research paper series

Globalisation, Productivity and Technology

Research Paper 2006/48

The Role of Experience in Export Market Entry: Evidence for UK Firms

by

Richard Kneller and Mauro Pisu

GEP

Leverhulme Centre
for Research on Globalisation and Economic Policy

The Authors

Richard Kneller is a Lecturer in the School of Economics at the University of Nottingham and an Internal Fellow of GEP. Mauro Pisu is a Researcher at the National Bank of Belgium.

The Role of Experience in Export Market Entry: Evidence for UK Firms

by

Richard Kneller and Mauro Pisu

Abstract

The recent literature on firm exporting behaviour has pointed out to sunk-cost as key determinant of export behaviour yet little insight into what they include or how they vary with experience. In this paper we provide fresh evidence on the barriers to exporting and the role of export experience and other firm-level characteristics. Our results indicate that experience matters but in a non-linear manner. The sunk-costs of exporting initially rise with experience. Overall; these results suggest the existence of a process of learning by doing whereby firms learn how to cope with export barriers through direct experience in export markets.

Outline

Non-Technical Summary

Over recent years there has grown a large body of work trying to understand the decision to participate in export markets and the characteristics of these firms. An important conclusion drawn from this research has been that firm characteristics, such as their size and productivity, and the costs of entering into export markets, labelled sunk-costs, matter for firm export decisions. The sunk-costs of exporting are thought to include the costs of identifying buyers, establishing distribution networks, product compliance/modifications, labelling, marketing etc. Only the best firms, the most productive within an industry, are able to cover these costs and make profits from exporting. Information constraints limit the ability of the data typically used in this literature to push the frontier of knowledge on these topics further forward. For example, despite the evidence that sunk-costs are important we have little information about what they actually include, which are relatively more important, or what actions firms take to overcome them.

In this study we use a new survey commissioned by UK Trade and Investment (UKTI) to make progresses on these issues. On the barriers to exporting the data contain detailed information on the type of hurdles firms face. It also allows us to confront the literature with a new question: how do barriers to exporting decline as the export experience of the firm increases.

In our analysis we investigate how the total number measures of export barriers firms face is related to firm and industry-level variables, such as export experience, size, R&D intensity, workers industry mobility and agglomeration. Our results suggest that barriers of exporting are important for new and experienced exporters alike. Firms that were successful in beginning to export identify fewer barriers than those firms that tried and failed. Secondly, we find strong evidence that the total number of barriers is strongly related to one firm-level variable, namely export experience However, not all aspects of experience are relevant. The number of barriers to exporting declines as the number of years the firm has been exporting increases, while the role for export intensity is negligible. The longer firms have been active in export markets the lower the number of barriers they will report, ceteris paribus. Other variables such as size and R&D intensity, which the existing literature has identified as important to meet the sunk costs of export and self-select into export markets, play no role in the number of barriers firms face.

Thirdly, experience appear to matter in a non-linear way. Non-export firms that were subsequently successful in beginning to export identify fewer barriers than those firms that tried and failed. Of greater interest however, is the comparison between these newly successful exporters and those firms with a few more years (three to five in total) of export experience. The latter actually identify *more* impediments to exporting, although these are fewer in number than that identified by non-exporters. The number of barriers firms report then declines again as the experience of the firm increases. Overall these results are consistent with the existing literature of firm-level export behaviour export experience matters.

1 Introduction

Over recent years there has grown a large literature investigating the determinants of firm export behaviour.[1] An important finding of this research has been that both sunk-cost to export market entry and firm characteristics, such as size and productivity, matter. Only the best firms within an industry, the biggest and most productive, are able to overcome the barriers to entry into foreign markets and make positive profits. While together sunk costs and heterogeneity have proved successful in explaining the patterns of exporting at the micro level, in the detail the insights have been skewed towards our understanding of firm characteristics. We know much about which firms are more likely to serve foreign markets and the behaviour of firms around the point at which they become exporters for the first time across a wide range of country settings (see the reviews by Lopez, 2005; Greenaway and Kneller, 2006; or Wagner, 2006), but still comparatively little about what actual barriers to entry into foreign markets firms face and which are relatively more important.

In this paper we draw on survey data for UK firms to provide new detail on the barriers of export market entry and in particular their relationship with export experience and other firm-level characteristics. Interest in the role of export experience develops out of the successful modelling of sunk costs and export participation by Roberts and Tybout (1997), Bernard and Jensen (2004) and Bernard and Wagner (1998). There the current export status of the firm is regressed against the lagged (or lags) export status and a range of other firm and industry controls. The greater the importance of past experience, indicated by the size of the coefficient on lagged export status, the more important sunk costs are viewed as being. Comparisons are then made how previous participation in export markets matters relative to not previously exporting, and if the firm remains outside of export markets how that experience decays with time.

The data used in this paper allow us to investigate these issues in a novel fashion. The data measure the barriers to exporting (firms' report on the factors that must be overcome to export) for firms who attempted to expand either the extensive or intensive margins of exporting at an identical point in time (two years) prior to the survey. These firms have large differences in the extent of their previous experience of exporting. The question we investigate is therefore how the barriers to exporting change with the growth (not decay) of

---

experience relative to other exporters as well as non-export firms. Uniquely the data allow us to identify both non-export firms that were successful in starting to export and those that tried and failed.

From this exercise we generate a number of findings. Firstly, barriers to export market entry can be important even for the most experienced exporters. Such evidence is consistent with the decline of extensive margin of firm exports described by Eaton, Kortum and Kramarz (2004, 2006) and Bernard, Jensen and Schott (2005) and with the idea that sunk-costs re-occur at the point of entry into every new market (Chaney, 2006).[2] Secondly, we find strong evidence that the total number of barriers is strongly related to some dimensions of export experience but not others. The number of years of exporting matters, whereas the intensive margin of firm exports does not. These effects for experience are also much stronger than those of other firm level controls such as size and R&D intensity.

Thirdly, there is a distinct pattern to the barriers to exporting that firms report. Experience matters in a non-linear way. As might be expected, non-export firms that were subsequently successful in beginning to export identify fewer barriers than those firms that tried and failed. Of greater interest however, is the comparison between these newly successful exporters and those firms with a few more years (three to five in total) of export experience. The latter actually identify *more* impediments to exporting, although these are fewer in number than that identified by non-exporters. The number of barriers firms report then declines again as the experience of the firm increases.

Finally, while our findings are robust to different combinations of barriers we find there are differences according to the type of barriers faced. Networking and Marketing barriers to exporting matter most for inexperienced exporters, even for those non-exporters that were recently successful in starting to export, whereas Cultural barriers to exporting initially *rise* with experience. In contrast we find no relationship between Procedural and Exchange Rate barriers and experience. These barriers appear to matter for firms with all levels of export experience.

The rest of the paper proceeds as follows. In Section 2 we place barriers to exporting in the context of the existing literature. Section 3 describes the survey we use in this exercise, the

---

[2] Eaton, Kortum and Kramarz (2005) and Bernard, Jensen and Schott (2005) show for France and the US that most of exporters sell abroad only a limited share of their output and to a limited number of foreign countries. The percentage of exporting firms declines as the export intensity or the number of foreign markets served rises.

measures of barriers to exporting used and the firm and industry controls. Section 4 presents the results and their robustness. Finally in Section 5 we draw some conclusions from the study.

