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Importing, Exporting and the Productivity of Services Firms in Sub-Saharan Africa

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Abstract

In this paper we examine productivity differences between trading and non-trading firms in the services sector using recently collected data on a sample of 19 sub-Saharan African firms. A variety of parametric and non-parametric tests are implemented in order to examine whether exporters, importers and two-way traders perform better than non-traders, and whether there are differences in performance between different types of trading firms. Our results indicate that services firms that are engaged in international trade perform significantly better than those firms that trade on the domestic market only. Two-way traders and exporters only are found to perform better than importers only, with no significant difference in performance found between two-way traders and exporters only. We further present evidence indicating that there is no significant difference in performance between export starters and export continuers, a result consistent with the self-selection hypothesis for African services firms.

Keywords: *productivity, imports, exports, services firms*

JEL classification: *D24, F10, L10*

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1. Introduction

A large empirical literature has developed over the last 15 years or so using firm- and plant-level data to consider whether firms with foreign exposure, and internationally trading firms in particular, perform better than domestically oriented firms.[1] Early empirical literature considered whether exporters performed better than non-exporters. There are two alternative – though not necessarily mutually exclusive – explanations as to why exporters may be more productive than non-exporters; namely self-selection and learning-by-exporting. Self-selection of the more productive firms into export markets may occur because there are additional costs associated with selling goods abroad that may include transport, distribution and marketing costs, the cost of personnel with skill to manage foreign networks, and production costs from modifying domestic products for foreign consumption (Fryges and Wagner, 2007). Learning-by-exporting is potentially important since exporting can be an important channel of information flows with overseas buyers sharing knowledge of the latest design specifications and production techniques that might otherwise be unavailable, as well as providing a competitive environment in which efficiency advantages can be obtained.

Since the seminal study of Bernard and Jensen (1995) there have been a large number of research papers that have considered the relationship between exporting and firm-level performance. Despite differences in methodology and country samples the results tend to be fairly consistent, and point to the conclusion that productivity is higher for exporters (see Wagner (2007) and (2012) for recent surveys and Martins and Yang (2009) for a meta-analysis of existing studies).[2] The majority of existing studies conclude in favour of self-selection and against the learning-by-exporting hypothesis, with only a few studies reaching the opposite conclusion (examples being Kraay, 2002; Bigsten et al., 2004; Aw et al., 2000).

While the focus of the early firm-level literature was on the relationship between exports and productivity there are good reasons to believe that importing could also be a significant source of productivity benefits. Capital and intermediate goods imports for example that

[1] Foreign exposure refers to two (not mutually exclusive) activities of firms, namely their trade status (i.e. whether they export or import) and their ownership (i.e. whether they are foreign-owned). In this paper we concentrate on the former, though there exists a literature that also tests whether foreign-owned firms perform better than domestically-owned ones (see Harris, 2002; Harris and Robinson, 2003; Harris and Li, 2007; Yasar and Morrison-Paul, 2007)

[2] In response to such empirical studies theoretical models such as that of Melitz (2003) were developed that provided a rationale for the observed positive relationship between export status and firm productivity, with firms in these models self-selecting into export markets due to sunk costs of exporting.

embody new technologies would be expected to bring in new knowledge that may ultimately enhance a firm's productivity. Imported intermediates may also affect productivity through the use of imported inputs that are of a better quality than domestic counterparts as well as learning spillovers between foreign and domestic firms.[3] There may also exist complementarity effects, whereby combining different intermediates creates gains that are more than the sum of their parts, an outcome that could be due to imperfect substitution across goods as in love-of-variety models Cheaper imports may allow firms to produce existing goods using the same inputs as before, but at a lower cost. Importing could also open up new ways of producing existing goods, and even allow entirely new goods to be made. Once again however any impact of importing on performance could be due to either self-selection or learning-by-importing (or both). We would expect there to be fixed costs associated with importing which would support the view that firms self-select into importing[4], with high-productivity firms offshoring their production and low-productivity firms limiting themselves to domestic sourcing.[5] Andersson et al. (2008) argue however that there are strong arguments in favour of a causal impact of importing on productivity. In particular, by importing a firm can exploit global specialisation and use inputs from the technology frontier. Importing intermediates also allows firms to specialise on activities where it has particular strengths.

In response to these arguments and the increasing availability of firm-level data with information on importing a small empirical literature has considered the relationship between importing and firm-level performance.[6] Empirical studies of importing and firm-level productivity now exist for a number of developed countries (Belgium, Denmark, France, Germany, Ireland, Italy, Portugal, Spain, Sweden, the UK and the USA) as well as a small number of transition and developing countries (Chile, Hungary, India, Indonesia, and Poland). The results of studies of the importer premium tend to indicate that importers perform better than non-importers (for a survey of these results see Wagner (2012)). A number of such studies combine the impact of importing and exporting by allowing the impact of international trade to differ depending upon whether the firms are exporters only, importers only or two way traders (see for example Muuls and Pisu, 2009; Andersson et al., 2008; Castellani

[3] Indeed, a large empirical literature at the country and industry level has examined the importance of knowledge spillovers through imports and found them to be economically significant both between developed countries, and also from developed to developing countries (for seminal studies see Coe and Helpman (1995) and Coe et al. (1997)).

[4] Such costs may include search costs as firms seek potential foreign suppliers, as well as costs related to the inspection of goods, negotiation and contract formulation, and to acquisition and customs procedures.

[5] See Antras and Helpman (2004) who develop a model similar to Melitz (2003) in which it is assumed that there are fixed costs to importing, and which results in the self-selection of firms into importing.

[6] Much of this recent literature on importing and performance has concentrated on the firm-level effects of offshoring. In addition to allowing firms to acquire inputs at lower costs and to acquire inputs embodying a higher level of technology, the offshoring of production gives firms the opportunity to allocate their resources to the activities where they are most productive, helping to increase specialisation and benefit from economies of scale. Despite such benefits there are also likely to be costs to the firm from offshoring. Such costs may include those related to differences in language, management culture and legal systems, as well as the search costs involved in finding partners in distant and foreign markets.

et al., 2010; Vogel and Wagner, 2010). The results from such studies indicate that the impact of trade on performance tends to be stronger for two way traders followed by importers and exporters, with all three groups performing better than firms not engaged in international trade. Some of the above studies also test for self-selection versus learning by importing effects (for example Vogel and Wagner, 2010), with the results tending to support the self-selection hypothesis.

