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The returns to exporting: Evidence from UK firms

by

Richard Kneller and Mauro Pisu

The Authors

Richard Kneller is an Associate Professor at the University of Nottingham and an Internal Research Fellow in GEP. Mauro Pisu is an economist in the Central Bank of Belgium and an External Research Fellow in GEP.

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Abstract

The question of learning versus self-selection has dominated the micro-econometric literature on firm export decisions, without leading to any firm conclusions. In part this reflects the limited information content of the data typically used. In this paper we use survey data on UK firms to offer some new insights into this debate. Consistent with the literature we find that the impacts of exporting on the size of firms are strongest, but that productivity type impacts also occur. These effects are larger the higher the export intensity of firms and the shorter their export experience.

JEL classification: D21, F14

Keywords: Learning by exporting, exports, productivity.

Outline

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Non-Technical Summary

One of the most robust findings, across different countries and time periods, of the micro-econometric research on firms export behaviour is that the most productive firms self-select into export markets. However, the results of this literature on the causal effects of exporting on firms performance are much more ambiguous. The most consistent benefits from exporting appear to be on firm size. With regards productivity, whereas evidence of post-entry gains are reported for the average firm in the UK and Italy, no such evidence is found for firms in Germany, the US, or Slovenia.

One of the main problem of the research on the causal effects of exports on firm performance is that the data source typically employed are poorly suited, at least in some respects, to investigate these issues. While the large micro-econometric data set used ensure a certain degree of representativeness, they contain only limited information on the various aspects of the firm on which export can impact upon. In addition, the time period they cover is usually short. As a result, empirical studies have been able to investigate the export effects for just one to three years after the start of exporting and prevent firm conclusions being reached.

In this study using a novel data source we offer fresh insight into the changes that occur to the firm because of exporting. We use a newly available survey of UK firms which contains information about the impacts of exporting on the performance of firms along several dimensions. Furthermore, the period covered is much longer than what available in larger micro-data set, allowing us to consider the effects of exporting for firms with up to 20 years of experience selling abroad.

Our econometric analysis suggests a much more nuanced view of the benefits of exporting compared to the existing literature. The gains seem to be primarily concentrated on increases in sales, improved growth and higher profits (the latter through higher volumes and not prices). Consistent with previous studies, these can be linked to the size of the firm. Changes concerning improvements in efficiency, the introduction of new products and an ability to compare yourself to overseas competition also occur, but are not as strong, in particular for export intensive firms that are new to exporting. These benefits are those that the current literature has discussed under the label learning.

Also, our evidence indicate that the impacts on size and productivity are more pronounced among firms with between two and ten years of previous export experience. Finally, we find that although the effects of exporting protract over a longer time-period than it has been possible to investigate so far (from one to three years) they do not persist forever. We find that the likelihood that the firm reporting a particular benefit to exporting as important declines as the experience of the firm rises.

1. Introduction

The literature on firm export behaviour has been dominated by one question: what is the direction of causation between exporting and firm performance? Known as the self-selection versus learning debate this literature has sought to establish whether the best firms choose to become exporters or whether being exposed to international markets brings additional benefits. The conclusions drawn from the surveys by Greenaway and Kneller (2006) and Wagner (2007) have been 1) self-selection effects dominate 2) the most consistent benefits from exporting are on firm size 3) to the extent that any effect on firm productivity can be found this appears confined to new exporters that are young (Delgado *et al.* 2002; Fernandes and Isgut, 2005), or are highly exposed to export markets (Kraay, 1999; Castellani, 2002; Girma *et al.*, 2004; Damijan *et al.*, 2006).

In this paper we offer fresh insight into the changes that occur to the firm as a result of exporting. For this purpose we use a newly available survey of UK firms which contains information about the impacts of exporting on the performance of firms along several dimensions. Such evidence provides a direct link from exporting to firm behaviour and allows us to provide new detail on the existing evidence, in particular aspects related to firm productivity. A second interesting feature of the data is that the firms studied have large differences in their previous experience of exporting, yet attempted to expand either the extensive or intensive margins of exporting at an identical point in time (two years) prior to the survey. Thus far the effect of learning has been studied only for first-time exposure to international markets relative to non-exporters. Here we observe the cross-time changes in firm behaviour from entry into new export markets for new and established exporters.

Our econometric analysis suggests that exporting has a positive effect on some firm performance measures. Consistent with the literature, the gains seem to be primarily on the size of the firm, such as increases in sales, improved growth and higher profits (the latter through higher volumes and not prices). The changes typically discussed under the label learning - improvements in efficiency, the introduction of new products and an ability to compare yourself to overseas competition - are not as strong, but can still be identified, in particular for export intensive firms that are new to exporting. This result supports the

productivity improvements found for export intensive new exporters in the UK by Girma *et al.* (2004a).

Of the new results we add to the literature perhaps of most interest is that the existing literature may be under-estimating the effects of exporting present in the data. It is not new exporters, on which almost exclusively studies have concentrated thus far, that experience the strongest benefits. Our evidence suggests that the impacts on size and productivity are more pronounced among firms with between 2 and 10 years of previous export experience. Finally, we find that although the effects of exporting protract over a longer time-period than it has been possible to investigate thus far (from one to three years) they do not persist forever. Bernard and Jensen (1999) and Greenaway and Kneller (2004a) have previously reported that while exporters have higher levels of productivity the rate of productivity growth between non-exporters and established exporters is not statistically different. We find that the likelihood that the firm reporting a particular benefit to exporting as important declines as the experience of the firm rises.

The rest of the paper proceeds as follows. Section 2 reviews the empirical evidence on self-selection verses learning and the inconclusive nature of the debate. Section 3 introduces the data used in the study, details the method of collection and the measurement of the variables used in the formal estimations. This section also provides some initial investigations on the relationship between the previous export experience of the firm and the benefits to exporting. Section 4 presents the econometric results and identifies the similarity of these findings with the existing literature. Finally Section 5 draws some conclusions from the study.

2. Export Impacts

In the literature on learning by exporting three types of effects are usually discussed:

1) *Technology transfer*: Interaction with foreign competitors and customers provides information about their process and products reducing costs and raising quality.

2) *Economies of Scale*: Exporting allows firms to increase the scale of production.¹

3) *Competition*: Increased competition in foreign markets forces firms to become more efficient and stimulates innovation.

The early debate on self-selection versus learning was won convincingly by those supporting self-selection. The arguments were perhaps most powerfully put by Bernard and Jensen (1999, 2004). In their study of US plants they found that even though exporters had a higher level of productivity, the rate of productivity growth of established exporters was not significantly different from that of non-exporters. This implies that the productivity distribution of firms (the productivity gap to non-exporters) in any given industry does not widen continuously over time. Put differently, to the extent that productivity gaps existed, the growth effects from learning could not be permanent.

This result led to a change in focus away from studying learning effects for all firms and instead towards their investigation for new exporters only. Bernard and Jensen (1999) and others (see Greenaway and Kneller, 2006) had already provided evidence that out of the pool of non-export firms, new exporters were already amongst the best and differed significantly from the average non-exporter, and that the periods leading up to and following export market entry were associated with significant changes in productivity. Building on this evidence the debate developed to consider whether learning effects might explain the surge in productivity that occurred around the point of first time export market entry. The question therefore became, while the best firms might self-select into becoming exporters, does their performance improve relative to similar firms that did not start exporting? This change in the hypothesis led to a change in methodology, with an emphasis on trying to control for the selection effect in the first stage.

Here the results have been less clear for either side, even when using similar methodologies. Whilst evidence of post-entry productivity improvements are reported for the average firm in the UK (Girma *et al.*, 2004), Canada (Baldwin and Gu, 2004), and Italy (Castellani, 2002), no such evidence is found for firms in Germany (Wagner, 2002), the US

¹ Evidence from Tybout and Westbrook (1995) suggests that this may be an unimportant source of efficiency

(Bernard and Jensen 1999, 2004), or Slovenia (Damijan *et al.*, 2006). However, much more consistent evidence has been found for an effect on the size of the firm.

The problems of apparent sensitivity of learning effects to context and methodology in addition to possible heterogeneity between firms are magnified by the lack of detail available within the typical data set. This has prevented firm conclusions to be drawn. Data limitations mean that the effect of exporting can be studied only for first-time exposure to international markets and not at entry into each new foreign market. Similarly firm productivity is the outcome from a whole series of investment and resource allocation decisions by the firm and not the residual from some crudely applied production function.² Together, these facts have allowed the same patterns of productivity for new exporters to be interpreted by some researchers as evidence of self-selection and by others as learning.

Case studies offer one solution to this problem, although questions surrounding the generality of results will always remain. Perhaps a more interesting approach to this question is that adopted by Baldwin and Gu (2004), who combine micro data with questionnaires about export behaviour. They find evidence of learning effects through changes in scale, increased efficiency and through competition. Canadian exporters used more foreign technologies, were more likely to have R&D collaboration with foreign firms and improved the flow of information about foreign technologies to Canadian firms. That also led to increased innovation and investments in absorptive capacity.