2   Barriers to exporting

Since Baldwin (1988), Baldwin and Krugman (1989), Dixit (1989) and Krugman (1989) sunk costs have been recognised an important explanation of hysterisis in exports markets. In addition to the (variable) costs involved in the delivery of products (including transportation, insurance, and policy costs) exporters face significant sunk costs before they enter export markets some (such as gathering information on foreign markets, exchange rate costs, language or cultural barriers, developing marketing and delivery channels, adapting products and packaging, and learning bureaucratic procedures).

Roberts and Tybout (1997) and Bernard and Jensen (2004) model sunk costs in the context of a profit maximising firm. In their model firms become exporters when the expected profits from exporting are greater than the up-front costs of export market entry. They show that these sunk costs lead to persistence in the export choice of firms and that export entry and exit decisions can depend importantly on expectations about future changes in sunk costs. Under the latter, firms may not enter export markets if current policies or exchange rates are not expected to persist into the future.

Asymmetries in the response to changes in sunk costs across time modelled in Roberts and Tybout (1997) and Bernard and Jensen (2004) are extended in Melitz (2003) to allow in addition for asymmetry in export responses across firms within the same industry. A firm's response to changes in sunk-costs will depend on its underlying characteristics such as its productivity.

From an empirical perspective the standard econometric approach to test the importance of sunk-costs has been to estimate probit or linear probability models of export market participation including the lagged (or lags) export status of the firm. The greater the size of the coefficient on lagged export status the more important are sunk-costs. These effects are found to persist for a number of periods, with the second and often the third lagged independent variable statistically significant (Bernard and Wagner, 1998; Bugamelli and Infante, 2002). Export experience, even if several periods ago, lowers the sunk costs of export

3

market entry today relative to those firms that are new to exporting, but the benefit of this experience decays with time.

Naturally the estimates of sunk costs differ importantly according to the country being considered. For example, Bernard and Jensen (2004) estimate for the US that exporting last period increases the probability the firm exports in this to be 40 per cent; Roberts and Tybout (1997) estimate the figure to be 60 per cent for Colombia; Bernard and Wagner (1998) between 38 and 85 per cent (with 50 per cent seen as the most likely figure) for Germany; and Bugamelli and Infante (2002) between 70 and 90 per cent for Italy.

More recently Chaney (2006) has argued that sunk-costs reoccur at the point of entry into every new export market. Consistent with the empirical evidence of Bernard, Jensen and Schott (2005) and Eaton, Kortum and Kramarz (2004) market specific sunk-costs combined with firm heterogeneity lead to a declining extensive margin of exporting across firms. Most firms export to just a few countries whereas few export to lots.[3] Similarly when followed over time firms are known to add new export markets only very slowly. Using data for Slovenia Damijan *et al*. (2006) find new exporters start exporting to only 3-4 markets initially and then add a new market on average every two years.

Given the importance of sunk-costs within the theoretical and empirical models it is perhaps surprising that little evidence exists on what they include or which are relatively more important. Of the microeconometric evidence reviewed by Greenaway and Kneller (2006) only three elements of sunk-costs have been investigated, exchange rates, agglomeration effects and policy. Moreover this research has failed to establish complete or conclusive evidence on any of these. Surveys specifically commissioned to gather information about export market barriers, as the one use in this study, offer one possible means to explore these issues in more detail.

3   *Data and Sample Characteristics*

Sampling Frame

---

[3] Eaton, Kortum and Kramarz (2004) find for France 34.5 per cent of all manufacturing exporters export to one overseas country, close to 20 per cent export to ten or more countries and 1.5 per cent to more than 50 countries. For the US Bernard, Jensen and Schott (2006) report that around 56.6 percent of exporters ship products to exactly one foreign country, whereas the 7.7 percent of them to ten or more overseas markets

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 a maximum of two years after their participation within the UKTI program.[5] The firms within the participation group are identified by UKTI files and represent the complete population of firms that participate in UKTI export programmes.[6] The number of firms participating in a UKTI programme and selected for the 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 importance of barriers to export market entry. 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 export experience and other measurable characteristics that were trying either to expand the intensive or extensive margins of exporting at a known and identical point in time. [7] 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 inclusion of the latter group is a unique characteristic of the data relative to those typically used to investigate issues of export market participation.

---

[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] This helps to reduce the likelihood that the results are due simply to 'memory' effects, or what Bertrand and Mullainathan (2001) call recall bias.
[6] The exception to this is diplomatic support.
[7] 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.

One potentially important issue with respect to the data relates to the possible upward bias in the number of barriers to exporting firms report. That participation in a UKTI export support programme is endogenous suggests an over-representation of firms that were facing barriers to exporting relative to the population of firms that attempted to increase exports during this period. Then, if difficulties in exporting are negatively correlated with size and experience, as reported by Bernard *et al.* (2005) these missing firms are likely to be large and experienced exporters. This is likely to lead to an upward bias in the number of barriers firms reported relative to the reference population and to reduce the variation in the number of barriers reported across firm characteristics such as size and experience. We demonstrate this latter effect on the results in Section 4. Controlling for participation in a UKTI programme removes the significance of almost all firm characteristics within the regression.

To control for aspects 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. The firms in this group were identified using FAME (for manufacturing) and Dun and Bradstreet (for services) information sources.[8] Firms that did not participate in a UKTI programme report the same set of questions to participant firms, thereby offering a counterfactual to the role of barriers to export market expansion/participation. As shown in Table 1 these firms were large and experienced exporters relative to those drawn from UKTI files and therefore seem likely to provide a reasonable proxy for the under-sampled part of the population.

In addition however, the firms in the second part of the sample 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.[9] These are therefore firms that attempted to expand export sales during the period and therefore should mirror those firms in the first part of the population. There are 86 of the 147 firms in the second part of the sample that sought information about exporting from non-UKTI sources. Investigation of the number of barriers reported by this group suggests that they report more barriers to exporting than the remaining firms that did not receive UKTI

---

[8] Equal numbers of manufacturing and service sector firms were chosen for this survey. 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.

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

support.[10]   In Section 4 we show that the results are sensitive to the separation of firms according to whether they participated in a UKTI programme or not, but not to the separation of whether or not they sought information about export market entry from sources other than UKTI.

Export Market Experience

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: when they started exporting and their export intensity. 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 how long 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 were not successful in starting to export, 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 to report also their estimate of 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 ship overseas 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.

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 in not observed. Damijan *et al*. (2006) find that exporters enter a small number of markets initially and add new markets relatively slow
ly, one every 2-3 years or so.

---

[10] This outcome holds when we condition on the size, R&D intensity and industry characteristics.

Firm and Industry-level 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 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. Consistent with existing evidence large firms have more export experience than small firms. In the sample there are no firm with more than 250 employees with no export experience and only one had been selling abroad for less than two years. In contrast, there is a certain 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 can be considered a measure of technology, hence a good proxy of the productivity level of firms.[11] We constructed a categorical variable with the same four classes of the employment variable. To reduce collinearity between them we generated 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.[12]

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 falling in the high range of R&D intensity 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

---

[11] 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 dataset we can be confident that the number of people engaged in R&D controls for different productivity levels among companies.

[12] 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 total number of employees at the firm 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)<

more than five years. Thus, like for the relationship of the number of employees and export experience, the number of years of exporting appear to be positively correlated with R&D intensity. However, this correlation is reduced more by those firms with zero or low R&D and a great deal of export experience than by those firms with a high R&D intensity and a short history in export markets.