The vast majority of the empirical literature searching for a relationship between a firm's trade status and firm-level performance use data on manufacturing firms only.[7] Only very recently have papers begun to appear that consider these relationships for services firms, with all such papers considering a small number of developed countries. Wagner (2012, Table 3) reports information on seven studies considering services firms all written or published in 2010 or 2011 and covering six developed countries (France, Germany, Italy, Netherlands, Sweden, United Kingdom).

The reasons for the lack of interest in services firms in the early literature are likely to relate to a lack of data on services firms as well as the presumption that services were in general non-tradable. Services are usually considered to be immaterial, non-storable and highly customised. Moreover, they usually require direct contact between user and provider. Despite this reported services trade has been rising and now comprises a significant portion of overall trade.[8] According to the WTO, the global value of cross-border services exports in 2007 was $3.3 trillion, or some 20 per cent of world trade in goods and services (WTO, 2008). The share rises to almost 50 per cent if transactions are measured in terms of direct and indirect value added content. If we add sales of services by foreign affiliates to this the value of services trade increases further.

There are also additional problems in conducting this kind of analysis for services firms relating to the measurement of productivity and international trade, though similar problems often arise in the measurement of manufacturing output and trade. It is often very difficult to measure productivity for many service industries since it is often difficult to define the real output of a service sector. Despite this, empirical analyses have constructed measures of both labour and multifactor productivity for services industries (see for example Triplett and Bosworth, 2004). Existing studies of the relationship between firm performance and international trade status for services firms tend to use a measure of labour productivity (i.e. output per worker). While information on importing by services firms is relatively straightforward to provide – especially since such imports need not be imports of services – there is somewhat more confusion with exporting. One of the main characteristics of trade in services is that only a limited number of services can be traded across borders. In fact, a larger number of services require physical contact between consumers and producers in

[7] For a recent study of manufacturing firms in SSA see Foster-McGregor et al. (2012).

[8] For the past two decades trade in services has grown faster than merchandise trade.

order to allow the transaction to occur. To account for this, the definition of trade in services has been extended to include four different modes of supply through which international transactions in services can occur. Besides the conventional mode (cross-border trade, Mode 1), the definition also includes movements of consumers to the countries where the services are provided (Mode 2), the commercial presence of services enterprises in the countries where the services are consumed (Mode 3), and finally the temporary movement of workers (Mode 4). This classification has been adopted as a framework for current multilateral negotiations under the General Agreement on Trade in Services (GATS) and regional agreements.

In this paper we begin to fill the gap in the existing literature by considering the relationship between services firm's international trade status and their productivity for a sample of 19 sub-Saharan African (SSA) countries. While it is common to assume that services are dominant in developed economies and manufacturing and agriculture dominate the economies of developing countries this is often not the case. Although services do dominate the economies of developed countries, accounting for almost 75 per cent of GDP in OECD countries (see Francois and Hoekman, 2010), they also form a significant component of developing countries' GDP. Francois and Hoekman (2010) for example note that services accounted for 66 per cent of value-added in Latin America in 2007 and that there has been a marked shift in value added towards the service sectors in sub-Saharan Africa, despite lagging growth rates. Massimiliano et al. (2008) note that services constitute over 50 per cent of GDP in low income countries, and that 47 per cent of GDP growth in sub-Saharan Africa over the period 2000-2005 was accounted for by services, compared with 37% and 16% for industry and agriculture respectively.

The current paper uses data from UNIDO's recently completed African Investor Survey (AIS) (see UNIDO, 2012) and a variety of parametric and non-parametric techniques to estimate the productivity effects of exporting, importing and two-way trading. The paper makes a number of contributions to the existing literature. This is the first paper that we are aware of that reports results on the trade-productivity relationship for services firms in SSA. Indeed, with the exception of Bhattacharya et al. (2010) – who consider differences in productivity between domestically-oriented firms, exporters and firms undertaking outward FDI in two sectors in India – this is the first paper that we are aware of that reports results for services firms in low-income countries. The dataset we use also covers more SSA countries and more firms than any other existing dataset that we are aware of, with some of the countries being surveyed for the first time. The current paper is also one of the few that distinguishes between the productivity of exporters, importers and two-way traders in developing countries. Using UNIDO's AIS data we show that services firms that are engaged in international trade perform significantly better than those firms that sell and purchase in the domestic market only. Two-way traders and exporters only are found to perform better than importers only, with no significant difference in performance found between two-way

traders and exporters only. We further present evidence indicating that there is no significant difference in performance between export starters and export continuers, a result consistent with the self-selection hypothesis for African services firms.

The remainder of the paper is set out as follows. Section 2 discusses the data employed in our analysis and reports descriptive statistics; Section 3 discusses the empirical methods used in our analysis; Section 4 reports the main results; and Section 5 summarises and concludes.

2. Data and Summary Statistics

The data are drawn from the most recent UNIDO African Investor Survey (AIS) which was conducted over the period 2010-2011 and which surveys over 6,000 manufacturing and services firms in 19 SSA countries. In order to ensure that the interviewed firms accurately represent the countries' economies, the samples were drawn from sampling frames which contained all available information about business activities in the survey countries. Furthermore, the sample was drawn by stratifying the sampling frames along the dimensions of size (10-49, 50-99 or 100+ employees), ownership (domestic or foreign) and sector (ISIC Rev. 3.1 2-digit level), and selecting companies randomly within each stratum. The data were collected mainly via face-to-face interviews between the respondent and a UNIDO enumerator, along with drop and pick in some occasions. The respondents were usually senior managers of the firm or – in the case of foreign ownership – the local subsidiary. After the interview, the data were checked in the country by supervisors and rechecked at UNIDO headquarters. In this paper we use data on the sub-sample of services firms, which gives a final usable sample covers 2,277 firms in 19 countries.[9] In our analysis we consider all countries together rather than reporting separate results for each country since for a number of countries in our sample there are relatively few firm observations (see Table A1 in the appendix), which would make it difficult to obtain reliable estimates of the productivity differences between internationally trading and non-trading firms.