The analysis that follows is similar in spirit to that Baldwin and Gu (2004), in that it relies on survey data containing firm-specific information about the effects of exporting on firm performance. Data containing such details and over such a long time period are not available in the large firm-level data sets that have been used so far to investigate these issues.³

change.

² More detailed objections to the measurement of firm productivity are raised by Katayama and Tybout (2003).

³ Obviously, this comes at the cost of fewer observations.

3. Data

Sample Frame

The data used in the study were collected by OMB Research between May and July 2005 as part of a project funded by UK Trade and Investment (UKTI) titled 'Relative Economic Benefits of Exports and FDI'.⁴ UKTI are the UK Government Agency responsible for aiding (domestic and foreign) firms to export from, or to locate production (goods and service) within the UK.

Of that wider study we use the part of the survey that covers export firms. Two types of firm were selected for this part of the survey. The first group consisted of firms that had participated in a UKTI support programme within the period April 2003 to September 2004. Interview with these firms therefore occurred within a maximum of two years after their participation in a UKTI program. The firms in the participation group were identified by UKTI files and represent the complete population of firms that participate in UKTI export programmes.⁵ The numbers of firms participating within a UKTI programme and selected for survey is chosen to provide sufficient coverage of the different types of UKTI programme, although within each programme the choice of which firms to interview was random.

The sampling structure offers a potentially interesting set of firms to investigate the effect on firms of the decision to export. Participation in a UKTI programme is voluntary and therefore indicates that the firm was attempting to expand export sales in existing or new markets within the sampling window. The sample therefore consists of firms with different levels of previous export experience and other measurable characteristics that were trying either to expand the intensive or extensive margins of exporting.⁶ Also included in the sample are a number of firms that were non-exporters before they participated in a UKTI export support programme and then, were either successful or failed to start exporting. The

⁴ A detailed summary of the survey methods used to collect these data can be found in the OMB Research report 'Telephone Survey of UKTI Inward Investment and Trade Development Customers and Non-Users: Summary Report' July 2005.

⁵ The exception to this is diplomatic support.

⁶ Along similar lines, by using a similar point in the business cycle we can feel greater confidence that the results are not driven by some time varying factor (exchange rates, external demand etc.) or other unobserved factor that we have not accounted for.

inclusion of the latter group is a unique characteristic of the data relative to those typically used to investigate the effect of export market participation.

That participation in a UKTI export support programme is endogenous suggests an over-representation of firms that were facing some problems to exporting relative to the population of firms that attempted to increase exports during this period. This opens the question of whether the exports effects identified are general, or unique to the sample of firms. To control for aspect of the sampling frame we include the second part of the sample collected for UKTI. This consists of exporters that did not seek any support from UKTI. This group of firms were selected from those firms that had not participated in a UKTI exports programme, but were exporters. The firms in this group were identified using two information sources, namely FAME (for manufacturing) and Dunn and Bradstreet (for services). Firms that did not participate in a UKTI programme report on a similar set of question to participant firms, thereby offering a counterfactual to the effect of export market expansion/participation. Equal numbers of manufacturing and service sector firms were chosen for this survey.⁷ The completed survey coverage is shown in Table 1.

A number of these firms also attempted to expand export sales at the same point in time as the UKTI-supported firms. Firms that were not supported by UKTI were asked whether the firm had sought information about export market entry from sources other than UKTI within the last two years. These sources include both private agencies, such as banks, consultancies and trade associations, as well as public agencies, such as Regional Development Agencies.⁸ There are 86 of the 147 firms in the second part of the sample that sought information about exporting from non-UKTI sources. We explore the effect of the construction of the sampling frame on the results below.

Export Market Experience

⁷ These were further separated by the size of the firm, with an aim that 30 firms would be selected for interview from each of the following four size bands (1-9 employees; 10-49 employees; 50-249 employees; 250+ employees). Within the industry and size bands, selection was again random. For a more complete description of the survey coverage readers may refer to Kneller and Pisu (2006).

⁸ Often the information delivered through these sources in fact contains information originally drawn from UKTI. We thank UKTI for pointing this out to us.

Export market experience is likely to contain three main dimensions, the length of time the firm has been exporting, the number of markets it serves and the intensity with which it serves those markets. In the UKTI survey we have information on two of these and partial information on the third. We know in detail when they started exporting and their export intensity and that most firms attempted to expand into a new market two years prior to the survey.⁹ We measure these at the date at which the survey was conducted (that is up to two years after participation in the UKTI programme).

Six categories for the length of time the firm has exported are used (non-exporters, 0-2 years, 2-5 years, 5-10 years, 10-20 years and 20+ years). The firms that are included in the group of non-exporters are those that participated in a UKTI export programme but this did not lead to overseas sales, while those in the 0-2 year category are those firms from the same cohort of UKTI support programme that were successful. Firms are asked also to report the ratio of firm exports to total output. Again this information is categorical. The information on these two variables is detailed in Table 2.

While it is the case that firms with longer export experience export a greater fraction of their total output, this is not a linear relationship. Those firms that started to export in the last two years have a mean (model) response that they export less than 15% of turnover. This is the same for firms that started to export between 2 and 5 years ago, although the median response is 16-50% of turnover. Firms in the group of starting to export over 5 years ago are spread across the export intensity bands, with some exporting a small share of total output and others a lot.

Firm and Industry Characteristics

Respondents to the survey are asked a number of questions about their characteristics. Firms are asked to report on their size, as measured by employment and turnover. It occurred that firms either did not know, or were more reluctant to report, their turnover so

⁹ The two dimensions of experience that we observe in the data, age and intensity, are likely to be positively correlated with the third, the number of markets served, which is not observed in full detail. Damijan *et al.* (2006) report that export firms enter a small number of markets initially and add new markets relatively slowly, one every 2-3 years or so.

we concentrate on size as measured by employment. These are grouped into four size bands (1-10, 10-50, 50-250 and 250 plus employees). Information on the distribution of firm size is shown in Table 3. As expected large firms have greater export experience than small firms. There are

no firm with more than 250 employees without any export experience and only one had been selling abroad for less than two years. In contrast, there are a number of small firms with a non-negligible export experience.

The data available in this study does not allow us to compute productivity measures. However, firms were asked to report on the number of employees engaged in R&D. R&D is usually considered a measure of technology, hence a good proxy of the productivity level of firms.¹⁰ To reduce collinearity between employment and R&D, which are measured using the same employment bands, we constructed five R&D intensity categories. These were labelled as Zero R&D, Low-intensity R&D, Low-medium R&D, Medium-high R&D, High R&D.¹¹

As it is possible to see from Table 4, around 25 percent of firms surveyed are classified as not doing any R&D. Only two percent of them have low R&D intensity. For the remaining companies the share of them doing R&D is increasing with the level of R&D intensity. From Table 4, it is evident that in general R&D intensity increases with the years of export experience. As for the total number of employees, only a small number of firms with our relative measure of R&D spending in the high range have little export experience. In comparison, there is a greater number of enterprises with a low level of R&D that have been active in the export market for more than five years. Thus, like for the relationship of the number of employees and export experience, the number of years of experience

¹⁰ One general result of the literature on R&D spending and productivity is that they are positively correlated. However this correlation seems to be driven by between firms variation rather than within firms variation (see Klette and Kortum (2004) for a review of the main stylised facts of the literature on R&D and productivity). Since we are using a cross section we can be confident that the number of people engaged in R&D controls for different productivity levels among companies.

¹¹ If number of employees engaged in R&D is zero, then R&D intensity is classified as zero. The other values of R&D intensity are created using the two categorical variables concerning the number of employees and number of employees engaged in R&D and subtracting the former from the latter. The difference can assume four different values (from -3, to 0), with increasing numbers identifying higher R&D intensity firms. Therefore, we constructed a R&D intensity variable consisting of four categories, from zero (no R&D) to four (high R&D intensity).

shipping goods overseas appear to be positively correlated with R&D intensity. However, this correlation is likely reduced more by those firms with zero or low R&D and a great deal of export experience.

The complete list of explanatory variables use in the econometric analysis is exhibited in Table 5. In addition to the firm-level variables just described we also include whether or not the firm is a multinational, a subsidiary of larger group and a member of a UK or international trade association.¹² Of the firms surveyed around some 20 per cent of them reported themselves as multinationals. The multinational firms were asked in the survey whether they exported to affiliates within the same group. Sixty firms identified that this was the case, although all also confirmed that they exported to non-affiliates also. It seems reasonable to assume that multinationals would not participate in a UKTI programme in order to expand intra-firm exports so we choose to leave all multinational firms within the sample. Around 48 percent of companies in the data reported to being member of UK or international trade association.

