly if intermittent exporting would be accommodated? Answering these questions would further shed light on the factors shaping the export journey of firms and the crucial role that productivity seems to be playing in that process.

Appendix A

Table A1: Continuously intermittent exporting versus switching to perennial exporting (manufacturing)

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
Labor productivity (ln)	0.153***	0.134**	0.180**	0.174**	0.116	0.220***	0.092	0.083	0.080
	(3.57)	(2.80)	(3.21)	(3.22)	(1.70)	(3.45)	(1.24)	(0.80)	(0.97)
Export share in sales	3.052***	3.481***	1.932*	2.368***	3.012*	1.806**	2.535***	5.184***	1.925*
	(4.78)	(4.01)	(2.46)	(3.77)	(2.45)	(2.74)	(3.40)	(3.40)	(2.56)
Share of EU-destinations in exports	0.422***	0.416***	0.447**	0.354*	0.372*	0.349*	0.363	0.596*	0.198
	(3.73)	(3.30)	(2.67)	(2.50)	(2.13)	(1.98)	(1.88)	(2.29)	(0.82)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	0.288**	0.318**	0.205	0.201	0.314*	0.046	0.283	0.501**	0.132
	(3.04)	(3.01)	(1.66)	(1.74)	(2.27)	(0.33)	(1.92)	(2.67)	(0.78)
Share of intermediate goods in exports × import status									
non-importer	0.137	-0.042	5.198*	0.684	0.554	1.221	0.834	1.038	0.588
	(0.35)	(-0.11)	(2.27)	(1.31)	(0.97)	(1.59)	(1.43)	(1.28)	(0.87)
importer	0.200	0.167	0.291	0.258	0.207	0.390	0.424	0.622	0.372
	(1.21)	(0.91)	(1.15)	(1.20)	(0.81)	(1.38)	(1.47)	(1.55)	(1.08)
Solvability ratio (ln)	-0.011	0.002	-0.034	-0.021	0.004	-0.051	-0.060	-0.030	-0.084
	(-0.31)	(0.05)	(-0.66)	(-0.46)	(0.07)	(-0.88)	(-1.02)	(-0.41)	(-1.24)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	0.208*	0.214	0.179	0.235	0.160	0.271	-0.020	-0.247	0.089
	(2.03)	(1.90)	(1.25)	(1.69)	(0.94)	(1.67)	(-0.11)	(-0.98)	(0.48)
SME (10-49 employees)	0.275*	0.261*	0.289	0.346*	0.199	0.473**	0.139	-0.110	0.263
	(2.50)	(2.14)	(1.90)	(2.32)	(1.10)	(2.69)	(0.77)	(-0.42)	(1.33)
SME (50-249 employees)	0.323	0.341	0.210	0.402	0.238	0.549	-0.144	-0.291	-0.014
	(1.71)	(1.60)	(0.81)	(1.69)	(0.81)	(1.93)	(-0.50)	(-0.76)	(-0.04)
large firms and MNCs	0.477**	0.414*	0.640*	0.546*	0.228	1.139**	0.416	-0.303	1.001*
	(2.59)	(2.05)	(2.37)	(2.23)	(0.79)	(3.27)	(1.37)	(-0.75)	(2.30)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	-0.653***	-0.653***	-0.456*	-0.591***	-0.659***	-0.383*	-0.359	-0.283	-0.352
	(-5.90)	(-5.56)	(-2.43)	(-4.26)	(-4.12)	(-2.06)	(-1.78)	(-1.02)	(-1.59)
5-10 years	-0.896***	-0.826***	-0.962***	-0.703***	-0.633***	-0.650***	-0.535***	-0.520*	-0.432*
	(-8.55)	(-7.11)	(-6.20)	(-5.29)	(-3.95)	(-3.87)	(-3.29)	(-2.46)	(-2.35)
more than 10 years	-1.005***	-0.931***	-1.013***	-0.799***	-0.736***	-0.700***	-0.594***	-0.514**	-0.517***
	(-11.21)	(-9.38)	(-7.30)	(-7.04)	(-5.48)	(-4.63)	(-4.30)	(-2.97)	(-3.30)
No. of observations	3,341	3,003	2,179	2,008	1,679	1,527	971	743	823
pseudo R^2	0.163	0.156	0.154	0.130	0.128	0.121	0.117	0.140	0.109

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Continuously intermittent exporting versus switching to perennial exporting (wholesale & retail)