The UNIDO dataset is unique in that it covers a relatively large number of African countries and a large number of firms. As far as we aware, the survey is the largest single survey for Africa in terms of both country and firm coverage. In addition, the survey is current with the survey having been conducted in 2010 and 2011. One drawback of the AIS for empirical work is that the data have a country and industry dimension only, with no time dimension available. This is considered a drawback since in much of the recent regression analysis on firm-level performance researchers have attempted to deal with issues of endogeneity and firm-level heterogeneity through the use of firm fixed effects and matching economet-

[9] The countries (and number of firms by country) are reported in the appendix in Table A1, while the service sectors (and the number of firms by industry) are reported in Table A2. These tables also report information on the number of exporters, importers, two-way traders and foreign-owned firms by country and sector.

rics (see Wagner, 2007 and 2012). The use of panel data also allows one to ask whether there are pre-entry differences between export starters and non-exporters to shed light on the issue of whether high performing firms self-select into export markets or whether firms become more productive through exporting. Despite this, the AIS does ask for some historical information. In particular, the survey asks for information on output, employment and export status in the previous period. We use this information below to examine differences in productivity performance for export starters, exiters and continuers, which allows us to say something about whether productivity differences between exporters and non-exporters are the result of self-selection or learning-by-exporting effects.

In our initial analysis we consider differences between firms with and without foreign exposure across a number of performance indicators. In particular, we compare firms by their; (i) the log of labour productivity (defined as the ratio of output to employment); (ii) the log of Total Factor Productivity (TFP); (iii) the log of sales; (iv) the log of the capital-labour ratio (K/L); (v) log employment; (vi) the log of average wages; and (vii) the log of annual average pre-tax profit margin. In the regression analysis that follows later however we follow much of the existing literature and concentrate on a single measure of performance, namely logged labour productivity. We further define three trade status variables for the following categories: (i) exporters only; (ii) importers only; and (iii) two-way traders (i.e. simultaneous exporters and importers). In the productivity comparison for two-way traders we usually make the comparison between two-way traders and non two-way traders, a group which may include exporters and importers. We do however also report results from a comparison in performance between two-way traders and exporters and importers only in the later analysis.

Before reporting results from the formal statistical tests we initially report a number of descriptive statistics for our sample of services firms. Table 1 reports simple frequency data for the full sample, while Table 2 reports summary statistics for our chosen performance measures for all firms, as well as for the different categories of firms (i.e. domestically oriented, exporters, importers, two-way traders). We can see from Table 1 that a much smaller percentage of firms are exporters only (just 4.9%) than importers only (31.1%), with just 5.6 per cent of firms simultaneously exporting and importing. Exporting firms are found to be the exception therefore, with just over 10 per cent of firms exporting. This is consistent with the majority of the existing literature for both developed and developing countries, which also tends to find that exporting is relatively rare. Data reported in Tables A1 and A2 indicate that in our sample of firm exporting is relatively important in Kenya and Madagascar, with importing being particularly relevant in Mozambique and Lesotho along with Malawi, Zambia, Ghana, Ethiopia and Cape Verde. Two-way traders are relatively important in Kenya and Cameroon. By sector, we find that exporting is a relatively frequent activity in computer and related activities, with importing being popular in other services and both wholesale and retail trade. Two-way traders are found to be more commonly found in

computers and related activities, air transport and wholesale trade. Just over a third of firms (36%) are classed as being foreign-owned, with 16% and 45% of the sub-sample of foreign firms being exporters and importers respectively – a higher percentage than for the full sample of firms. In the regression analysis below we will take account of the fact that foreign owned firms are more likely to be involved in international trade by including a foreign ownership dummy variable. The frequency table also indicates that only a very small number of firms stopped exporting or began exporting in the year of the survey (0.8% and 1.7% respectively).

Table 1

Frequency Table

Variable	Frequency	Percentage of Total
Total Number of Firms	2,277	100
Exporter only	111	4.87
Importer only	709	31.14
Two-way	128	5.62
Foreign	817	35.88
Foreign exporter	133	5.84
Domestic exporter	106	4.66
Foreign importer	370	16.25
Domestic importer	467	20.51
Export exiter	17	0.75
Export starter	39	1.71
Export continuer	179	7.86

Notes: This table reports simple frequency statistics of firms by type. When splitting countries into foreign and domestic exporters and importers no distinction is made between firms that both export and import. This explains why the number of foreign and domestic exporters exceeds the number of exporters only for example.

Table 2

Summary Statistics

Variable	All firms	Domestically-Oriented	Exporters	Importers	Two-way Traders
Log Output Per Worker	10.22 (10.30)	9.92 (9.94)	10.99 (10.89)	10.49 (10.62)	11.28 (11.43)
Log TFP	6.73 (6.72)	6.68 (6.62)	7.49 (7.54)	6.64 (6.64)	7.10 (7.34)
Log Sales	13.72 (13.80)	13.36 (13.30)	14.85 (15.02)	13.95 (14.06)	15.26 (15.20)
Log K/L	9.08 (9.19)	9.01 (9.16)	9.58 (9.63)	9.06 (9.12)	9.45 (9.62)
Log Employment	3.49 (3.33)	3.43 (3.22)	3.81 (3.83)	3.46 (3.33)	4.02 (3.91)
Log Average Wages	8.14 (8.20)	8.06 (8.08)	8.64 (8.65)	8.18 (8.23)	8.42 (8.59)
Log Profit Rate	2.65 (2.71)	2.68 (2.71)	2.56 (2.77)	2.66 (2.71)	2.32 (2.30)

The table reports the mean value of the performance indicators for all firms, domestically-oriented firms, exporters only, importers and two-way traders. Also reported in brackets are the median values.

Table 2 reports the mean values of the performance variables, with the median also reported in brackets. These initial summary statistics hint at there being differences between

trading firms and non-trading firms as well as between the different types of trading firms. The table indicates that according to both the mean and median values that trading firms perform better than domestically-oriented firms across nearly all performance measures, the major exception being the log of the pre-tax profit margin. The table also indicates that the mean and median values of output per worker, sales and employment are higher for two-way traders than either exporters or importers, results similar to those found elsewhere. Interestingly, the mean and median values of all performance measures (except the profit rate) are higher for exporters than for importers, which is different to that found in many other studies (mainly looking at manufacturing industries).