The complete list of explanatory variables 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 a larger group and a member of a UK or international trade association.[13] All these characteristics can be thought to be relevant for the number of barriers, and therefore the extent of sunk costs firms face. Companies with foreign affiliates abroad, or being part of a larger groups or a trade association could, in principle, have a their disposal a larger set of information about foreign markets that might make exporting easier. This might be reflected in a lower numbers of export barriers they confront.

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. This could facilitate exports leading to a lower reported number of barriers. 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

---

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

firms from their industry. Finally 60 percent of the companies sampled were in the manufacturing sector.

Barriers to Exporting

The main advantage of the OMB survey is that it contains information about specific barriers to exports. Firms were read a list of 'issues' they might have encountered when trading overseas and asked to indicate whether each of these was a difficulty they had faced. The ordering of these questions was random.[14] These issues are listed in Table 6.

Within this paper we sum over the positive replies to give a total number of barriers that firms reported they faced. This has the advantage of allowing us to focus on the generality of barriers to exporting rather than on any particular hurdles. In Figure 1 we present a histogram of the total number of export barriers. Given that we have a count variablem the height of each bin is the probability of firms reporting a certain number of barriers. Perhaps the most obvious feature of Figure 1 is that firms use the whole range of possible scores. There are fifty firms that identify no barriers to exporting and sixteen that identified all twelve. Most companies reported a number of barriers between zero and six. After this point the frequency decreases quite quickly with only ten percent of firms reporting a number of barriers equal to, or larger than ten. The average number of barriers is 4.91 and the median is five.

There is an obvious similarity among some of the questions posed within the survey. An important issue is whether firms have a tendency to report the same barriers as a difficulty. We investigate this using factor analysis. Three clear groups are identified using this process.[15] The first group (detailed in Table 6) might be described as factors relating to 'networks' of the type discussed by Rauch (1999). Included in this group are barriers related to identifying the first contact, basic information and marketing. The second group appear to be connected to procedural matters and includes problems of regulation, tax, logistics and exchange rates. The final group includes 'cultural' barriers to entry. Included in this group are issues relating to culture and language. We explore the importance of these groups in the data in Section 4 below.

---

[14] While rich in detail, we recognise that a limitation of data of this type is that they capture perceptions of barriers to exporting and not actual costs incurred. However, as pointed out before this type of data has the benefit to allow us to go beyond the crude distinction between exporters and non-exporters and to identify what are the actual barriers firms confront.

Before perusing our econometric analysis it is worth investigating how the total number of barriers to export relates to the main firm-level characterises, namely years of export experience, export intensity, number of employees and R&D intensity. Figure 2 and Figure 3 offer graphical analysis in this respect. They show, respectively, the histograms and the box-whisker plots of the number of barriers drawn for the different categories of the variables considered.[16]

The main point emerging from Figure 2 and 3 is that there seem to be a negative relation between the number of export barriers and years of export experience. For the other controls, this negative relationship is either less strong, as for export intensity, or non-existent, as for employment and R&D intensity. This is true whether we consider the whole distribution of the number of barriers (Figure 2) or its mean and inter-quartile range (Figure 3).

Perusing the detail in Figure 2, we find that the distribution of the number of barriers shifts to the left the longer the firm has been active in export markets. The histogram seems to be symmetric and centred around its mode and median for firms with no experience. For companies with some export experience the distribution shifts progressively to the left. This signals that the longer the export experience the higher the probability to report a low number of barriers. However, in all experience groups there are some companies that report both the maximum (12) and the minimum (0) number of barriers. This might suggest that sunk costs might re-occur at the entry of each new export destination.

The same pattern does not hold when we consider the other firm-level variables. For export intensity, an increase from zero to less than 15 percent leads the distribution to become more skewed to the right. However, this does not keep on as the proportion of revenues coming from overseas rises. For level of export intensity higher than 15 percent the right tail of the histogram becomes fatter. This pattern suggests overall that firms with low export experience, having been able to overcome the first barriers to export, report a lower number of barriers than non-exporters. Yet, as their involvement in export markets increases they are likely to face additional barriers. The relationship between the number of barriers, on the one hand, and employment or R&D intensity, on the other is even less clear. There not seems to

---

[15] A fourth factor was also identified, although this did not turn out to be meaningful.
[16] In the box-whisker plot the median 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.

be any clear pattern between them, suggesting that the size and the technological level of firms is not directly linked with export barriers.

In Figure 3 the negative correlation between export experience and the number of hurdles to exporting is evident. The median decreases from 6 for firms with no export experience to 5 for those with less then 10 years of experience to 4 for firms that have been exporting for more than ten years. The spread of the distribution, measured by the inter-quartile range, shows a more complex behaviour. Firms with no export experience have greater variation in their answers, as do firms with 10-20 years experience, than enterprises in other groups. The range is smallest for firms that have entered export markets relatively recently (0-2 years). This might be because some of the companies that have entered export markets three or more years ago, are trying to penetrate new foreign market. These are likely to report more export barriers that those that do not try to sell to new destinations, therefore causing the spread of the distribution to increase.

The behaviour of the median and inter-quartile range of the number of barriers with respect to export intensity is different. The median number falls as export intensity rises, but not monotonically. The spread of the distribution appears to decreases although not continuously.[17] The graph of R&D intensity and employment are similar to each other in same respects. The median does not decreases for higher level of employment and R&D spending. On the contrary, the inter-quartile range increases.

The idea that the number of barriers is negatively related to the years of activities in export markets is corroborated by Table 7. This shows the Spearman rank correlation statistics.[18] The correlation between the number of barriers with the years of export experience is negative and significant, whereas there is no evidence of a correlation with other firm-level variables. Also, worth of mentioning in Table 7 is that both export intensity and the number of employees are positively correlated with the export experience.

---

[17] It is worth noting that the behaviour of the inter-quartile reinforces the explanation given above for the variation of the spread in relation to the years of export experience. The spread is lower for companies in the 1-15 percent category than for non-exporters. It rises for firms with a 16-50 percent export share. This can be the result of the fact the companies with a 1-15 percent of export share are the ones that just started exporting. In 16-50 percent export intensity category there can be those comprises trying, or that just managed, to penetrate new export markets. These are more likely to face a higher number of barriers than those enterprises, in the same export intensity group, which raises export share increasing sales in the old export market and therefore facing no further barriers.

[18] The Spearman rank correlation value is a non-parametric statistics based on ranks. It is less affected by outliers than the more common Pearson correlation measure. It is also more suited to categorical variables, which can be ranked meaningfully, as in this exercise (see Conover 1999)

4   *Results*

In this section of the paper we investigate the patterns suggested in Figure 2 and 3 controlling for observable firm and industry characteristics as well as for the construction of the sample. The reported results use a negative binomial model for count data (see Greene 2000, p.886).

As described in Section 3, while the firms in our sample attempted to expand export sales during the sample period we can identify when this was successful or not only for those that were not previously exporting when they participated in a UKTI programme. To be consistent across measures of experience in Table 8 we aggregate the firms that attempted to export from a position of not previously exporting and those with less than two years of experience into a single group. We then disaggregate these two sets of firms in Table 9. Finally, in Table 9 we also consider the effect of adding experience measured by the export intensity of the firm. In each of these table we report the regressions with and without controlling for whether the firms sought help in overcoming barriers from outside of the firm within the last two years (either from UKTI or from another source).