The last set of variables we consider includes three types of agglomeration measures and whether firms are in the manufacturing or service sectors. The three geographical concentration measures consider whether in the local same area there are other exporting firms, there is a high mobility of workers between firms in your industry, or there is a leading firm from your industry. It is conceivable that agglomeration facilitates the exchange of information among firms. To add some detail: 50 percent of firms surveyed reported to be in an area with other exporting firms, 21 percent declared there to be a high level of mobility of workers between firms in the area, whereas 30 percent reported they were located nearby a leading firms from their industry. Finally 60 percent of the companies sampled were in the manufacturing sector.

Entry Effects

The OMB survey asks a series of questions regarding the impact on firm performance of exporting. The question contains two parts. In the first part, firms are presented with a list

of nine ways through which firms could benefit from exporting and were asked if they had benefited from any of them. If they answered yes they were then asked to rate how important this has been on a 1-5 scale, where 5 means to a critical extent and 1 to a no extent.¹³ In Table 6 we list the potential benefits.¹⁴ The question about ‘Improved profitability’ was followed by an additional question concerning whether the increase in profits was due to increase in volumes sold or prices. We use this information to disentangle the effect of improved profitability generated by larger volume and higher prices.

The detailed information on various aspects of firm performance and benefits to exporting offer an alternative perspective on the learning by exporting hypothesis to that relying on more conventional data sources. While the survey offers much more direct evidence on the learning by exporting hypothesis compared to that inferred from measures of firm productivity these benefits are recorded as perceived by the firm. We recognise this as an important point of note regarding the data. However, the timing of the questionnaire relatively soon after the attempt to expand export sales or to start exporting reduces the possibility of ‘recall bias’ (Bertrand and Mullainathan, 2001).

Summary Statistics

The majority of firms replied “yes” they have benefited from exporting under each of the nine categories listed in Table 6. Given the high rate of “yes” responses to the benefits of exporting, in some cases more than 80 per cent, it would seem likely that the different benefits are highly correlated. In terms of the pair-wise correlations, these are relatively low however. The largest correlation is 0.487, between increased profitability and increased sales.

¹² Subsidiaries were asked that all answers relate to their experiences as individual plants and not to the group as a whole.

¹³ These questions were asked only to those firms whose exports made up less than 75 per cent of their export turnover.

¹⁴ It should be noted that these questions are asked to non-export firms also. Here the question must relate to the anticipation of a benefit. The results for this group should therefore provide an interesting comparison to those who have actually stated to export.

Alternatively we might use factor analysis to consider more broadly patterns to the types of benefit firms identify as a benefit to exporting.¹⁵ Two clear groups are identified using this process.¹⁶ The first group (detailed in Table 6) might be described as impacts relating to the size of the firm. This group include the benefits relating to the growth of the firm, reduced dependency on a single market and improvements to sales and profitability. The second group is perhaps more interesting as it includes a number of factors typically discussed within the learning by exporting literature. For example, learning often includes a discussion of economies of scale (improved capacity utilisation) and improvements due to competition and reductions in X-inefficiency, as well as factors that might be described as the ability to imitate and improve the quality and delivery of products (ability to compare your self to competitors, improvements to your products and services and improvements in marketing). It is likely that a number of these variables will be captured by improvements in measured productivity in the typical firm data set.

Within the paper we are interested in variation in the benefits from exporting linked to firm-level characteristics. Figure 1 depicts the box-whisker plot of the sum of the benefits from exporting reported by firms for different levels of some firm's characteristics.¹⁷ We concentrate on the number of years firms have been active in export markets, their export intensity, number of employees and their R&D intensity. The first two of these characteristics can be linked to the export experience, whereas the latter two refer to their size and technological capabilities. As noted previously, the OMB survey includes information about firms that try without success to enter export markets. These enterprises fall in the 0 years and 0% export intensity groups. Obviously, for these companies the answer about the positive effects export could generate have to be interpreted as expected benefits.

¹⁵ We exclude the additional questions on profitability for this exercise. Adding them led to the identification of a additional factor to that above that contained the original question on profitability and the supplement question on volume. The supplement question relating to the impact of increased prices and profitability did not belong to any of the identified factors.

¹⁶ A third factor was also identified, although this did not turn out to be meaningful.

¹⁷ In the box-whisker plot the median of the distribution is identified by the dark line in the middle of the box, the edges of the box indicate the 25th and 75th percentiles (i.e. the inter-quartile range) and the 'T's' the minimum and maximum values.

As it is possible to see from Figure 1, in certain respects the behaviour of the distribution of the sum of positive benefits from exporting for firms with different years of export experience and degree of export intensity are similar. The median tends to increase as the years of experience into export markets and export intensity rise. Also, with respect to years of export experience, the behaviour of the median response is non-linear and peaks at the 2-5 and 5-10 year range. On the contrary, with respect export intensity, it rises monotonically. This is suggestive of the facts export benefits may be stronger for the more export intensive exporters and for those that started to export not long time ago.¹⁸

Furthermore, the central point of the distribution is lower for firms that just started to export (those with less than two years of export experience) and for those having only a limited exposure to export market (those with an export share in the 1-5% range) than for non-exporters. This suggests that the expected benefits from exporting are higher than what firms actually experience, straight after exporting or for low level of export intensity.

Considering employment and R&D intensity, the median of the distribution of the number of export benefits appear to peak in the medium range. However, the inter-quartile range is large throughout indicating high variability in the responses of export benefits for firms having different size and R&D intensity.

Figure 2 and Figure 3 analyse the relationship between export experience and export intensity on the one hand and export benefits on the other in more detail. They consider separately each type of benefits firms may have experienced. Each bar in the graphs shows the percentage of firms in each export age and export intensity class that answered “yes” or “no” to the question about specific positive effects of exporting.

Focusing on non-exporters, Figure 2 and Figure 3 suggest that, not surprisingly, increases in sales, growth and profitability are the most frequent benefits would be exporters expect

¹⁸ The behaviour of the inter-quartile range is also interesting. Whereas it is more or less constant as the export intensity rises, it increases for firms with longer export experience. This would either suggest that the benefits from exporting become more uncertain the longer firms have been active into export markets or that

from selling abroad (more than 80% of these firms reported these expected benefits). Less dependency on a single or small number of markets, improvements in marketing strategies and the opportunity of comparisons with competitors abroad are in the mid-range rate of positive responses (between 67% and 78% of non-exporters replied “yes” to these questions). The least expected positive impacts from exporting are improvements in products or services, increase in the utilisation of existing capacity and improvements in process efficiency. The latter two are the only expected benefits receiving a positive reply from less than 50% of would-be exporters. The fact that increases in process efficiency, i.e. productivity, are identified by only 30% cent of non-exporters suggests this is not one of the main reasons driving their decision to start exporting.

With regards export age, from Figure 2 it is possible to see a clear pattern linking export experience and the frequency of firms reporting each benefit. There is a steep increase in the frequency of positive replies for companies with 2 to 5 and 5 to 10 years of export experience with respect to enterprises that just started to export (i.e. those with less than 2 years of experience). Also, the frequency of firms reporting each benefit appears to decrease for the 10-20 years and/or 20 plus years age groups (according to the benefit). Exceptions to this pattern are when the benefits to exporting relate to an ‘increased ability to compare yourself with competition from abroad’ and ‘improvements to your products or services’. For the former, there is a higher percentage of firms (more than 60%) reporting this positive effect throughout, irrespective of their experience. For the latter, there appear to be a negative trend between the frequency of positive replies in each age group and the number years of activity in foreign markets. This would suggest that improvements in products or services are more likely to be introduced in the first few years after the start of export sales.

Overall the graphs in Figure 2 suggest that most exporters experience benefits from exporting in the first 10 years of selling abroad. After this period there is a decrease in the percentage of firms reporting positive effects. This pattern indicates the existence of a non-linear relationship between number of years of activity in export markets and perceived benefits from exporting. One possible explanation for disagreement in current studies as to

respondents become more unsure what the actual benefits from exporting may be after a long time has passed

the effects new export market entry on firm performance is the short time period over which such effects are measured, usually 1 to 3 years after the start of exporting and the inability to capture the expansions in the extensive and intensive margin of sales after the firm begins to export. Our descriptive graphs support this view and suggest that benefits from exporting might accrue over a longer time horizon and therefore that the identification of the extensive margin is important.

The same broad view emerges from Figure 3, which exhibits the benefits from exporting for different export intensity groups. Overall, the frequency of firms reporting positive benefits appears to increase with export intensity. Contrary to what we have seen in Figure 2, in most cases the benefits seem to persist also for those firms that are more exposed to international markets (those having an export share larger than 25% of their turnover). Not surprisingly, there are steep increases, as export intensity rises, of the frequency of firms reporting “Improved utilisation of existing capacity”, “A level of growth that would otherwise not have been possible”, “Reduced dependence on a single market or small number of markets”, and “Increased sales”. Also, the percentage of firms reporting “Improvements to your products or services” or “Improved process efficiency” appear to increase with the extent of exposure to export markets.