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
Labor productivity (ln)	0.078***	0.074**	0.081**	0.093**	0.063	0.113***	0.149***	0.098	0.164***
	(3.65)	(3.12)	(2.74)	(3.15)	(1.74)	(3.32)	(3.90)	(1.90)	(3.88)
Export share in sales	1.487***	1.843***	0.508*	1.302***	1.990***	0.714**	1.139***	2.544***	0.699*
	(8.34)	(8.03)	(2.30)	(5.95)	(4.62)	(3.23)	(4.14)	(4.19)	(2.55)
Share of EU-destinations in exports	0.432***	0.509***	0.170*	0.274***	0.401***	0.101	0.097	0.187	0.032
	(8.09)	(8.69)	(2.21)	(4.14)	(5.10)	(1.19)	(1.14)	(1.66)	(0.32)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	0.374***	0.372***	0.321***	0.412***	0.406***	0.382***	0.429***	0.424***	0.397***
	(6.76)	(6.10)	(4.19)	(5.73)	(4.69)	(4.40)	(4.72)	(3.61)	(3.89)
Share of intermediate goods in exports × import status									
non-importer	0.082	0.077	0.012	0.146	0.135	0.095	0.602	0.215	0.817
	(0.32)	(0.28)	(0.03)	(0.47)	(0.35)	(0.28)	(1.47)	(0.40)	(1.72)
importer	0.124	0.157	0.017	0.192	0.279*	0.043	0.115	0.136	0.084
	(1.35)	(1.56)	(0.13)	(1.74)	(2.03)	(0.32)	(0.81)	(0.72)	(0.51)
Solvability ratio (ln)	-0.056**	-0.036	-0.108***	-0.028	-0.002	-0.052	-0.035	0.007	-0.062
	(-2.65)	(-1.52)	(-3.41)	(-1.09)	(-0.06)	(-1.62)	(-1.04)	(0.16)	(-1.55)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	0.183***	0.193***	0.119	0.198**	0.193*	0.167*	0.150	0.138	0.126
	(3.71)	(3.58)	(1.68)	(3.06)	(2.45)	(2.16)	(1.77)	(1.21)	(1.36)
SME (10-49 employees)	0.264***	0.283***	0.173*	0.315***	0.293**	0.288**	0.342***	0.297*	0.328**
	(4.49)	(4.40)	(2.09)	(4.16)	(3.22)	(3.18)	(3.48)	(2.33)	(3.04)
SME (50-249 employees)	0.197	0.226	0.075	0.318*	0.215	0.413*	0.325	0.284	0.335
	(1.72)	(1.75)	(0.50)	(2.29)	(1.32)	(2.34)	(1.86)	(1.29)	(1.69)
large firms and MNCs	0.077	0.102	-0.018	0.060	0.083	0.016	0.165	0.102	0.174
	(0.99)	(1.17)	(-0.17)	(0.60)	(0.65)	(0.14)	(1.32)	(0.57)	(1.25)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	-0.682***	-0.595***	-0.770***	-0.451***	-0.474***	-0.354***	-0.378***	-0.448**	-0.290*
	(-11.99)	(-9.54)	(-9.16)	(-5.75)	(-4.89)	(-3.73)	(-3.37)	(-2.93)	(-2.27)
5-10 years	-0.856***	-0.731***	-1.003***	-0.705***	-0.635***	-0.664***	-0.583***	-0.498***	-0.551***
	(-14.47)	(-11.18)	(-11.68)	(-9.41)	(-6.75)	(-7.38)	(-6.29)	(-3.80)	(-5.34)
more than 10 years	-1.055***	-0.981***	-1.058***	-0.829***	-0.833***	-0.701***	-0.702***	-0.707***	-0.612***
	(-20.64)	(-17.61)	(-13.75)	(-12.91)	(-10.34)	(-9.01)	(-8.86)	(-6.36)	(-6.86)
No. of observations	8,807	7,939	5,970	5,126	4,219	4,024	2,493	1,922	2,142
pseudo R^2	0.157	0.161	0.121	0.114	0.131	0.084	0.095	0.112	0.079

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Continuously intermittent exporting versus switching to non-exporting (manufacturing)