The evidence from column 1 of Table 8 points strongly to a conclusion that previous experience matters for the number of export barriers identified as an impediment to exporting. The coefficients on export experience ranging from no export experience up to 5-10 years are all positive and statistically significant relative to those firms that have been exporting for over 20 years. Thus, less experienced firms identify more barriers to exporting.

There is an interesting ordering to the coefficients however. The point estimates on firms with no and 0-2 years of exporting experience is nearly identical to that for 2-5 years of exporting.[19] After this point the coefficients decline gradually as the level of experience increases, and while still positive ceases to be significant for firms with more than 10 years of export experience.

Of the other firm level variables in the regression few are statistically significant. There is little systematic variation in the responses given by firms to the number of barriers to exporting. To some extent this is surprising given that industry and size were used as part of the sampling frame. It may reflect however the similarities in firm characteristics between

new exporters and established exporters found in Bernard and Jensen (1999) and Greenaway and Kneller (2004). Within the results there is some evidence that firms with medium-low R&D (with respect to companies with zero R&D) and those belonging to trade associations report a higher number of barriers. There is also some evidence of agglomeration effects. Firms co-located with leading firms in the area report fewer barriers. This result is consistent with export-agglomeration effects from foreign multinationals found for the UK by Kneller and Pisu (2006) and reviewed in Greenaway and Kneller (2006).

These relationships for export experience found in Table 8 are robust to the inclusion of the measure of help (column 3) but not the UKTI participation indicator (column 2). As noted above the use of the UKTI participation dummy was expected to reduce the variation between the number of barriers for any given level of export experience and reduce the size and significance of this effect. Adding back those firms that attempted to expand export sales, but did not seek information directly from the UK government agency (UKTI) again leads to a conclusion that experience is important, although the effect is reduced is size. In both cases the measures of help are themselves significant. This would suggest self-selection; firms that face the most barriers seek external support.

In Table 9 we split out the least experienced group of exporters into those that were successful and those that were not in entering export markets for the first time.[20] Column 2 in the table 9 then controls for whether the firm sought information and assistance to become an exporter, whereas columns 3 and 4 consider another measure of export experience, namely export intensity.

Overall we find that the number of perceived barriers to exporting rises with experience as before, but in line with prior expectations, the estimated coefficient on those firms that were unsuccessful in starting to export is larger than that of those firms that were successful (i.e. companies with less than two years of export experience). The estimates of the coefficients relating to exporters with 5-10 and 10-20 years of experience are virtually unchanged from Table 8 to Table 9. It would appear from Table 9 that those companies that were unsuccessful in becoming exporters identify more barriers than those that did not. When we add the control for when the firm sought information from external sources (column 2) the difference in the number of barriers identified by those that were successful in starting to

---

[19] The $\chi^2(1)$ statistics to test formally the null hypothesis of equality of two parameters is 0.01. The null is not rejected at more ninety percent significance level.

[20] We choose not to report the control variables in order to conserve space.

export is no longer significantly different from those that have been exporting for 20 years or longer.

In the third column of Table 9 we use export intensity instead of years spent on export markets as a measure of export experience. These differences are measured relative to the most experienced firms, in this case those with an export intensity greater than 50 per cent. The results shown there suggest that only the length of experience into export and not the degree of involvement in them, as measured by export intensity, affects the number barriers to export firms face. Despite the fact that export intensity and years of activities in export markets are strongly positively correlated (see Table 7), none of the export intensity categories is significant, or close to significant at standard levels.[21]

In the last column of Table 9 we do a further check and consider the years of experience and export intensity at the same time. Again the omitted category for the latter variable is the group of firms with an export intensity greater than 50 per cent.[22] It appears again that only export age matters whereas export intensity do not.[23]

Overall from these results it is possible to deduce that only past experience in export markets and, to a less extent co-location with leading firms, helps to reduce the number of export barriers firms face. This result is consistent with the main finding of the existing empirical literature of exports. export status is the strongest predictor of current export status.

What our results add to our understanding of firms export behaviour is that through experience into export markets firms learn how to overcome successfully barriers to export. That is firms learn how to export through practice.

Robustness

---

[21] To check whether or not these results depend on the admittedly rough categories of export intensity used, we run the same regression in column 3 of Table 9 with the following finer classes: 0%, 1-5%, 6-10%, 16-25%, 26-50%, 51-75% and 76-100%. The reference group was the last. The results confirm those in Table 9. All export intensity categories are positive, but not significant at 10% level, with the except of 0% and 26-50% groups which are significant at 10% level (P-values are 0.082 and 0.093, respectively).

[22] Note that in Table 9 the category of firms with zero percent of export experience drops down since it is perfectly collinear with firms with no export experience (0 years).

[23] We also conducted the same type of robustness check described in footnote 21, using both export age and the finer categories of export intensity. None of the export intensity dummies were significant at 10% level, whereas the estimates of the export age dummies were analogous of those presented in Table 9.

We checked whether these results are driven by the choice of questions asked as part of the survey that underlies our dataset. We do so by choosing combinations of the eight of the twelve questions asked to participating firms and then re-estimating the effect of experience on the number of barriers firms face. This yields a total of 33 regressions. We summarise the results from this exercise in Table 10. The table includes information on the average parameter value for each of the experience categories across the 33 regressions, along with their standard deviations, minimum value and maximum value of the coefficient. We report two types of standard deviations. One is computed using the 33 parameter values obtained, the other using bootstrap method (Efron 1979). Finally in columns 5 and 6 we report the percentage of times that the parameter was significant at either the 5 or 10 per cent level.

As it is possible to see from column two of Table 10 the bootstrapped standard errors are larger than those obtained thorough the conventional method. The conventional standard errors are downward biased. This is because the estimates of the 33 regressions, used to compute the average parameter, are not independent from each other as they come from the same sample. Bootstrap standard errors avoid this problem.[24]

The conclusion that can be drawn from Table 10 is that the main features of the results from Table 8 are not driven by any particular barrier or combination of them. The point estimates for non-exporters, firms with 2-5 years of export experience and 5-10 years of experience are significant in all of the regression estimated and the range of parameter values is reasonably narrow for these three experience categories.

Greater sensitivity is displayed for firms with 0-2 and 10-20 years of experience. The point estimates on these categories display much greater variability and there is noticeable sensitivity to the level of significance chosen. For the 0-2 category significance at the 10 per cent level is found 73 per cent of the time, but only 42 per cent at the five per cent level. For the group with 10-20 years of experience significance at the 10 per cent level is found in 70 per cent of the regressions estimated, but only 6 per cent when considered at the 5 per cent level. For these groups there is some suggestion that they behave differently to the most experienced firms but this conclusions remains sensitive to the choice of barriers to exporting chosen. We also check that the point estimate on experience decline in the same manner as in

---

[24] It is worth noting that a test for the normality of the empirical distribution of the average parameter does not reject the null hypothesis for all five export age category considered. This implies that the nominal confidence intervals computed using the normal distribution are virtually equivalent to those obtained by means of the percentile method. These are available upon request.

Table 9. We find that the point estimate on the group of firms with 2-5 years of export experience is greater in size than that found for non-exporters in all cases; 5-10 years is greater than that on 2-5 years in all but 2 cases; and that on 10-20 years of experience is smaller than that on 5-10 years of experience in all cases.