In general, these descriptive graphs suggest that the extent of benefits from exporting might depend on the two types of export experience we have considered. We would expect that the positive impacts from exporting are stronger for firms with higher export propensity and those that started recently to export (relatively to companies with more than 10/20 years of experience selling overseas). Evidence of this would support that identified by Kraay (1999), Castellani (2002), Girma *et al* (2004) and Damijan *et al.* (2006).

4. Econometric specification

In this exercise we are interested in identifying which firms are more likely to benefit from exporting and the extent to which such effects are beneficial. The appropriate methodology changes with each question. To investigate the effects of firm and industry-level variables

since the firm started to export.

on the probability of reporting some particular benefit from exporting we estimate the following latent variable model:

$$y_i^* = x_i\beta + \varepsilon_i$$

where i indexes firms, x_i is the set of explanatory variables in Table 5 supposed to affect the benefits of exporting, β is the vector of parameter to be estimated and ε_i is a normal error term. y_i^* can be considered a latent variable, unobserved by the econometrician, which captures the actual benefit from exporting accruing to the firm. We assume that surveyed firms will reply positively to the question whether or not exporting has produced any particular benefit if $y_i^* > 0$ (i.e. positive benefits) and negatively if $y_i^* \leq 0$ (i.e. negative benefits). Therefore, the probability of experiencing positive benefits from exporting can be modelled through the standard probit specification as (see Verbeek 2005, pp 192):

$$P(y_i = 1 | x_i) = P(y_i^* > 0 | x_i) = P(x_i\beta + \varepsilon_i > 0) = P(\varepsilon_i \leq x_i\beta) = F(x_i\beta)$$

where $F()$ is the cumulative normal distribution since ε_i is assumed to be normally distributed. The parameter of interest can then be estimated through standard maximum likelihood method.¹⁹

The second question we want to examine concerns the extent of the benefits from exporting. The model is essentially the same as in the probit, except for the fact that instead of having just two outcomes we observe five. For this reason, we use the same explanatory variables and we expect them to have the same qualitative effects.²⁰ The dependent variable measuring the importance of the benefits from exporting ranges from one (to no extent) to five (to a critical extent). This can be modelled through an ordered probit model of the following type (Verbeek 2005, pp 203):

$$y_i^* = x_i\delta + \varepsilon_i$$

$$\text{with } y_i = j \text{ if } \gamma_{j-1} \leq y_i^* < \gamma_j \text{ and } j = 1, 2, \dots, J^{21}$$

y_i^* can still be considered as the actual benefits accruing to firm i from its exporting activities and is unobserved by the econometrician. Then, the probability of the firm

¹⁹ All estimations have been conducted using Stata 9.

²⁰ This model is however estimated using only a subset of the observations used for the Probit. This is because the question concerning the importance of the benefits from exporting was posed only to those firms that reported positive benefits.

²¹ In this exercise $J = 5$

reporting one of the particular j values is the probability of the latent variable to fall within the $\gamma_{j-1} - \gamma_j$ range.²² For this reason we have that:

$$P(y_i = 1 | x_i) = F(-\infty < y_i^* \leq \gamma_1 | x_i) = F(-x_i\delta)$$

$$P(y_i = j | x_i) = F(\gamma_{j-1} \leq y_i^* < \gamma_j | x_i) = F(\gamma_j - x_i\delta) - F(\gamma_{j-1} - x_i\delta) \text{ for every } 1 < j < J$$

$$P(y_i = J | x_i) = F(\gamma_{J-1} < y_i^* < \infty | x_i) = 1 - F(\gamma_{J-1} - x_i\delta)$$

As before the parameter of the model along with the ancillary boundary value of γ s can be estimated through standard maximum likelihood. Unlike in the probit, the sign of the estimated parameters is not generally informative about the sign of the respective marginal effects.²³ Therefore, marginal effects, one for each different outcome, need to be calculated as

$$\frac{\partial P(y_i = j | x_i)}{\partial x_i} = [f(\gamma_j - x_i\beta) - f(\gamma_{j-1} - x_i\beta)]\beta$$

Marginal effects of dummy variables are computed as the difference between the probabilities obtained when the dummy takes the two different values. Given that these marginal effects are non-linear functions of the parameter of interest their standard errors is computed through the delta method (see Greene 2000, pp 357-358).

5. Empirical Results

We organise the results according to their inclusion in one of the two groups identified from the factor analysis in Table 6. We provide the results for the impacts on firm size in Table 7a and the productivity impacts in Table 7b. From these tables it is immediately evident the lack of significance of most of the control variables in the regression. This is expected and is consistent with Greenaway and Kneller (2004a) who have previously reported for UK firms that new exporters display characteristics that are already similar to established exporters.²⁴

²² The ordered probit model assumes that $\gamma_0 = -\infty$ and $\gamma_J = \infty$.

²³ Only for the lowest and largest outcome the sign of the marginal effects can be derived from the sign of the related parameters. If β is positive (negative) then the sign of the marginal effect for the highest outcome is positive (negative) and the sign of the marginal effect for the lowest outcome will be negative (positive).

²⁴ This result is not driven by the correlation with experience and holds also when we omit the experience variables.

Of the export experience dummies the omitted categories are those that have been in export markets the longest (20+ years of export experience) and the least export intensive (less than 5% of turnover). Drawing on the results available in the existing literature and on the descriptive analysis, we would expect that the effects from entering foreign markets should be strongest for the newest and most export intensive exporters (and lowest in the omitted categories). This prior appears to be born out by the data. The estimated coefficients of the export age and export intensity dummies are, where significant, in all cases positive.

Comparing across Tables 7a and 7b it would appear that overall the impact of exporting on firm performance is most clearly identified on the variables measuring firm size in Table 7a compared to the firm productivity impacts in Table 7b. These size impacts are consistent with improvements in aggregate productivity growth through resource reallocation towards exporters found by Bernard and Jensen (2004) Hannson and Lundin (2004) and Falvey *et al.*, (2004).

Another striking set of results within Table 7a and 7b concerns the number of significant coefficients for firms with more than 2 years export experience. The positive effects may take more than two years to appear and may occur differently at entry into each new export markets for established exporters. Firms with 2-5 years of export experience are more likely to identify seven of the eleven channels as delivering benefits compared to the most experienced firms and there are a total of eight for firms with 5-10 years of previous export experience. This would suggest that the previous literature may have underestimated the time period over which benefits from exporting may take place. In most cases the effects of exporting last up to 10 years after the firm started exporting.

Perusing the estimates of export intensity it is possible to see that they behave in a sensible manner since the effects are larger the greater the export intensity of the firm. For some of the benefits from exporting this is unsurprising. For example, we might expect that as the export intensity of the firm rises it would be increasingly likely to report an effect on growth of the firm, reduced dependency on a single market as well as increased sales and profitability (due to volume). The exception to all this is the case of improved profitability due to higher prices in export markets. Here we find that only the most export intensive

firms (export intensity 50%-75%) report such effects. It should also be remembered that only 15 per cent of firms reported such effect as important. The weak relationship for this variable with export experience might be used to suggest that the strong results found for the other types of benefit to exporting are not being driven by some omitted factor.

There is also some evidence that the larger the export intensity the higher the probability the firm reported benefits related to productivity (Table 7b). These are limited to the most export intensive firms only however. This finding is consistent with the results of Castellani (2002) who reported that productivity benefits for Italian firms are increasing with their share of output sold abroad.

While in general the evidence of productivity impacts from exporting appear less strong a number of the results in the table are of note. Firstly, and perhaps of greatest interest, are the results for firms that have been exporting only for less than two years. These are the new firms to export within the data, and the firms that the learning literature has focused on. According to the results in the table the three types of benefits, firms with this level of export experience most clearly identify, might be captured as improvements in measured productivity. New export firms most clearly identify improvements in the ability to compare themselves with the competition, that exporting led to improved products and improved marketing. That is, the results are consistent with why the existing literature has found *some* evidence of learning (Greenaway and Kneller, 2006). This is in part because productivity estimates capture our ignorance, our inability to properly measure the inputs and outputs of the firm. It is therefore the case that the estimated productivity effects from exporting in this literature may include traditional elements such as technology transfer (ability to compare yourself with competition) or softer elements such as improved marketing, as well as poor measurement of the firms output (improved products). In addition, consistent with Kraay (1999), Castellani (2002), and Girma *et al.*, (2004), the most export intensive firms are most likely to report these effects

As expected, the point-estimates in Tables 7a and 7b decline with the export experience of the firm. This is consistent with the view that the effects of exporting do not persist in the long run, although this not always a simple linear decline. A declining role for experience is

most clearly true for comparisons with competitors, less dependency on a single market and improved products (although the effects for the latter two are only weakly significant). For some of the other positive effects to exporting the relationships are more complicated. We find that exporters report increased growth (between 2 and 20 years of exporting), improved ability to compare with other firms (between 0 and 5 years of exporting), increases in efficiency (between 2 and 5 years of selling abroad) and marketing (between 2 and 10 years of export practice) in a manner different to established exporters. Similarly increased sales and profitability (due to volume) is reported for firms with 2-5 and 5-10 years of experience.