3. Methodology

In order to test for differences between internationally trading and non-trading services firms as well as between importing, exporting and two-way trading firms we employ a number of statistical methods. We begin by reporting results from a simple comparison of means test, in which we allow the two distributions to have different variances. Such a test concentrates on only one moment of the distribution however, the mean. As such, we also make use of the concept of first order stochastic dominance, which allows one to both compare and rank the entire distributions of – in our case – firm performance. Establishing stochastic dominance requires that the productivity distributions of the three types of firm differ across all moments of the distribution, which thus provides a stricter test of the model than simply comparing mean productivity levels. In particular, we follow the approaches of Deglado et al. (2002) and Girma et al. (2004) and make use of the non-parametric one- and two-sided Kolmogorov-Smirnov (KS tests).

Letting F and G be two cumulative distribution functions, for example the productivity of exporters and non-exporters, then first order stochastic dominance of F relative to G means that $F(z) - G(z)$ must be less or equal to zero for all values of z, with strict inequality for some z. This can be tested using the one-sided and two-sided Kolmogorov-Smirnov (KS) test. The two-sided KS statistic tests the hypothesis that both distributions are identical, and the null and alternative hypotheses can be expressed as:

$$\begin{aligned} H_0&: F(z) - G(z) = 0 \qquad \forall\, z \in \Re \\ H_1&: F(z) - G(z) \neq 0 \quad \text{for some } z \in \Re \end{aligned}$$

While the one-sided test can be formulated as:

$$\begin{aligned} H_0&: F(z) - G(z) \leq 0 \qquad \forall\, z \in \Re \\ H_1&: F(z) - G(z) > 0 \quad \text{for some } z \in \Re \end{aligned}$$

In order to conclude that F stochastically dominates G requires that one can reject the null hypothesis for the two-sided test, but not for the one-sided test. In our analysis below we report results from the one-sided test for both the hypothesis that F dominates G and that G dominates F.

The KS test statistic for the two- and one-sided tests are:

$$KS_2 = \sqrt{\frac{n.m}{N}} \max_{1 \le i \le N} \{F_n(z_i) - G_m(z_i)\}$$
$$KS_1 = \sqrt{\frac{n.m}{N}} \max_{1 \le i \le N} |F_n(z_i) - G_m(z_i)|$$

respectively, where n and m are the sample sizes from the empirical distributions of F and G respectively, and $N = n + m$.

Finally, we turn to regression analysis which allows us to condition on other factors affecting performance. In particular, we report results from OLS regressions, where in different specifications we include various fixed effects (i.e. sector and country, sector-country interactions) to control for un-modelled country and sector specific differences in performance. We follow much of the existing literature that considers the productivity premium from trade by estimating an initial equation of the following form:

$$\ln Y_{ijk} = \beta_1 \ln EMP_{ijk} + \beta_2 (\ln EMP_{ijk})^2 + \beta_3 AGE_{ijk} + \beta_4 K/L_{ijk} + \beta_5 HK_{ijk} + \beta_6 EXP_{ijk} + \beta_7 IMP_{ijk} + \beta_8 TWOWAY_{ijk} + \theta_i + \varphi_j + \varepsilon_{ijk} \quad (1)$$

where Y is our measure of firm performance (i.e. labour productivity) in firm k in country i and sector j, EMP is the (logged) number of employees, AGE is firm age in years, K/L is the (logged) capital-labour ratio, HK is a measure of human capital[10], EXP, IMP and $TWOWAY$ are dummies for exporters, importers, and two-way traders respectively, and θ_i and φ_j are country- and sector-specific effects respectively. In various specifications these latter effects are replaced by sector-country fixed effects, τ_{ij}. We also include in some specifications a dummy variable taking the value one if the firm is foreign-owned ($FOREIGN$).[11] This allows us to control for the fact that foreign-owned firms are more likely to be engaged in some form of international trade.

The above regression equation is estimated using standard OLS techniques along with the standard within regression when including sector-country fixed effects. Such models seek to estimate the productivity premia at the conditional mean of the productivity distribution. There are reasons to believe however that the impact of exporting and importing is likely to differ across firms. In particular, the recent theoretical literature on trade and productivity (e.g. Melitz, 2003) suggests that firm heterogeneity is to be expected. To account for this possibility therefore we also estimate the above regression model using quantile regression methods.[12] Quantile regression models seek to model the conditional quantile functions, in which the quantiles of the conditional distribution of the dependent variable are expressed as functions of observed covariates (for more information see Buchinsky (1998) and Koenker and Hallock (2001)). The main advantage of quantile regressions is that po-

[10] Defined as the ratio of technical, administrative and sales workers in total employment.

[11] A firm is defined a foreign-owned if more than 10 per cent of the firm's equity is held by foreigners.

[12] For an introduction to quantile regression models see Buchinsky (1998) and Koenker and Hallock (2001).

tentially different solutions at distinct quantiles may be interpreted as differences in the response of the dependent variable to changes in the regressors at various points along the conditional distribution of the dependent variable. The method thus allows one to estimate different parameters on the trade variables for under-achievers (i.e. those at the lower end of the conditional productivity distribution) and over-achievers (i.e. those at the upper end). In addition to allowing for non-linearities in the relationship between a firm's trading status and its performance, quantile regressions have a number of other advantages over OLS. Median regression methods can be more efficient than mean regression estimators in the presence of heteroscedasticity, while when the error term is non-normal, quantile regression estimators may be more efficient than least squares estimators. Quantile regressions are also robust with regard to outlying observations in the dependent variable. In a sample of heterogeneous firms values of some variables are likely to be far away from others. These outliers could be due to reporting errors or to idiosyncratic events and can have a large influence on the coefficients when estimating the regression model by OLS. By using quantile regression methods which are robust to outlying observations we are able to examine the sensitivity of our results to outliers. The quantile regression objective function is a weighted sum of absolute deviations, which gives a robust measure of location, so that the estimated coefficient vector is not sensitive to outlier observations on the dependent variable.