As a final exercise we exploit the factor analysis from Section 4 further (see Table 11). There we found that firms tended to respond similarly to three groups of questions. We labelled these 'Networks and Marketing, 'Procedural and Exchange Rates' and 'Cultural'. In Table 11 we sum across the answers within these three groups and then repeat the estimation of the negative binomial model, including and excluding the broad-measure of export market entry assistance.

We find some interesting differences across these groups. Most obviously the number of procedural and exchange rate barriers do not vary with the export experience of the firm.[25] Experience would not appear to matter for all types of barriers to exporting. Of the other patterns we find that the role of experience is different according to whether the barriers to export relate to networking and marketing or to cultural factors. For network and marketing, which includes such factors as identifying the first contact and establishing an initial dialogue, firm's with less than 5 years of export experience are significantly likely to identify these as problems. There is also a change in the pattern of the point estimates compared to Table 9. The coefficient on the non-export firms is largest at 0.473 as before but now the drop in the size of the coefficient is smaller than previous, to 0.414 on 0-2 years of experience which is in turn very similar to that for 2-5 years of experience. There is less of a difference between successful and failed exporters for these type of barriers.

In contrast to this the pattern for cultural barriers to exporting are more similar to the pattern in Table 9. The coefficient on non-exporters, 2-5 years and 5-10 years are all significant, whereas that for 0-2 years is not. One unexpected change to the pattern in the coefficients is that the point estimate for the group with 0-2 years of experience is now larger than that for 2-5 years of experience. It would appear that some barriers to exporting rise as export market experience rises. The coefficient on the 0-2 year group is the only one that is sensitive to the measure of broad-help in column 4 of Table 9.

---

[25] This result is robust to the inclusion of export intensity.

5   *Conclusions*

Over recent years the literature on the determinants of exports at the level of the firm has grown considerably. An important finding of this research is that both firm characteristics, such as size and productivity, and the sunk-costs of exports matter for firms exporting decisions. We now know much why some firms export whereas others do not and about the characteristics exporters relative to non-exporters.

Although within this literature sunk costs of exports play a prominent role, little is known about what actual barriers to export firms face and how they evolve according to export experience and other firm-level characteristics. In this paper we use a survey data set for UK firms to investigate these issues. Our results indicate that the total number of barriers is strongly related to the export experience of firms, defined as the numbers of years they have been exporting. These effects are also stronger than other firm level controls such as size and R&D intensity, which vary in no systematic way with the total number of barriers. The effect of experience is non-linear. The number of barriers firms report rises before declining again as their experience increases. Furthermore, the degree of involvement in export markets, as measured by export intensity, does not appear to have any effect on the number of export barriers firms face.

Overall, the role of export experience on the number of export barriers we identify is consistent with the findings of the empirical firm-level literature on exports, which points out that lagged export status is the strongest predictor of current export decisions. That is export experience matters. However, our results suggest that experience is important because only through it the number of export barriers firms face declines. Productivity and size, whereas important in determining the ability of firms to meet the sunk costs of exports and self select into export markets, appear to play no role in this respect.

It is reasonable to expect that the effect of experience and other firms characteristics is not homogeneous across different types of barriers, as our analysis indicates. The investigation about the importance of single barriers and their relation with experience and how they are perceived is left to future research.

References

Aw, B.Y. and Hwang, A.R. (1995), Productivity in the Export Market: A Firm Level Analysis, *Journal of Development Economics,* Vol. 47, pp.131-332.

Baldwin, Richard (1988). **'**Hyteresis in Import Prices: The Beachhead Effect', *American Economic Association,* Vol. 78(4) pp 773-85

Baldwin, R. and Krugman, P. (1989).'Persistent Trade Effects of Large Exchange Rate Shocks', *Quarterly Journal of Economics* Vol. 104, pp. 635-54.

Bernard, A., Eaton, J., Jensen, J.B. and Kortum, S. (2003). 'Plants and productivity in international trade', *American Economic Review*, vol. 93, pp. 1268-1290.

Bernard, A. and Jensen, J.B. (1999). 'Exceptional exporters performance: cause, effect or both?', *Journal of International Economics*, Vol. 47, pp. 1-25.

Bernard, A. and Jensen, J.B. (2004). 'Why Some Firms Export', *Review of Economics and Statistics*, Vol. 86, pp.561-569.

Bernard, A. Jensen, J. and Schott, P. (2005). 'Importers, exporters and multinationals: A portrait of firms in the U.S. that trade goods', Tuck School of Business, mimeo

Bernard, A. and Wagner, J. (1998). 'Export Entry and Exit by German Firms' *Weltwirtschaftliches Archiv*, 2001, Vol. 137, pp. 134-157.

Bertrand, M and Mullainathan, S. (2001). 'Do People Mean What They Say? Implications for Subjective Survey Data', *American Economic Review*, Vol 91(2) pp. 67--72

Bugamelli, M. and Infante L., (2002). 'Sunk Costs of Exports', Temi di discussione (Economic working papers) 469, Bank of Italy, Economic Research Department.

Chaney, T. (2006). 'Distorted gravity: Heterogeneous firms, market structure and the geography of international trade' mimeo. University of Chicago.

Conover, W.J. (1999) *Practical Nonparametric Statistics*, Wiley, New York

Damijan, J., Polanec S., and Prašnikar J. (2006). 'Self-selection, export market heterogeneity and productivity improvements: Firm level evidence from Slovenia', *The World Economy* Vol. 29, (forthcoming)

Dixit, A. K (1989). 'Hysteresis, Import Penetration, and Exchange Rate Pass-Through', *Quarterly Journal of Economics,* Vol. 104(2), pp. 205--228

Eaton, J. Kortum, S. and Kramarz, F. (2004) 'Dissecting Trade: Firms, Industries, and Export Destinations', American Economic Review Papers and Proceedings, 94, 150-154.

Eaton, J. Kortum, S. and Kramarz, F. (2006). 'An anatomy of international trade: Evidence from French firms' New York University, mimeo.

Efron, B. (1979) "Bootstrapping methods: Another Look at the Jacknife", *Annals of Statistics*, Vol. 7, pp.1-26

Greenaway, D. and Kneller, R. (2004). 'Exporting and Productivity in the UK'. *Oxford Review of Economic Policy*, Vol. 20. No. 3, pp. 429-439.

Greenaway, D. and Kneller, R. (2006). 'Firm heterogeneity, exporting and foreign direct investment' *The Economic Journal*, (forthcoming).

Greene, William H. (2000): *Econometric Analysis*. Fourth Edition. London: Prentice Hall.

Helpman, E., Melitz, M. and Yeaple, S. (2004). 'Export versus FDI with heterogeneous firms' *American Economic Review*, Vol. 94(1), pp. 300-316.

Klette, T.J. and. Kortum, S. (2004). "Innovating Firms and Aggregate Innovation" *Journal of Political Economy*, Vol. 112(5), pp. 986-1018

Kneller, R. and Pisu, M. (2006). 'Industrial linkages and export spillovers from FDI' *The World Economy*, (forthcoming).

Krugman, P. (1989). 'The Case for Stabilizing Exchange Rates', *Oxford Review of Economic Policy* Vol. 5(3) pp 61-72.

López, R. A. (2005). 'Trade and Growth: Reconciling the macroeconomic and microeconomic evidence', *Journal of Economic Surveys,* vol. 19, pp. 623-648.

Melitz, M. (2003). 'The impact of trade on intra-industry reallocations and aggregate industry productivity', *Econometrica*, Vol 71, pp. 1695-1725.