The results may also help to explain some of the other results found in the exporting literature. According to the results exporting allows firms to compare themselves with competitors more easily (labelled technology transfer in the learning literature), as well as being more likely to improve their process efficiency and their products. To the extent that the last two factors depend on R&D this might help to explain the positive interaction effect found between exporting and R&D by *Aw et al.* (2006).

Finally, as noted above, the coefficients of the group of non-export firms relate to anticipated benefits to exporting. These are significant in a number of cases, although grouped primarily on the measures of firm size. Non-exporters anticipate improvements in growth, reduced dependency on a single market, increased sales and improved profitability (due to volume increases only). Among the gains from exporting we relate to productivity only improvements in marketing appear to be expected by export-aspiring firms.

A concern raised above was that firms that participated in a UKTI support programme may have a tendency to over-report benefits to exporting. In Tables 8a/b we add the control for participation in one of the UKTI programmes. Few of the estimated effects of export experience change. The changes in the results that do occur relate to a loss of significance of reduced dependency on a single market, improved products for firms with 5-10 years of experience, and for improved marketing for firms with less than 2 years of exporting, while capacity utilisation becomes significant for firms with 5-15% of exports over total sales. The participation dummy is itself significant in only three cases (growth, dependency and

capacity). Overall, we can feel confident that the effects being picked up are general rather than specific to the sample under study.

Intensity of the Benefits from Exporting

In the next set of regressions we further explore the effects of export market entry on firms' performance by testing for differences in the size of the reported benefits. In a follow up question firms that identified one of the above effects from exporting were asked to grade the importance of the gains they received from 1 (to no extent) to 5 (to a critical extent). We estimate these as ordered probit regressions. Owing to the large number of estimated coefficients, for example for the nine experience categories there are nine possible types of entry effects and five possible outcomes, we choose to report only the sign of the significant marginal effects in Table 9a/b.²⁵

We are particularly interested in the marginal effects on the export experience and export intensity dummies and only these marginal effects are reported. For each specific outcome, marginal affects of dummies can be computed as the difference in probabilities between the reference firms and those firms within another category. Since as reference firm we are using the least export intensive firms with more than 20 years of export experience we expect the marginal effects to be positive at the higher end of the dependent variables (i.e. firms benefit to a critical extent) and negative at the lower end of the dependent variable (i.e. firms benefit to no extent). This is because the gains from exporting should be larger for firms that have recently started exporting and for those that are more export oriented.

Overall the results in Table 9a and b reinforce the view that export experience, measured by both the number of years of exporting and export intensity, matters for the benefits that export market entry generate. The positive marginal effects are concentrated in the last two columns, which refer to outcomes four (benefits to medium-high extent) and five (benefits to a high extent). On the contrary, the marginal effects on the probability of reporting export benefits from no critical importance to medium importance are when significant all negative. Even when firms of different experience levels identify the same benefit as

important it is still the case that those that are new to exporting and are the most export intensive identify the benefit most keenly.

However, the effects of export experience on the extent of benefits are not distributed evenly across the different types of gains. In the case of 'increased ability to compare yourself with competition abroad' and 'improved process efficiency' the number of significant marginal effects is small for example. This contrasts to the probit regressions for these channels where there were a number of significant differences across firms.

For the remaining channels the number of significant coefficients is much larger. An obvious pattern here is that the left hand columns in the table contain the significant negative marginal effects, while the right hand columns are dominated by positive coefficients. Where this occurs it would appear it would suggest these firms were less likely to identify the importance of a benefit from exporting with a low score and more to give it a high score, relative to the most export experienced firms and least export intensive firms (those with 20+ years of export experience and export less than 5% of total output).

An additional noticeable feature in the table is the place where the significant marginal effects switch from negative to positive. This occurs between the medium (score of 3) and medium-high (score of 4) levels of benefit for the productivity variables in Table 8b, but happens at medium-high (score of 4) to high (score of 5) scores for impacts on the size of the firm. This would suggest that the benefits to firms for the level of growth, reduced dependency and increased sales are much more likely to be graded of a high order and therefore possibly also of a greater magnitude. Finally, in general, significance is found for both of the aspects of experience, in particular the size impacts are balanced across both aspects of experience. It is of interest however that the significant marginal effects in the table tend to be concentrated on firms with five or less years of export experience and who export more than 15% of their total output.

²⁵ The follow up questions on whether the profit effects were due to price or volume were not additionally graded on a 1-5 scale by firms.

6. Conclusions

The question over whether firms select into export markets or if they receive any benefit from doing so has received a great deal of attention in the micro-econometrics of trade. Despite this volume of research activity, this literature has not managed to generate a clear conclusion either way. That is in part explained by the lack of sufficient detail within existing data used to investigate this question. The patterns of firms productivity describing self-selection can just as easily be interpreted as learning by exporting. To make progress on this issue requires new types of data, such as the survey data used on Canadian firms by Baldwin and Gu (2004).

In this paper we use new survey evidence for UK firms. This data have a number of characteristics that make useful in this context. Firstly it has rich detail on a number of potential impacts on firm performance of exporting and second it compares firms with different levels of experience.

Our analysis reveals a number of patterns in the data. For example, consistent with existing evidence the impact on firm size are more clear than that on the determinants of firm productivity. Second companies with less export experience and with higher export intensity seem in general to benefit to a greater extent. Third, most of the gains from exporting arise two years after the firm first began selling abroad and persist for long periods (up to ten years). Fourth, the pattern of results appear consistent with the evidence for new UK exporters investigated by Girma *et al.* (2004).

Overall, these findings indicate that firms might benefit from exporting. However, exports impact mostly on the size of the firm and only to a more limited extent on other productivity related variables. Research on the learning by exporting versus self-selection hypotheses would benefit from other surveys specifically designed to explore this issue further and for other countries.

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Table 1: Export experience and Size for UKTI non-participants (participants)

Number of Employees	1-10	11-50	50-250	250+	Total
Export experience					
Do not export	0 (15)	0 (10)	0 (1)	0 (0)	0 (26)
Within the last 2-years	0 (21)	2 (7)	0 (2)	0 (1)	2 (31)
Between 2 and 5 years ago	0 (43)	1 (23)	0 (12)	1 (2)	2 (80)
Between 5 and 10 years ago	2 (23)	1 (18)	3 (10)	1 (1)	7 (52)
Between 10 and 20 years ago	12 (14)	11 (24)	20 (12)	6 (3)	49 (53)
More than 20 years ago	19 (8)	17 (19)	30 (27)	20 (16)	86 (70)
Total	33 (124)	32 (101)	53 (64)	28 (23)	146 (312)

Source: OMB survey. Authors' calculation.

Table 2: Export experience and export intensity

Export intensity	0% of turnover	<15% of turnover	16-50% of turnover	50%+ of turnover	Total
Export experience					
Do not export	26				26 (5.56%)
Within the last 2-years		20	6	7	33 (7.17%)
Between 2 and 5 years ago		33	30	19	82 (17.83%)
Between 5 and 10 years ago		21	19	19	59 (12.83%)
Between 10 and 20 years ago		29	30	44	103 (22.39%)
More than 20 years ago		37	67	53	157 (34.14%)
Total	26 (5.65%)	140 (30.43%)	152 (33.04%)	142 (30.87%)	460 (100%)

Source: OMB survey. Authors' calculation.

Table 3: Export experience and number of employees

Employees	1-10	10-50	50-250	250+	Total
Export experience					
Do not export	15	10	1	0	26 (6%)
Within the last 2-years	21	9	2	1	33 (7%)
Between 2 and 5 years	43	24	12	3	82

ago					(18%)
Between 5 and 10 years ago	25	19	13	2	59 (13%)
Between 10 and 20 years ago	26	35	32	9	102 (22%)
More than 20 years ago	27	10	57	36	156 (34%)
Total	157 (34%)	133 (29%)	117 (26%)	51 (11%)	458

Source: OMB survey. Authors' calculation.