One problem with the use of quantile regression methods in a panel context arises when including a large number of fixed effects, as is the case when we include sector-dummy fixed effects.[13] In particular, the inclusion of a large number of fixed effects leads to an incidental parameters problem; with a large number of cross-sectional units and a small number of observations for each cross-sectional unit the estimates of the fixed effects are likely to be poor. The poor quality of the estimates of the fixed effects causes the estimates of the main parameters of interest to be badly behaved. Koenker (2004) discusses approaches to deal with such problems, including a class of penalised quantile regression estimators, while Powell (2010) develops an unconditional quantile regression estimator that allows for the inclusion of fixed effects. Both of these approaches are computationally intensive to implement however. Recently, Canay (2011) has introduced an alternative method of estimating quantile regression models with fixed effects that is easy to implement using standard software. The method is based upon the assumption that the fixed-effects in the model act like pure location shift effects, meaning that the fixed effects are constant across quantiles. Given this assumption, Canay proposes the following two-step estimator:

(i) Estimate the standard fixed effects regression at the conditional mean (i.e. the usual within transformation) and using the estimated parameters from this model construct estimates for the individual fixed effects as $\hat{\alpha}_i = \frac{\sum_{t=1}^{T}\left(Y_{it} - X_{it}^{'}\hat{\beta}_{\mu}\right)}{T}$, where $\hat{\alpha}_i$ are the es-

[13] With 19 countries and 24 sectors we have 456 fixed effects to estimate.

timated fixed effects, Y_{it} is the dependent variable, X_{it} are the explanatory variables, and $\hat{\beta}_{\mu}$ are the estimated parameters from the conditional mean regression.

(ii) Define $\hat{Y}_{it} \equiv Y_{it} - \hat{\alpha}_i$ and estimate the quantile regression(s) using this newly defined variable as the dependent variable.

Canay (2011) shows that this estimator is consistent for large T. Canay (2011) also proposes a bootstrap procedure for estimating the variance-covariance matrix for this estimator. The bootstrap method is implemented by drawing with replacement a sample of size NT and computing the two-step estimator as described above. Repeating this a total of B times the estimated bootstrapped variance-covariance matrix at quantile τ is constructed as:

$$\frac{1}{B}\sum_{j=1}^{B}\left(\hat{\beta}_j^*(\tau) - \bar{\beta}^*(\tau)\right)\left(\hat{\beta}_j^*(\tau) - \bar{\beta}^*(\tau)\right)'$$

where $\hat{\beta}_j^*(\tau)$ are the estimated parameters from the jth bootstrap and the τth quantile, and $\bar{\beta}^*(\tau) = \frac{1}{B}\sum_{j=1}^{B}\hat{\beta}_j^*(\tau)$.

We adapt this approach to our dataset, which has a country, sector and firm dimension. In our analysis we account for sector-country fixed effects and so follow step 1 above to construct estimates for the sector-country fixed effects and then use these to define the transformed dependent variable for use in step 2. Analogous to the arguments of Canay (2011) the estimator in this case would be consistent as the number of firms increase.[14]

4. Results

4.1. Main Results

We begin our comparison of trading and non-trading firms by conducting simple mean comparison tests for exporters versus non-exporters, importers versus non-importers, and two-way traders versus non two-way traders. To account for differences in these performance measures across sectors and countries we de-mean our performance measures, by constructing a variable equal to the logged value of the performance measure minus the mean of the logged value of performance of all firms in the same country and sector. We also use this demeaning procedure when employing the non-parametric KS test below. Results are reported in Table 3. The results in Table 3 indicate that output per worker, TFP, sales, capital stock and average wages are higher for exporters than for non-exporters, with no significant differences found between the two groups for employment

[14] For brevity we choose not to report results when including country and sector fixed effects separately. Given the relatively small number of fixed effects to be included in this case however, it is possible to include them using standard quantile regression methods. These results are available upon request and are qualitatively consistent with those when including country-sector fixed effects.

and the profit rate. The results for importers versus non-importers are found to be similar with importers performing better than non-importers along all performance criteria other than TFP and the profit rate, for which no significant differences are found. For two-way traders versus non two-way traders we again find no significant differences in TFP between the two types of firms, with no significant difference in wages also found in this case. In this case we also find that the mean profit rate is higher in the non-two-way traders is significantly higher than that for two-way traders.[15]

Table 3

Mean Comparison Test Results on Demeaned Data

	Mean Value		Alternative Hypothesis (p-values)		
	Traders	Non-Traders	Unequal Means	Difference favourable to traders	Difference favourable to non-traders
Exporters versus Non-Exporters					
Log Output Per Worker	0.530	-0.062	0.00***	0.00***	1.00
Log TFP	0.479	-0.032	0.00***	0.00***	1.00
Log Sales	0.698	-0.100	0.00***	0.00***	1.00
Log Capital-Labour Ratio	0.485	-0.047	0.00***	0.00***	1.00
Log Employment	0.138	-0.036	0.12	0.06*	0.94
Log Wage	0.234	-0.023	0.02**	0.01**	0.99
Log Profit Rate	-0.055	0.014	0.58	0.71	0.29
Importers versus Non-Importers					
Log Output Per Worker	0.128	-0.111	0.00***	0.00***	1.00
Log TFP	0.055	-0.015	0.43	0.22	0.79
Log Sales	0.260	-0.216	0.00***	0.00***	1.00
Log Capital-Labour Ratio	0.156	-0.106	0.00***	0.00***	1.00
Log Employment	0.133	-0.105	0.00***	0.00***	1.00
Log Wage	0.132	-0.080	0.00***	0.00***	1.00
Log Profit Rate	0.017	0.007	0.85	0.43	0.58
Two-way versus Non Two-way Traders					
Log Output Per Worker	0.543	0.031	0.00***	0.00***	1.00
Log TFP	0.092	-0.003	0.56	0.28	0.72
Log Sales	0.985	-0.059	0.00***	0.00***	1.00
Log Capital-Labour Ratio	0.300	-0.018	0.03**	0.02**	0.98
Log Employment	0.451	-0.027	0.00***	0.00***	1.00
Log Wage	0.155	-0.009	0.11	0.05*	0.95
Log Profit Rate	-0.157	0.010	0.05*	0.97	0.03**

While the results reported in Tables 3 would seem to suggest that services firms that trade internationally perform better than those that do not trade internationally the statistics only

[15] We also test for differences in the median of our performance measures across these groups using the Stata package '*cendif*'. The results are not reported for reasons of brevity, but are largely similar to those using the test of means. The major difference being that the differences in performance between importers and non-importers using the median test are usually not significant (except for output per worker and sales).

look at one moment of the distribution of the performance measures (i.e. the mean). Table 4 therefore reports a similar set of results using the non-parametric Kolmogorov-Sirnov test. The results in Table 4 are fairly consistent with those from the mean comparison test in Table 3. In particular, we find that exporters are found to stochastically dominate non-exporters along all performance criteria except the profit rate, where no significant differences in the two distributions is found. Results for importers versus non-importers are quite similar, though there no significant differences between the two distributions of TFP either. This is also the case for two-way traders, though as with the mean comparison results we find that in the case of the profit rate the distribution for non-two-way traders dominates that of two-way traders.