OMB (2005) 'Telephone Survey of UKTI Inward Investment and Trade Development Customers and Non-Users: Summary Report', OMB Research: London.

Rauch, J. E. (1999) "Networks versus markets in international trade", *Journal of International Economics*, Vol. 48(1), pages 7-35.

Roberts, M. and Tybout, J. (1997). 'The decision to export in Colombia: An empirical model of entry with sunk costs', *American Economic Review*, Vol. 87, No. 4, pp.545-563.

Wagner, J (2006). 'Exports and productivity: a survey of the evidence from firm level data'. *The World Economy*, Vol 29 (forthcoming).

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

Number of Employees / Export experience	1-10	11-50	50-250	250+	Total
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 / Export experience	0% of turnover	<15% of turnover	16-50% of turnover	50%+ of turnover	Total
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 / Export experience	1-10	10-50	50-250	250+	Total
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 ago	43	24	12	3	82	(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

R&D Export experience	Zero	Low	Medium-low	Medium-high	High	Total
Do not export	8	0	1	7	10	26 (6%)
Within the last 2-years	14	0	1	7	11	33 (7%)
Between 2 and 5 years ago	23	1	7	16	33	80 (18%)
Between 5 and 10 years ago	12	0	8	18	19	57 (13%)
Between 10 and 20 years ago	20	1	25	29	27	102 (23%)
More than 20 years ago	35	7	41	43	24	150 (33%)
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, 50250 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

Firm Variables	*Industry Variables*
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	Manufacturing Indicator (binary)

(5 categories)
Multinational Indicator
(binary)
Subsidiary Indicator
(binary)
Member of UK or International Trade
Association
(binary)

Source: OMB survey.

Figure 1: Histogram of reported number of barriers
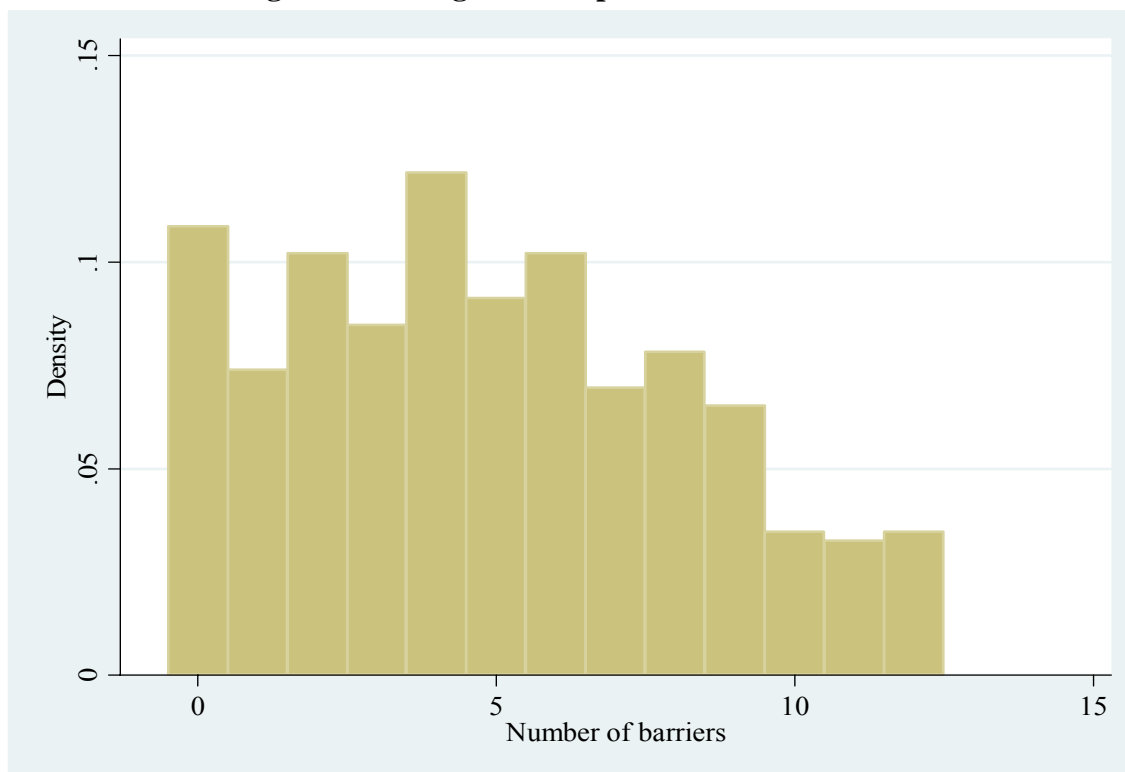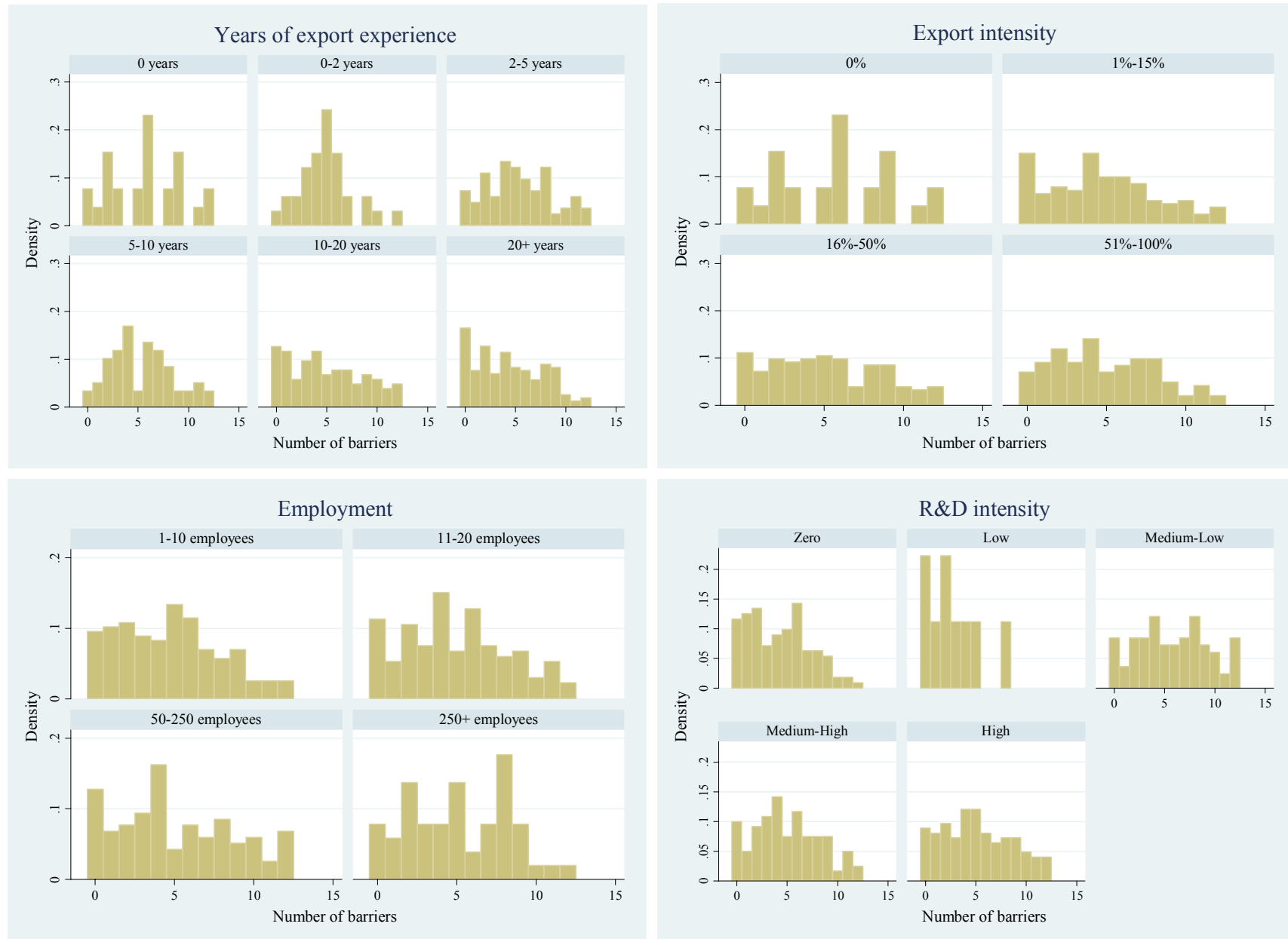