Table 4: Export experience and R&D intensity

Export	R&D	Zero	Low	Medium-low	Medium-high	High	Total
Do not export		8	0	1	7	10	26 (60%)
Within the last 2-years		14	0	1	7	11	33 (70%)
Between 2 and 5 years ago		23	1	7	16	33	80 (180%)
Between 5 and 10 years ago		12	0	8	18	19	57 (130%)
Between 10 and 20 years ago		20	1	25	29	27	102 (230%)
More than 20 years ago		35	7	41	43	24	150 (330%)
Total		112 (25%)	9 (2%)	83 (19%)	120 (27%)	124 (28%)	448

Source: OMB survey. Authors' calculation. R&D intensity is computed considering the four categories of the categorical variables concerning the number of employees engaged in R&D and their total number of employee. The four categories are 1-10, 10-50, 50-250 and 250+ employees. R&D intensity is obtained subtracting the former from the latter. The difference can assume four different values, which identify firms with zero, medium-low, medium high and high R&D.

Table 5: Industry and firm-level variables

<i>Firm Variables</i>	<i>Industry Variables</i>
Date of first export market entry (6 categories)	Lots of firms in your area with export experience (binary)
Export Intensity (4 categories)	There is considerable movement of staff between firms in your area (binary)
Employment (4 categories)	Some of the leading firms from your industry are based in your area (binary)
R&D intensity (5 categories)	Manufacturing Indicator (binary)
Multinational Indicator (binary)	
Subsidiary Indicator (binary)	
Member of UK or International Trade Association (binary)	

Source: OMB survey.

Table 6: Export impacts

Group1 - Size
Growth that would not otherwise have been possible
Improved profitability
Increased sales
Reduce dependency on a single market
Group 2- Productivity
Improved utilisation of capacity
Ability to compare with competition
Improvements to products or services
Improved process efficiency
Improved marketing

Source: OMB survey

**Table 7a: Probit regressions of the probabilities of benefiting from exporting
(size effects)**

	Increase growth	Less dependency on single market	Increase sales	Improved profitability	Improved profitability (price)	Improved profitability (volume)
Non-exporter	0.244 (4.34)* *	0.221 (2.70)**	0.087 (2.41)*	0.236 (2.81)**	0.076 (0.67)	0.334 (3.66)**
Export <2 years	0.119 (1.43)	0.003 (0.03)	0.048 (1.13)	-0.064 (0.60)	0.020 (0.24)	-0.104 (0.83)
Export 2-5 years	0.179 (3.03)* *	0.104 (1.44)	0.099 (3.37)**	0.216 (3.28)**	0.053 (0.87)	0.277 (3.68)**
Export 5-10 years	0.179 (2.67)* *	0.140 (1.87)+	0.068 (2.10)*	0.188 (2.73)**	0.055 (0.81)	0.164 (2.01)*
Export 10-20 years	0.153 (2.63)* *	-0.099 (1.40)	0.021 (0.55)	0.058 (0.89)	0.037 (0.73)	0.095 (1.32)
Export 5%-15%	0.108 (1.59)	0.164 (2.44)*	0.044 (1.28)	0.092 (1.18)	0.086 (1.18)	0.124 (1.37)
Export 15%-25%	0.153 (2.33)*	0.206 (3.06)**	0.075 (2.10)*	0.177 (2.32)*	0.075 (1.00)	0.239 (2.77)**
Export 25%-50%	0.293 (5.23)* *	0.258 (4.17)**	0.092 (2.88)**	0.191 (2.81)**	0.021 (0.35)	0.253 (3.25)**
Export 50%-75%	0.292 (5.04)* *	0.337 (5.72)**	0.119 (3.66)**	0.226 (3.25)**	0.179 (2.30)*	0.280 (3.52)**
Export agglomeration Staff Movement Technical Frontier Manufacturing Dummy Employment 10-49 Employment 49-249 Employment 250+ Low R&D	0.112 (2.28)*	0.079 (1.54)	-0.023 (0.79)	0.018 (0.34)	-0.024 (0.69)	0.070 (1.24)
	-0.137 (2.13)*	0.020 (0.34)	-0.055 (1.43)	-0.054 (0.86)	-0.004 (0.10)	-0.074 (1.08)
	0.053 (1.01)	0.050 (0.91)	0.102 (3.21)**	0.073 (1.29)	0.023 (0.57)	0.025 (0.40)
	-0.061 (1.25)	0.039 (0.77)	0.007 (0.23)	-0.057 (1.13)	-0.120 (3.23)**	-0.047 (0.84)
	0.045 (0.59)	0.046 (0.56)	0.050 (1.42)	0.096 (1.20)	-0.006 (0.10)	0.123 (1.40)
	0.068 (0.72)	0.010 (0.10)	-0.046 (0.86)	0.062 (0.66)	0.190 (2.15)*	0.083 (0.79)
	0.169 (1.96)+	0.118 (1.31)	0.043 (0.82)	0.009 (0.08)	-0.022 (0.28)	0.048 (0.39)
	-0.116 (1.52)	0.010 (0.14)	-0.061 (1.41)	-0.128 (1.71)+	-0.065 (1.38)	-0.158 (1.93)+
Medium-Low R&D	-0.171 (0.84)	-0.131 (0.62)	-0.116 (0.73)	-0.300 (1.40)		-0.277 (1.19)
Medium-High R&D	0.120 (1.22)	0.125 (1.32)	0.057 (1.30)	0.007 (0.06)	-0.075 (1.33)	-0.014 (0.12)

High R&D	-0.020 (0.23)	-0.066 (0.74)	0.001 (0.03)	-0.124 (1.31)	-0.087 (1.57)	-0.161 (1.58)
MNE dummy	-0.083 (1.19)	-0.119 (1.48)	-0.037 (0.88)	-0.053 (0.68)	0.023 (0.42)	-0.098 (1.15)
Subsidiary dummy	-0.055 (0.86)	0.039 (0.58)	-0.092 (2.40)*	-0.148 (2.03)*	0.020 (0.40)	-0.232 (2.86)**
Member of Trade assoc.	0.017 (0.36)	0.080 (1.65)+	0.021 (0.75)	0.008 (0.17)	-0.038 (1.12)	0.056 (1.06)
Observations	369	369	369	369	362	369

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; the reported coefficients all refer to estimated marginal effects (calculated at the mean of the right hand side variables). Omitted category for export years is 20+ years, for export intensity is 0%-5%, for employment is 0-10 employees, for R&D is Zero R&D.

**Table 7b: Probit regressions of the probabilities of benefiting from exporting
(productivity effects)**

	Utilisation of capacity	Ability to compare with competition	Improved products	Increase in efficiency	Improved marketing
Non- exporter	-0.062 (0.45)	0.198 (1.91)+	0.174 (1.45)	0.117 (0.75)	0.252 (2.56)*
Export <2 years	-0.056 (0.49)	0.198 (2.13)*	0.216 (2.21)*	0.127 (1.03)	0.165 (1.69)+
Export 2-5 years	0.005 (0.06)	0.152 (2.04)*	0.114 (1.39)	0.187 (2.00)*	0.251 (3.47)**
Export 5-10 years	0.031 (0.36)	0.093 (1.13)	0.156 (1.83)+	0.193 (1.98)*	0.228 (2.93)**
Export 10-20 years	-0.111 (1.41)	0.049 (0.72)	-0.031 (0.43)	-0.015 (0.18)	0.056 (0.83)
Export 5%-15%	0.129 (1.60)	0.034 (0.40)	0.021 (0.23)	-0.053 (0.52)	0.025 (0.28)
Export 15%-25%	0.165 (1.97)*	0.064 (0.75)	0.060 (0.65)	0.169 (1.59)	0.123 (1.46)
Export 25%-50%	0.289 (4.19)**	0.180 (2.42)*	0.205 (2.60)**	0.184 (1.97)*	0.096 (1.19)
Export 50%-75%	0.279 (3.86)**	0.264 (3.45)**	0.256 (3.05)**	0.248 (2.48)*	0.218 (2.65)**
Export agglomerati on	0.028 (0.52)	0.010 (0.19)	0.053 (0.96)	-0.035 (0.59)	0.023 (0.43)
Staff Movement	0.062 (1.00)	0.029 (0.44)	0.044 (0.66)	-0.018 (0.25)	-0.006 (0.08)
Technical Frontier	0.073 (1.22)	0.016 (0.27)	0.058 (0.96)	0.066 (0.98)	0.010 (0.16)
Manufactur ing Dummy	0.050 (0.93)	0.058 (1.09)	-0.007 (0.13)	0.032 (0.53)	0.090 (1.63)
Employmen t 10-49	0.099 (1.17)	0.018 (0.22)	0.127 (1.46)	0.158 (1.59)	-0.225 (2.51)*
Employmen t 49-249	0.124 (1.27)	0.074 (0.74)	0.122 (1.19)	0.220 (1.90)+	0.038 (0.37)
Employmen t 250+	0.066 (0.57)	0.134 (1.23)	0.090 (0.80)	-0.065 (0.48)	-0.006 (0.05)
Low R&D	-0.133 (1.69)+	-0.135 (1.76)+	-0.171 (2.15)*	-0.243 (2.88)**	-0.120 (1.54)
Medium- Low R&D	-0.087 (0.42)	0.126 (0.63)	-0.101 (0.52)	0.188 (0.78)	-0.154 (0.75)
Medium- High R&D	0.040 (0.42)	0.118 (0.63)	0.061 (0.52)	0.043 (0.78)	0.060 (0.75)

High R&D	(0.35)	(1.15)	(0.54)	(0.34)	(0.55)
High R&D	-0.145	0.048	-0.089	-0.158	0.215
	(1.46)	(0.55)	(0.90)	(1.54)	(2.56)*
MNE dummy	-0.006	0.030	-0.019	0.165	0.025
	(0.08)	(0.42)	(0.24)	(1.85)+	(0.32)
Subsidiary dummy	-0.000	-0.012	-0.007	-0.083	0.012
	(0.00)	(0.17)	(0.10)	(1.01)	(0.17)
Member of Trade assoc.	-0.005	0.002	0.044	0.034	-0.037
	(0.10)	(0.04)	(0.84)	(0.59)	(0.73)
Observations	369	369	369	369	369

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; the reported coefficients all refer to estimated marginal effects (calculated at the mean of the right hand side variables). Omitted category for export years is 20+ years, for export intensity is 0%-5%, for employment is 0-10 employees, for R&D is Zero R&D.