Table 4

Foreign Exposure and Firm-Level Productivity – Kolmogorov-Smirnov Test Results

	Equality of Distribution		**Differences favourable to traders**		**Differences favourable to non-traders**	
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Exporters vs Non-Exporters						
Log Output Per Worker	0.2787	0.000***	-0.0290	0.838	0.2787	0.000***
Log TFP	0.3088	0.000***	-0.0287	0.899	0.3088	0.000***
Log Sales	0.2537	0.000***	-0.0098	0.980	0.2537	0.000***
Log Capital-Labour Ratio	0.1508	0.017**	-0.0030	0.98	0.1508	0.008***
Log Employment	0.1272	0.066*	-0.0136	0.962	0.1272	0.033**
Log Wage	0.1703	0.005***	-0.0129	0.966	0.1703	0.002***
Log Profit Rate	0.0768	0.708	-0.0768	0.374	0.0599	0.550
Importers vs Non-Importers						
Log Output Per Worker	0.0990	0.000***	-0.0047	0.979	0.0990	0.000***
Log TFP	0.0773	0.250	-0.0231	0.830	0.0773	0.125
Log Sales	0.1471	0.000***	-0.0058	0.968	0.1471	0.000***
Log Capital-Labour Ratio	00859	0.002***	-0.0079	0.944	0.0859	0.001***
Log Employment	0.1077	0.000***	-0.0014	0.998	0.1077	0.000***
Log Wage	0.1065	0.000***	-0.0071	0.955	0.1065	0.000***
Log Profit Rate	0.0540	0.201	-0.0540	0.101	0.0323	0.439
Two-Way vs Non-Two-Way Traders						
Log Output Per Worker	0.1704	0.002***	-0.0054	0.993	0.1704	0.001***
Log TFP	0.0986	0.876	-0.0654	0.736	0.0986	0.497
Log Sales	0.2806	0.000***	-0.0068	0.989	0.2806	0.000***
Log Capital-Labour Ratio	0.1408	0.016**	-0.0099	0.977	0.1408	0.008***
Log Employment	0.2129	0.000***	-0.0009	1.000	0.2129	0.000***
Log Wage	0.1266	0.045**	-0.0220	0.892	0.1266	0.022**
Log Profit Rate	0.1611	0.008***	-0.1611	0.004***	0.0282	0.845

Notes: ***, ** and * indicate significance at the 1, 5, and 10 per cent levels.

We now turn to regression analysis which allows us to control for other firm-specific factors when examining the relationship between a firm's trade status and its performance. For brevity, we also concentrate on a single measure of firm performance, namely the log of

labour productivity, in the regression analysis. Table 5 reports regression results from estimating Equation (1) using OLS. The table reports results when including a number of different fixed effects, with Column (1) including no country or sector fixed effects, Column (2) including country and sector fixed effects separately, and Column (3) including sector-country fixed effects. The final three columns report similar results but also include a dummy variable equal to one if the firm is foreign-owned. We control for foreign ownership since foreign-owned firms have been found to perform better than domestically-owned ones and in our dataset are more likely to be internationally trading firms. The results on employment and employment squared are largely consistent with existing literature and indicate that labour productivity rises with firm size, but at a diminishing rate. Firm age is found to have a positive effect on productivity when significant, while the foreign dummy is large positive and significant. The coefficients on the capital-labour ratio and the measure of human capital are also consistently positive and significant as would be expected.

Table 5

OLS Results for Exporters, Importers and Two-Way Traders

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
$\ln EMP$	0.399***	0.458***	0.385***	0.377***	0.445***	0.366***
	(0.112)	(0.114)	(0.133)	(0.108)	(0.111)	(0.131)
$\ln EMP^2$	-0.0608***	-0.0644***	-0.0576***	-0.0609***	-0.0648***	-0.0575***
	(0.0145)	(0.0144)	(0.0171)	(0.0141)	(0.0140)	(0.0167)
AGE	0.0105***	0.00407	0.00298	0.0116***	0.00484*	0.00348
	(0.00273)	(0.00277)	(0.00316)	(0.00265)	(0.00267)	(0.00304)
K/L	0.329***	0.314***	0.300***	0.326***	0.310***	0.296***
	(0.0214)	(0.0221)	(0.0240)	(0.0209)	(0.0216)	(0.0236)
HK	0.0106***	0.00692***	0.00640***	0.0101***	0.00670***	0.00609***
	(0.00104)	(0.00112)	(0.00127)	(0.00103)	(0.00110)	(0.00125)
EXP	0.759***	0.646***	0.638***	0.676***	0.566***	0.548***
	(0.128)	(0.121)	(0.135)	(0.127)	(0.120)	(0.135)
IMP	0.571***	0.346***	0.342***	0.513***	0.275***	0.260***
	(0.0705)	(0.0780)	(0.0860)	(0.0700)	(0.0768)	(0.0845)
TWO	1.231***	0.874***	0.839***	1.076***	0.727***	0.674***
	(0.152)	(0.148)	(0.163)	(0.153)	(0.146)	(0.158)
$FOREIGN$				0.503***	0.508***	0.529***
				(0.0693)	(0.0691)	(0.0760)
$H_0: EXP = IMP$	2.00	5.49***	4.34**	1.56	5.23**	4.22**
$H_0: EXP = TWO$	6.40**	1.74	1.11	4.69**	0.91	0.46
$H_0: IMP = TWO$	18.08***	13.11***	9.60***	13.11***	9.89***	7.11***
Sector and Country Fixed Effects	No	Yes	No	No	Yes	No
Sector-Country Fixed Effects	No	No	Yes	No	No	Yes
Observations	2,125	2,125	2,125	2,125	2,125	2,125
F-Statistic	82.28***	25.09***	5.05***	81.29***	26.41***	5.36***
R-squared	0.255	0.372	0.458	0.273	0.389	0.473