Source: OMB survey. Notes: Authors' calculation.

Table 6: Barriers to Exporting

Barrier
Group 1 – Networks and Marketing
Obtaining basic information about an export market
Identifying who to make contact with in the first instance
Building relationships with key influencers or decision-makers
Establishing an initial dialogue with prospective customers or business partners
The marketing costs associated with doing business in an overseas market
Group 2 – Procedural and Exchange Rates
Dealing with legal, financial and tax regulations and standards overseas
Logistical problems
Exchange rates and foreign currency
Group 3 - Cultural
Language barriers
Cultural differences (not language)
Not having an office or site in an export market
A bias or preference on the part of overseas customers

24

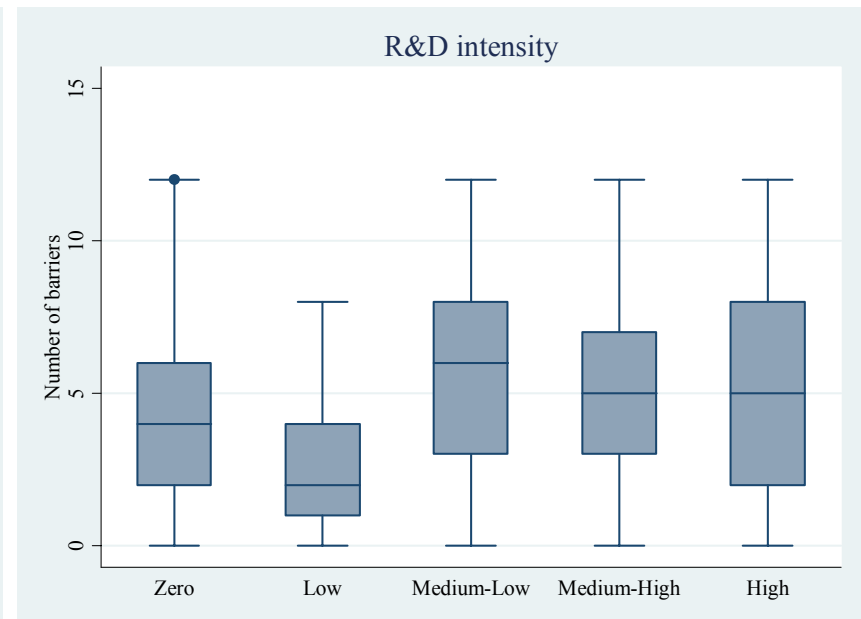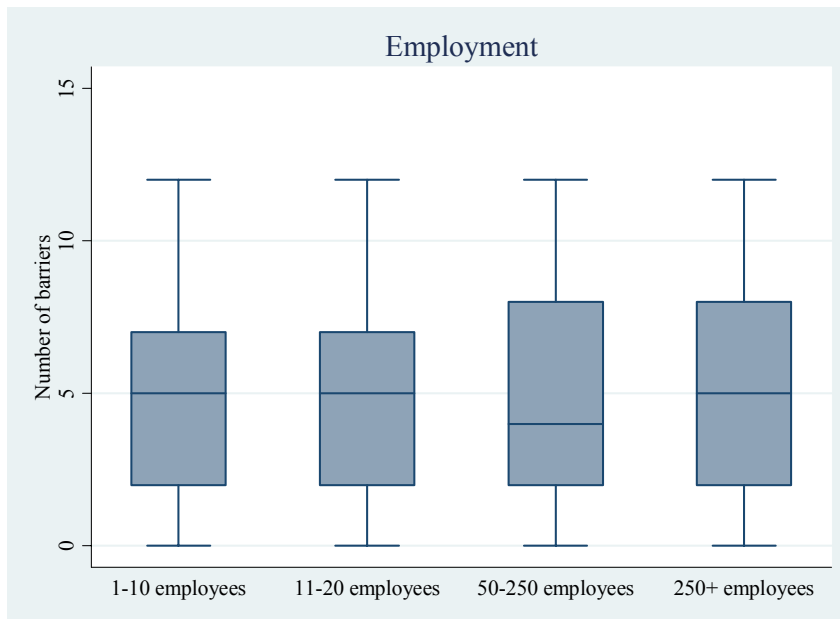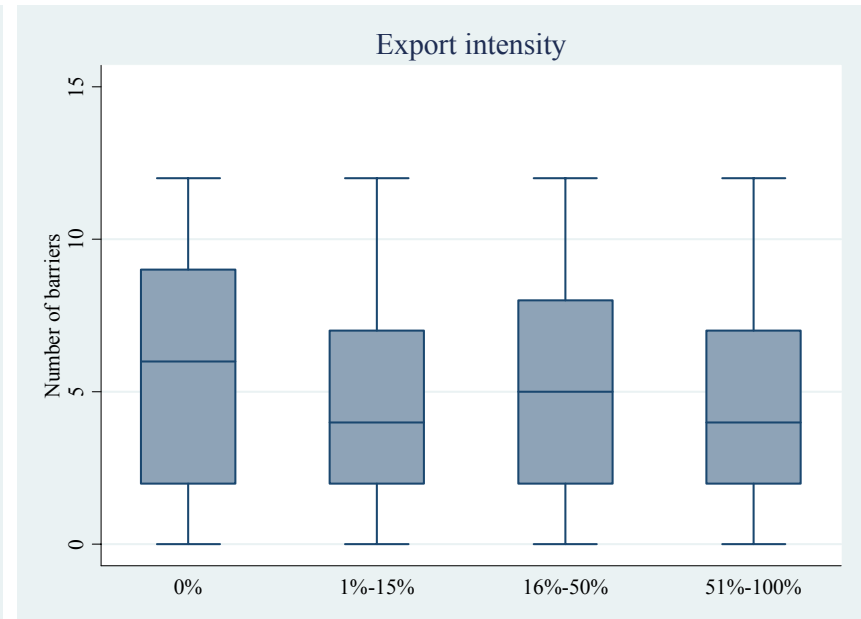| for doing business with firms established in their own country |
|---|

Figure 2: Histograms of number of barriers against firm-level characteristics

Figure 3: Box-whisker plot of number of barriers against firm level characteristics

Source: OMB survey. Notes: Authors' calculation.