**Table 8a: Probit regressions of the probabilities of benefiting from exporting
(size effects)**

	Increase growth	Less dependenc y on single market	Increased sales	Improved profitabilit y	Improved profitabilit y: price	Improved profitabilit y: volume
Non-exporter	0.230 (3.62)**	0.174 (1.79)+	0.088 (2.53)*	0.227 (2.53)*	0.051 (0.46)	0.336 (3.53)**
Export <2 years	0.076 (0.82)	-0.087 (0.74)	0.055 (1.35)	-0.085 (0.75)	0.004 (0.05)	-0.100 (0.78)
Export 2-5 years	0.140 (2.11)*	0.029 (0.35)	0.104 (3.52)**	0.204 (2.90)**	0.035 (0.56)	0.280 (3.53)**
Export 5-10 years	0.153 (2.12)*	0.089 (1.09)	0.073 (2.31)*	0.179 (2.52)*	0.040 (0.60)	0.166 (2.00)*
Export 10-20 years	0.158 (2.75)**	-0.096 (1.37)	0.020 (0.55)	0.058 (0.89)	0.037 (0.72)	0.095 (1.32)
Export 5%-15%	0.093 (1.35)	0.147 (2.14)*	0.047 (1.36)	0.088 (1.11)	0.079 (1.10)	0.125 (1.36)
Export 15%-25%	0.148 (2.24)*	0.198 (2.89)**	0.076 (2.20)*	0.176 (2.30)*	0.070 (0.95)	0.239 (2.77)**
Export 25%-50%	0.286 (5.04)**	0.243 (3.87)**	0.094 (3.01)**	0.188 (2.74)**	0.017 (0.28)	0.254 (3.24)**
Export 50%-75%	0.286 (4.90)**	0.327 (5.49)**	0.120 (3.71)**	0.222 (3.19)**	0.170 (2.20)*	0.281 (3.51)**
Export agglomeration	0.105 (2.15)*	0.070 (1.37)	-0.022 (0.76)	0.016 (0.31)	-0.025 (0.71)	0.070 (1.24)
Staff Movement	-0.140 (2.16)*	0.019 (0.32)	-0.054 (1.41)	-0.055 (0.88)	-0.005 (0.13)	-0.074 (1.08)
Technical Frontier	0.061 (1.16)	0.063 (1.19)	0.101 (3.18)**	0.075 (1.32)	0.022 (0.56)	0.025 (0.40)
Manufacturing Dummy	-0.077 (1.64)	0.020 (0.39)	0.011 (0.36)	-0.062 (1.22)	-0.124 (3.37)**	-0.046 (0.81)
Employment 10-49	0.034 (0.44)	0.036 (0.44)	0.051 (1.47)	0.094 (1.17)	-0.009 (0.15)	0.124 (1.40)
Employment 49-249	0.053 (0.55)	-0.008 (0.08)	-0.042 (0.79)	0.057 (0.60)	0.185 (2.09)*	0.084 (0.79)
Employment 250+	0.154 (1.77)+	0.089 (0.96)	0.049 (0.98)	0.001 (0.01)	-0.028 (0.36)	0.049 (0.40)
Low R&D	-0.111 (1.45)	0.013 (0.19)	-0.061 (1.42)	-0.127 (1.70)+	-0.065 (1.37)	-0.158 (1.94)+
Medium-Low R&D	-0.127 (0.62)	-0.076 (0.35)	-0.135 (0.82)	-0.286 (1.32)		-0.279 (1.19)
Medium-High R&D	0.131 (1.38)	0.139 (1.51)	0.055 (1.25)	0.011 (0.11)	-0.073 (1.28)	-0.014 (0.12)
High R&D	-0.016 (1.38)	-0.065 (1.51)	0.001 (1.25)	-0.123 (0.11)	-0.086 (1.28)	-0.161 (0.12)

	(0.18)	(0.73)	(0.01)	(1.31)	(1.56)	(1.58)
MNE dummy	-0.059	-0.081	-0.044	-0.043	0.030	-0.100
Subsidiary dummy	(0.84)	(1.00)	(1.04)	(0.56)	(0.53)	(1.17)
Member of Trade assoc.	-0.086	0.001	-0.085	-0.158	0.012	-0.230
UKTI participant	(1.30)	(0.02)	(2.17)*	(2.06)*	(0.25)	(2.74)**
	0.007	0.065	0.022	0.005	-0.041	0.057
	(0.15)	(1.35)	(0.80)	(0.10)	(1.17)	(1.06)
	0.124	0.172	-0.023	0.039	0.029	-0.008
	(1.93)+	(2.64)**	(0.67)	(0.61)	(0.69)	(0.12)
Observations	369	369	369	369	362	369

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; the reported coefficients all refer to estimated marginal effects (calculated at the mean of the right hand side variables). Omitted category for export years is 20+ years, for export intensity is 0%-5%, for employment is 0-10 employees, for R&D is Zero R&D. Omitted category for export years is 20+ years, for export intensity is 0%-5%, for employment is 0-10 employees, for R&D is Zero R&D.

Table 8b: Probit regressions of the probabilities of benefiting from exporting (productivity effects)

	Utilisation of capacity	Ability to compare with competition	Improved products	Increase in efficiency	Improved marketing
Non-exporter	-0.007	0.186	0.126	0.098	0.195
	(0.05)	(1.68)+	(0.96)	(0.60)	(1.70)+
Export <2 years	-0.013	0.189	0.182	0.113	0.098
	(0.12)	(1.92)+	(1.74)+	(0.88)	(0.91)
Export 2-5 years	0.045	0.139	0.069	0.173	0.191
	(0.52)	(1.71)+	(0.77)	(1.71)+	(2.32)*
Export 5-10 years	0.061	0.082	0.124	0.183	0.184
	(0.68)	(0.95)	(1.38)	(1.78)+	(2.19)*
Export 10-20 years	-0.115	0.050	-0.029	-0.014	0.061
	(1.45)	(0.74)	(0.39)	(0.17)	(0.90)
Export 5%-15%	0.139	0.030	0.006	-0.058	-0.000
	(1.76)+	(0.34)	(0.07)	(0.56)	(0.00)
Export 15%-25%	0.170	0.062	0.053	0.166	0.116
	(2.04)*	(0.71)	(0.57)	(1.57)	(1.35)
Export 25%-50%	0.296	0.177	0.194	0.179	0.077
	(4.30)**	(2.36)*	(2.45)*	(1.92)+	(0.93)
Export 50%-75%	0.288	0.261	0.246	0.244	0.201
	(4.06)**	(3.40)**	(2.91)**	(2.42)*	(2.41)*
Export agglomeration	0.033	0.008	0.049	-0.037	0.014
	(0.60)	(0.15)	(0.87)	(0.61)	(0.26)
Staff Movement	0.061	0.029	0.043	-0.018	-0.010
	(0.98)	(0.44)	(0.64)	(0.25)	(0.15)
Technical Frontier	0.070	0.018	0.062	0.067	0.019
	(1.17)	(0.31)	(1.03)	(1.00)	(0.31)
Manufacturing Dummy	0.061	0.055	-0.019	0.029	0.069
	(1.11)	(1.01)	(0.34)	(0.48)	(1.26)
Employment	0.105	0.016	0.119	0.156	-0.246