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
Labor productivity (ln)	0.003	-0.001	-0.062	-0.031	-0.074	-0.079	-0.202	-0.593**	-0.185
	(0.04)	(-0.01)	(-0.64)	(-0.32)	(-0.72)	(-0.67)	(-1.09)	(-2.78)	(-0.81)
Export share in sales	2.421***	2.681***	2.278**	0.955	1.769	0.044	-0.401	4.622	-1.089
	(3.81)	(3.71)	(2.63)	(1.03)	(1.46)	(0.03)	(-0.29)	(0.76)	(-0.73)
Share of EU-destinations in exports	-0.905***	-0.878***	-1.249***	-1.341***	-1.255***	-1.690***	-1.725***	-1.672***	-2.052***
	(-6.49)	(-5.67)	(-6.33)	(-7.34)	(-5.85)	(-7.50)	(-7.07)	(-5.29)	(-6.90)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	-0.019	0.008	-0.115	0.002	0.115	-0.160	-0.245	-0.049	-0.325
	(-0.14)	(0.05)	(-0.65)	(0.01)	(0.52)	(-0.67)	(-0.72)	(-0.14)	(-0.72)
Share of intermediate goods in exports × import status									
non-importer	0.329	0.201	13.817	0.754	0.618	1.606*	0.528	0.680	0.663
	(0.84)	(0.50)	(1.61)	(1.24)	(0.97)	(2.47)	(0.69)	(0.73)	(0.66)
importer	0.196	0.185	0.303	0.330	0.435	0.429	0.673*	1.147**	0.701
	(1.09)	(0.95)	(1.13)	(1.33)	(1.60)	(1.27)	(2.07)	(2.85)	(1.58)
Solvability ratio (ln)	-0.000	0.004	0.000	-0.082	-0.064	-0.135	-0.050	0.020	-0.125
	(-0.00)	(0.06)	(0.00)	(-1.03)	(-0.67)	(-1.45)	(-0.40)	(0.13)	(-0.93)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	-0.024	-0.042	0.033	0.059	-0.180	0.365	-0.066	-0.595	0.273
	(-0.17)	(-0.25)	(0.15)	(0.27)	(-0.76)	(1.20)	(-0.17)	(-1.37)	(0.59)
SME (10-49 employees)	-0.196	-0.222	-0.087	-0.203	-0.443	0.094	-0.050	-0.676	0.341
	(-1.25)	(-1.24)	(-0.36)	(-0.84)	(-1.73)	(0.28)	(-0.13)	(-1.45)	(0.72)
SME (50-249 employees)	0.100	0.089	0.150	0.074	-0.012	0.259	0.323	-0.077	0.602
	(0.36)	(0.29)	(0.35)	(0.18)	(-0.03)	(0.42)	(0.60)	(-0.12)	(0.88)
large firms and MNCs	-0.071	-0.205	1.087*	0.290	-0.236	1.773**	-0.378	-1.593	0.537
	(-0.26)	(-0.70)	(2.26)	(0.72)	(-0.56)	(3.19)	(-0.47)	(-1.75)	(0.61)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	0.653	0.618	0.972*	0.382	0.070	0.743	0.151	0.305	-0.005
	(1.93)	(1.73)	(2.07)	(1.09)	(0.19)	(1.56)	(0.22)	(0.30)	(-0.01)
5-10 years	0.976**	1.039**	0.938*	-0.062	-0.252	0.031	0.260	0.662	0.319
	(3.20)	(3.19)	(2.20)	(-0.18)	(-0.67)	(0.07)	(0.42)	(0.68)	(0.45)
more than 10 years	1.052***	1.087***	1.235**	0.468	0.251	0.806*	0.768	1.335	0.770
	(3.56)	(3.44)	(3.04)	(1.53)	(0.76)	(2.07)	(1.27)	(1.48)	(1.11)
No. of observations	1,597	1,273	587	892	579	464	408	205	265
pseudo R^2	0.159	0.159	0.225	0.262	0.262	0.347	0.418	0.468	0.480

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Continuously intermittent exporting versus switching to non-exporting (wholesale & retail)