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Turning to the trade variables we find coefficients on the exporter, importer and two-way dummy variables that are large positive and significant in all cases. There seems to be a pattern in the results with importers having the smallest coefficient and two-way traders the largest. The size of the estimated productivity premia, particularly for two-way traders, are often found to be large, though the size of the coefficients tend to fall when the foreign ownership dummy is included and when either sector and country or sector-country fixed effects are included. The results suggest that the premia for two-way traders ranges from a low of 96 per cent to a high of 242 per cent, with the premia from exporting ranging from 73 to 113 per cent and the premia from importing ranging from 30 to 77 per cent.[16] Tests of the equality of these coefficients indicate that there tends not to be a significant difference in productivity between exporters and two-way traders, but that there are usually significant differences between importers and both exporters and two-way traders, indicating that exporters and two-way traders perform significantly better than importers. This is something we return to briefly below.

Table 6

Quantile Regression Results for Exporters, Importers and Two-Way Traders

	(1) 10th	**(2)** 30th	**(3)** 50th	**(4)** 70th	**(5)** 90th
$\ln EMP$	0.304*	0.506***	0.426***	0.260**	0.117
	(0.165)	(0.113)	(0.141)	(0.110)	(0.200)
$\ln EMP^2$	-0.0502**	-0.0707***	-0.0627***	-0.0452***	-0.0352
	(0.0217)	(0.0143)	(0.0178)	(0.0137)	(0.0250)
AGE	0.0167***	0.0138***	0.0118***	0.0113***	0.0106**
	(0.00448)	(0.00289)	(0.00338)	(0.00251)	(0.00420)
K/L	0.389***	0.340***	0.342***	0.315***	0.265***
	(0.0349)	(0.0210)	(0.0256)	(0.0198)	(0.0389)
HK	0.00641***	0.00896***	0.0105***	0.0112***	0.0111***
	(0.00181)	(0.00121)	(0.00155)	(0.00118)	(0.00196)
EXP	1.027***	0.719***	0.567**	0.595***	0.532*
	(0.246)	(0.178)	(0.222)	(0.168)	(0.276)
IMP	0.534***	0.627***	0.675***	0.528***	0.398***
	(0.120)	(0.0839)	(0.105)	(0.0792)	(0.133)
TWO	0.891***	0.954***	1.189***	1.269***	1.239***
	(0.240)	(0.165)	(0.206)	(0.156)	(0.265)
$FOREIGN$	0.342***	0.456***	0.417***	0.503***	0.641***
	(0.115)	(0.0796)	(0.100)	(0.0765)	(0.129)
$H_0: EXP = IMP$	3.77*	0.25	0.22	0.15	0.22
$H_0: EXP = TWO$	0.18	1.04	4.69**	9.62***	3.87**
$H_0: IMP = TWO$	2.08	3.73*	5.90**	21.49***	9.54***
Psuedo R^2	0.180	0.184	0.168	0.155	0.124
Observations	2,125	2,125	2,125	2,125	2,125

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[16] The premia are calculated from the estimated coefficients on the trade dummies as $100(e^{\beta}-1)$, where β is the estimated coefficient.

Table 6 reports results from estimating the regression model using quantile regression and the fixed effects quantile estimator of Canay (2011) in particular. Results are reported for the 10th, 30th, 50th (i.e. median), 70th and 90th percentiles of the conditional productivity distribution. Results on the control variables are largely similar to those when using OLS in terms of sign and significance, though firm size is not found to be a significant determinant of productivity in the biggest over-achievers (i.e. firms at the 90th percentiles). Coefficients on the trade dummies are generally consistent with those from the OLS results, with positive and significant coefficients found in all cases. The ranking of the coefficients by size also tends to be consistent with the OLS results, with two-way traders performing better than exporters only, who in turn perform better than importers only (the exception being at the 10th percentile where exporters are the best performing firms). Once again, the differences in the coefficients are generally significant for the comparison between importers only and two-way traders, with significant differences also found between two-way traders and exporters at higher quantiles. Interestingly, in the case of exporters only and importers only the coefficients on the trade status dummies tend to be largest for under-achievers, declining as we move to higher quantiles. The reverse is the case for two-way traders however, with the coefficients on this variable increasing as we move to higher quantiles.

4.2 Productivity Differences between Exporters, Importers and Two-Way Traders

In the more recent literature on international trade and firm-level performance attention has been paid to the issue of whether there are productivity differences between different types of trading firms, and in particular between exporters only, importers only and two-way traders (see Wagner, 2012). Results from existing studies tend to indicate a clear ranking in terms of performance by trading type, with two-way traders having the highest levels of productivity, followed by importers only and then exporters only. In the regression results reported above we find somewhat different results with importers only having the smallest productivity premium, and no significant differences found between the productivity premium for two-way traders and exporters only. We now further examine this issue by reporting results from the KS test, which allows us to compare the entire distribution.

Table 7 reports the results from the KS test for logged labour productivity as well as the other performance indicators considered above. The table reveals that there are few significant differences in the distributions of the performance measures between exporters and two-way traders. Only in the case of TFP and the profit rate do we find significant differences, which in both cases favour the exporting group. In the case of importers versus two-way traders significant differences are found for sales, employment and the profit rate, the former two of which favour two-way traders and the latter favouring importers. In the case of exporters versus importers we observe that there are significant differences in the distributions of output per worker, TFP, sales and wages, all of which favour exporters. Overall, the results tend to suggest that there are fewer differences between the trading

groups than is often found, particularly with respect to our main variable of interest, labour productivity. Moreover, exporters are found to perform better than importers across many criteria, a result that is not often found in the literature, while they are found to perform as well and sometimes better than two-way traders, a group that is often found to perform better than others.