t					
10-49	(1.25)	(0.19)	(1.37)	(1.57)	(2.72)**
Employment	0.135	0.071	0.111	0.217	0.017
t					
49-249	(1.39)	(0.71)	(1.08)	(1.86)+	(0.16)
Employment	0.082	0.128	0.076	-0.068	-0.044
t					
250+	(0.73)	(1.16)	(0.67)	(0.50)	(0.35)
Low R&D	-0.136	-0.134	-0.170	-0.243	-0.116
	(1.71)+	(1.76)+	(2.13)*	(2.88)**	(1.50)
Medium-	-0.120	0.133	-0.070	0.195	-0.090
Low					
R&D	(0.58)	(0.66)	(0.36)	(0.80)	(0.42)
Medium-	0.032	0.120	0.072	0.045	0.080
High					
R&D	(0.28)	(1.16)	(0.65)	(0.36)	(0.74)
High R&D	-0.147	0.048	-0.087	-0.158	0.220
	(1.49)	(0.55)	(0.88)	(1.54)	(2.64)**
MNE	-0.026	0.037	-0.001	0.171	0.062
dummy	(0.33)	(0.50)	(0.01)	(1.89)+	(0.79)
Subsidiary	0.018	-0.020	-0.031	-0.090	-0.032
dummy	(0.22)	(0.28)	(0.40)	(1.08)	(0.42)
Member of	0.002	-0.001	0.036	0.030	-0.054
Trade assoc.	(0.04)	(0.02)	(0.66)	(0.53)	(1.07)
UKTI	-0.082	0.034	0.103	0.032	0.191
participant	(1.24)	(0.50)	(1.49)	(0.43)	(2.84)**
Observations	369	369	369	369	369

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; the reported coefficients all refer to estimated marginal effects (calculated at the mean of the right hand side variables). Omitted category for export years is 20+ years, for export intensity is 0%-5%, for employment is 0-10 employees, for R&D is Zero R&D.

Table 9a: Importance of the benefits from exporting

Barrier	Not critical	Med-Low	Mid critical	Med-High	To a critical	
Level of growth no otherwise possible	Non-Exporter		-			+
	<2 years					
	2-5 years					
	5-10 years					
	10-20 years					
	Export 5-15%		-	-		+
	Export 15-25%		-	-	-	+
	Export 25-50%					
Export 50-75%						
Reduced dependency on a single market	Non-Exporter	-	-	-	-	+
	<2 years	-	-	-		+
	2-5 years					
	5-10 years		-	-		+
	10-20 years					
	Export 5-15%	-	-	-	-	+
	Export 15-25%	-	-	-	-	+
	Export 25-50%					
Export 50-75%						
Increased sales	Non-Exporter		-	-	-	+
	<2 years		-	-		+
	2-5 years					
	5-10 years		-	-		
	10-20 years		-	-		+
	Export 5-15%		-	-	-	+
	Export 15-25%	-	-	-	-	+
	Export 25-50%					
Export 50-75%						
Improved profitability	Non-Exporter		-	-		+
	<2 years		-	-	+	+
	2-5 years					
	5-10 years					
10-20 years						

Export 5-15%	-	-		+
Export 15-25%	-	-	+	+
Export 25-50%	-	-		+
Export 50-75%				

Source: OMB survey. Authors' calculation. Notes: + and - indicate the sign of the marginal effects estimated from an ordered probit model. Only significant effects are reported.

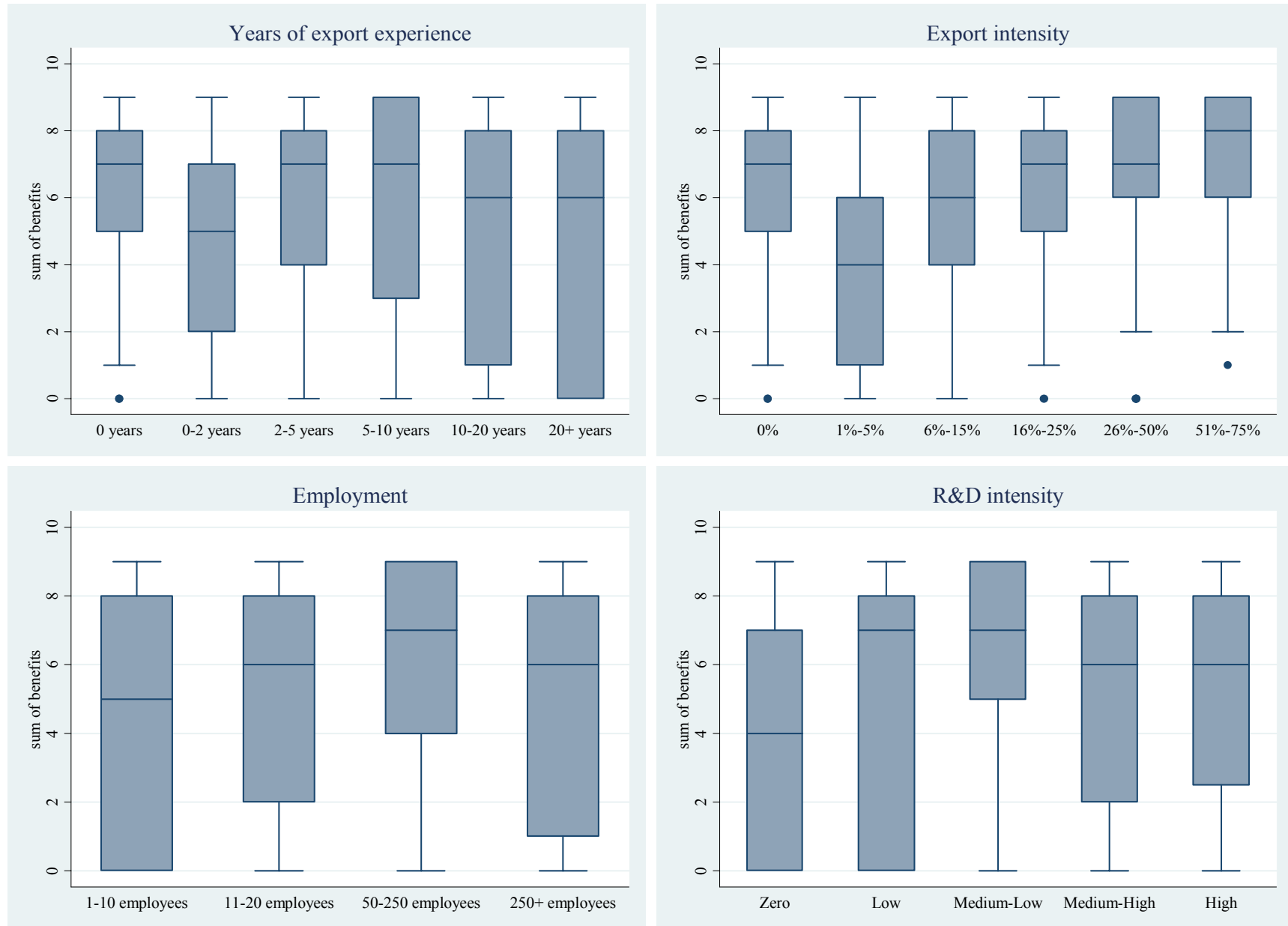
Table 9b: Importance of the benefits from exporting

Barrier		Not critical	Med- Low	Mid critical	Med- High	High critical
Capacity utilisation	Non-Exporter					
	<2 years				+	
	2-5 years				+	
	5-10 years					
	10-20 years					
	Export 5-15%				+	
	Export 15-25%		-	-	+	+
	Export 25-50%		-	-	+	+
Export 50-75%						
Increased ability to compare yourself with competitio n abroad	Non-Exporter					
	<2 years					
	2-5 years					
	5-10 years					
	10-20 years					
	Export 5-15%					
	Export 15-25%					
	Export 25-50%		-	-	+	
Export 50-75%						
Improved products or services	Non-Exporter				+	
	<2 years				+	
	2-5 years	-	-	-	+	+
	5-10 years					
	10-20 years					
	Export 5-15%					
	Export 15-25%	-	-		+	
	Export 25-50%		-		+	
Export 50-75%						
Improved process efficiency	Non-Exporter					
	<2 years					
	2-5 years		-			
	5-10 years					
	10-20 years					
	Export 5-15%					
	Export 15-25%					
	Export 25-50%					
Export 50-75%						

	Non-Exporter	-	+
	<2 years		+
	2-5 years	-	+
	5-10 years		
	10-20 years		
Improved marketing	Export 5-15%		
	Export 15-25%		
	Export 25-50%	-	+
	Export 50-75%		

Source: OMB survey. Authors' calculation. Notes: + and - indicate the sign of the marginal effects estimated from an ordered probit model. Only significant effects are reported.

Figure 1: Box plot of the sum of the export benefits



Source: OMB Survey. Authors' calculation

Figure 2: Percentage of firms reporting benefits from exporting and years of export experience



Source: OMB Survey. Authors' calculation

Figure 3: Percentage of firms reporting benefits from exporting and export intensity



Source: OMB Survey. Authors' calculation