	$t, t+3$			$t, t+4$			$t, t+5$		
	all	no switching	switching	all	no switching	switching	all	no switching	switching
Labor productivity (ln)	-0.014	-0.019	0.012	-0.046	-0.066	-0.002	-0.041	-0.016	-0.029
	(-0.48)	(-0.58)	(0.30)	(-1.02)	(-1.26)	(-0.04)	(-0.66)	(-0.20)	(-0.43)
Export share in sales	0.515	0.884**	-0.287	0.021	0.724	-0.450	0.263	1.138	0.321
	(1.70)	(2.59)	(-0.71)	(0.04)	(1.35)	(-0.80)	(0.34)	(0.98)	(0.43)
Share of EU-destinations in exports	-1.017***	-0.972***	-1.321***	-1.477***	-1.419***	-1.699***	-1.863***	-1.879***	-1.990***
	(-18.11)	(-15.85)	(-15.70)	(-20.61)	(-16.92)	(-18.35)	(-18.42)	(-14.51)	(-16.97)
Import status									
non-importer	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
importer	0.027	0.032	0.029	-0.011	-0.009	0.059	0.001	-0.060	0.118
	(0.40)	(0.42)	(0.31)	(-0.12)	(-0.09)	(0.54)	(0.01)	(-0.41)	(0.79)
Share of intermediate goods in exports × import status									
non-importer	0.182	0.178	0.129	0.015	0.065	-0.019	0.228	-0.046	0.410
	(0.94)	(0.84)	(0.39)	(0.06)	(0.22)	(-0.06)	(0.64)	(-0.11)	(0.87)
importer	0.067	0.099	-0.060	0.057	0.162	-0.100	-0.065	-0.001	-0.102
	(0.72)	(1.00)	(-0.43)	(0.48)	(1.17)	(-0.67)	(-0.41)	(-0.01)	(-0.56)
Solvability ratio (ln)	0.000	0.019	-0.086	0.000	0.015	-0.021	0.028	0.043	0.017
	(0.01)	(0.56)	(-1.89)	(0.00)	(0.33)	(-0.43)	(0.52)	(0.65)	(0.27)
Firm size									
SME (0-1 employees)	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
SME (2-9 employees)	-0.111	-0.101	-0.153	-0.130	-0.149	-0.118	-0.085	-0.172	-0.021
	(-1.51)	(-1.29)	(-1.52)	(-1.32)	(-1.38)	(-0.95)	(-0.57)	(-0.95)	(-0.12)
SME (10-49 employees)	-0.221**	-0.198*	-0.301*	-0.251*	-0.272*	-0.229	-0.259	-0.407*	-0.151
	(-2.64)	(-2.20)	(-2.57)	(-2.23)	(-2.16)	(-1.62)	(-1.50)	(-1.98)	(-0.78)
SME (50-249 employees)	-0.313*	-0.298	-0.392	-0.346	-0.398	-0.256	-0.198	-0.320	-0.081
	(-2.03)	(-1.82)	(-1.83)	(-1.83)	(-1.92)	(-1.04)	(-0.75)	(-1.00)	(-0.26)
large firms and MNCs	-0.004	0.026	-0.015	-0.139	-0.115	-0.150	0.353	0.393	0.397
	(-0.03)	(0.21)	(-0.09)	(-0.88)	(-0.64)	(-0.78)	(1.62)	(1.41)	(1.60)
Firm age									
less than 3 years	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline	baseline
3-5 years	0.618***	0.691***	0.457*	0.197	0.126	0.301	0.472	0.387	0.491
	(4.52)	(4.81)	(2.40)	(1.22)	(0.69)	(1.56)	(1.83)	(1.24)	(1.71)
5-10 years	0.933***	1.040***	0.770***	0.354*	0.343*	0.421*	0.400	0.323	0.445
	(6.36)	(6.73)	(3.91)	(2.35)	(2.01)	(2.44)	(1.73)	(1.15)	(1.78)
more than 10 years	1.114***	1.193***	1.062***	0.519***	0.490**	0.609***	0.529*	0.463	0.585*
	(7.88)	(8.05)	(5.61)	(3.75)	(3.15)	(3.82)	(2.51)	(1.83)	(2.54)
No. of observations	4,974	4,106	2,137	2,855	1,948	1,753	1,300	729	949
pseudo R^2	0.139	0.135	0.195	0.231	0.215	0.285	0.325	0.319	0.359

Notes: All regressions include industry-year fixed effects. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Explanation of figures

Empty cell	Figure not applicable
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*	Provisional figure
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2018–2019	2018 to 2019 inclusive
2018/2019	Average for 2018 to 2019 inclusive
2018/19	Crop year, financial year, school year, etc., beginning in 2018 and ending in 2019
2016/17–2018/19	Crop year, financial year, etc., 2016/17 to 2018/19 inclusive

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Colophon

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