Table 7: Spearman rank correlation matrix of the number of barriers and firm-level characteristics

	Number of barriers	Years of export	Export intensity	Number of employees	R&D intensity
Number of barriers	1.0000				
Years of export	-0.1264 (0.0074)	1.0000			
Export intensity	-0.0003 (0.9955)	0.3233 (0.0000)	1.0000		
Number of employees	0.0541 (0.2527)	0.4296 (0.0000)	0.0599 (0.2057)	1.0000	
R&D intensity	0.0820 (0.0829)	-0.1175 (0.0128)	0.0285 (0.5468)	-0.2055 (0.0000)	1.0000

Source: OMB survey. Authors' calculation. P-values in parenthesis.

Table 8: Negative binomial regression of reported number of barriers

	Number of barriers	Number of barriers	Number of barriers
No export and Export age:0 -2 years	0.319 (2.83)**	0.144 (1.27)	0.228 (2.06)*
Export age:2-5 years	0.311 (3.02)**	0.131 (1.26)	0.224 (2.22)*
Export age:5-10 years	0.259 (2.55)*	0.104 (1.07)	0.188 (1.92)+
Export age:10-20 years	0.122 (1.30)	0.116 (1.25)	0.148 (1.59)
Exporting firms in the area	0.105 (1.54)	0.091 (1.35)	0.090 (1.36)
Workers mobility in the area	-0.003 (0.04)	-0.021 (0.28)	-0.042 (0.56)
Leading firms in the area	-0.150 (2.09)*	-0.140 (1.98)*	-0.093 (1.32)
Manufacturing Dummy	0.110 (1.61)	0.080 (1.20)	0.094 (1.40)
Employment 10-49	0.120 (1.04)	0.072 (0.64)	0.100 (0.90)
Employment 49-249	0.126 (0.88)	0.092 (0.65)	0.112 (0.76)
Employment 250+	0.294 (1.92)+	0.252 (1.66)+	0.356 (2.39)*
Low R&D	-0.560 (1.84)+	-0.470 (1.49)	-0.602 (2.18)*
Medium-Low R&D	0.294 (2.20)*	0.327 (2.46)*	0.229 (1.68)+
Medium-High R&D	0.095 (0.86)	0.082 (0.78)	0.072 (0.67)
High R&D	0.153 (1.62)	0.129 (1.39)	0.127 (1.34)
MNE dummy	-0.013 (0.12)	0.070 (0.68)	-0.008 (0.08)
Subsidiary dummy	0.130 (1.33)	0.048 (0.50)	0.083 (0.88)
Member of Trade assoc.	0.162 (2.38)*	0.139 (2.11)*	0.112 (1.66)+
UKTI participant		0.445 (5.00)**	
Broad-Help			0.649 (4.54)**
Constant	0.814 (3.64)**	0.770 (3.54)**	0.410 (1.70)+
Observations	448	448	448
Alpha	0.29**	0.26**	0.25**
Poisson goodness of fit	1080.92**	1034.58**	1025.33**

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; Alpha is the estimated over-dispersion parameter. Rejection of the null H_0:

alpha = 0 suggests that the negative binomial specification is more appropriate than Poisson (which assumes alpha = 0). Poisson goodness of fit is a $\chi 2$ statistics, with respectively 429, 428 and 428 degrees of freedom . It tests the appropriateness of the negative binomial model against the Poisson model; rejection indicates that Poisson specification is not supported by the data. Omitted category for export years is 20+ years, for employment is 0-10 employees, for R&D is Zero R&D.

Table 9: Negative binomial regression of reported number of barriers

	Number of barriers			
	Export age	**Includes broad-help**	**Only export intensity**	**Export intensity and Export age**
No export	0.397	0.310		0.331
	(2.70)**	(2.13)*		(2.19)*
Export age 0-2 years	0.254	0.170		0.185
	(2.02)*	(1.39)		(1.48)
Export age 2-5 years	0.311	0.231		0.235
	(3.03)**	(2.29)*		(2.27)*
Export age 5-10 years	0.260	0.194		0.201
	(2.56)*	(1.97)*		(2.03)*
Export age 10-20 years	0.123	0.162		0.170
	(1.31)	(1.75)+		(1.84)+
Export intensity 0%			0.176	
			(1.29)	
Export Intensity 1% - 15%			0.023	-0.010
			(0.27)	(0.11)
Export Intensity 16% - 50%			0.061	0.058
			(0.81)	(0.77)
Observations	448	448	448	448
Alpha	0.29**	0.25**	0.26**	0.25**
Poisson goodness of fit	1079.15**	1018.40**	1029.96**	1015.81**

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; Alpha is the estimated over-dispersion parameter. Rejection of the null H_0: alpha = 0 suggests that the negative binomial specification is more appropriate than Poisson (which assumes alpha = 0). Poisson goodness of fit is a $\chi 2$ statistics, with respectively 429, 428, 429 and 425 degrees of freedom . It tests the appropriateness of the negative binomial model against the Poisson model; rejection indicates that Poisson specification is not supported by the data. Omitted category for export years is 20+ years, for export intensity is 50+%, for employment is 0-10 employees, for R&D is Zero R&D. Some regressors are omitted for reasons of space; these are the ones reported in Table 8.

Table 10: Negative binomial regression of combinations of number of barriers

	Average parameter	Standard deviations	Min. param. value	Max. param. value	Percentage of Regression significant at 10% level	Percentage of Regression significant at 5% level
No export	0.470	(0.038)** [0.168]**	0.393	0.532	100	100
Export age:0 -2 years	0.255	(0.050)** [0.142]+	0.130	0.341	73	42
Export age:2-5 years	0.380	(0.037)** [0.108]**	0.310	0.439	100	100
Export age:5-10 years	0.314	(0.030)** [0.107]**	0.259	0.385	100	100
Export age:10-20 years	0.173	(0.020)** [0.103]+	0.125	0.204	70	6

Source: OMB survey. Authors' calculation. Notes: standard errors of the average parameter in parenthesis; standard error of the average parameter bootstrapped 1000 times in brackets; + significant at 10%; * significant at 5%; ** significant at 1%.

Table 11: Negative binomial regression of reported number of barriers

	Number of Network and Marketing Barriers	Number of Procedural and Exchange Rate Barriers	Number of Cultural Barriers	Number of Network and Marketing Barriers	Number of Procedural and Exchange Rate Barriers	Number of Cultural Barriers
No export	0.473 (3.07)**	0.139 (0.63)	0.466 (2.90)**	0.373 (2.44)*	0.056 (0.25)	0.363 (2.25)*
Export age:0-2	0.414 (3.05)**	0.134 (0.79)	0.044 (0.24)	0.325 (2.46)*	0.059 (0.35)	-0.047 (0.25)
Export age:2-5	0.412 (3.70)**	0.133 (1.02)	0.269 (2.19)*	0.321 (2.92)**	0.058 (0.43)	0.174 (1.40)
Export age:5-10	0.190 (1.46)	0.182 (1.44)	0.406 (3.57)**	0.116 (0.91)	0.122 (0.97)	0.326 (2.86)**
Export age:10-20	0.166 (1.48)	0.154 (1.40)	0.088 (0.77)	0.181 (1.62)	0.168 (1.54)	0.101 (0.91)
Broad- Help				0.629 (3.21)**	0.504 (3.06)**	0.736 (3.93)**
Observations	448	448	448	448	448	448

Source: OMB survey. Authors' calculation. Notes: Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; Omitted category for export years is 20+ years, for employment is 0-10 employees, for R&D is Zero R&D.