Table 7

Productivity Differences between Two-Way Traders and Exporters and Importers Only

Group 1 vs. Group 2	Equality of Distribution		Differences favourable to Group 1		Differences favourable to Group 2	
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Exporters vs Two Way Traders						
Log Output Per Worker	0.1416	0.182	0.1010	0.296	-0.1416	0.091*
Log TFP	0.2797	0.046**	0.0251	0.970	-0.2797	0.023**
Log Sales	0.1102	0.463	0.1102	0.235	-0.0402	0.824
Log Capital-Labour Ratio	0.0538	0.995	0.0513	0.730	-0.0538	0.708
Log Employment	0.1347	0.229	0.1347	0.115	0.0000	1.000
Log Wage	0.0674	0.952	0.0090	0.990	-0.0674	0.585
Log Profit Rate	0.2014	0.036**	0.0530	0.757	-0.2014	0.018**
Importers vs Two Way Traders						
Log Output Per Worker	0.1164	0.104	0.1164	0.052*	-0.0078	0.987
Log TFP	0.0983	0.921	0.0602	0.796	-0.0983	0.544
Log Sales	0.2063	0.000***	0.2063	0.000***	-0.0078	0.987
Log Capital-Labour Ratio	0.093	0.301	0.0933	0.151	-0.0194	0.921
Log Employment	0.1583	0.008***	0.1583	0.004***	-0.0015	0.999
Log Wage	0.1136	0.128	0.1136	0.064*	-0.0361	0.758
Log Profit Rate	0.1489	0.029**	0.0297	0.845	-0.1489	0.015**
Exporters vs Importers						
Log Output Per Worker	0.2180	0.000***	-0.0398	0.738	0.2180	0.000***
Log TFP	0.2911	0.000***	-0.0373	0.866	0.2911	0.000***
Log Sales	0.1675	0.009***	-0.0185	0.937	0.1675	0.005***
Log Capital-Labour Ratio	0.0958	0.344	-0.0104	0.980	0.0958	0.173
Log Employment	0.0680	0.767	-0.0680	0.412	0.0669	0.424
Log Wage	0.1491	0.029**	-0.0139	0.964	0.1491	0.014**
Log Profit Rate	0.0800	0.710	-0.0626	0.548	0.0800	0.374

Notes: ***, ** and * indicate significance at the 1, 5, and 10 per cent levels.

4.3 Productivity Differences between Export Starters, Continuers and Exiters

While there are only limited data on past performance and status in the AIS, the dataset does include information on export status in the previous period. From this data we are able to construct variables indicating whether firms began exporting, continued exporting or stopped exporting in the survey year. We are thus able to ask whether there are differences in performance between export starters, continuers and exiters, which allows us to

say something on the question of whether productivity differences between exporters and non-exporters is due to self-selection or learning-by-exporting in our sample of countries. If learning-by-exporting is not relevant, with the productivity premium of exporters being due to the self-selection of more productive firms into exporting, then we would expect there to be no significant differences in productivity between export starters and continuers.

Table 8

Productivity Differences between Export Starters, Continuers and Exiters

Group 1 vs. Group 2	Equality of Distribution		Differences favourable to Group 1		Differences favourable to Group 2	
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Export Starter vs Continuing Exporter						
Log Output Per Worker	0.0959	0.934	-0.0959	0.560	0.0453	0.879
Log TFP	0.1677	0.848	-0.1179	0.691	0.1677	0.473
Log Sales	0.1241	0.718	-0.1241	0.379	0.1094	0.471
Log Capital-Labour Ratio	0.1188	0.766	-0.0089	0.995	0.1188	0.412
Log Employment	0.1143	0.805	-0.1143	0.439	0.0443	0.884
Log Wage	0.0839	0.980	-0.0839	0.643	0.0766	0.692
Log Profit Rate	0.3062	0.016**	-0.0321	0.948	0.3062	0.008***
Export Exiter vs Continuing Exporter						
Log Output Per Worker	0.2860	0.137	-0.2860	0.069*	0.0055	0.999
Log TFP	0.1620	1.000	-0.1544	0.799	0.1620	0.781
Log Sales	0.4417	0.003***	-0.4417	0.002***	0.0055	0.9999
Log Capital-Labour Ratio	0.2398	0.333	-0.0370	0.958	0.2398	0.167
Log Employment	0.3625	0.027**	-0.3625	0.013**	0.0155	0.992
Log Wage	0.1683	0.771	-0.1441	0.525	0.1683	0.415
Log Profit Rate	0.1905	0.740	-0.0522	0.932	0.1905	0.394
Export Exiter vs Export Starter						
Log Output Per Worker	0.2865	0.268	-0.2865	0.135	0.0322	0.975
Log TFP	0.2875	0.911	-0.2875	0.533	0.1500	0.842
Log Sales	0.4883	0.006***	-0.4883	0.003***	0.0088	0.998
Log Capital-Labour Ratio	0.2198	0.622	-0.0975	0.800	0.2198	0.321
Log Employment	0.3538	0.094*	-0.3538	0.047**	0.026	0.983
Log Wage	0.2152	0.648	-0.2152	0.337	0.1347	0.653
Log Profit Rate	0.2488	0.589	-0.2488	0.303	0.1636	0.597

Notes: ***, ** and * indicate significance at the 1, 5, and 10 per cent levels.

To examine whether there are differences in productivity between export starters, continuers and exiters we follow the same steps as above. Table 8 reports the results from the KS test. The results indicate that there are in general no significant differences in the distributions of the performance measures between continuing exporters and export starters, the exception being the profit rate for which export starters stochastically dominate. There are also few significant differences found between the distributions of export exiters and the other two groups. Significant differences exist for sales and employment when considering the comparison with export exiters and both starters and continuers, and in all cases favour

starters of continuers. Overall however, we find few differences between the three groups of exporting firms.

Table 9

OLS Results for Starters, Exiters and Continuers

	(1)	(2)	(3)	(4)	(5)	(6)
$\ln EMP$	0.402***	0.459***	0.387***	0.379***	0.446***	0.367***
	(0.112)	(0.113)	(0.133)	(0.108)	(0.110)	(0.130)
$\ln EMP^2$	-0.0611***	-0.0644***	-0.0578***	-0.0612***	-0.0648***	-0.0577***
	(0.0145)	(0.0144)	(0.0170)	(0.0141)	(0.0140)	(0.0166)
AGE	0.0102***	0.00370	0.00252	0.0114***	0.00450*	0.00306
	(0.00274)	(0.00278)	(0.00317)	(0.00266)	(0.00268)	(0.00305)
KL	0.329***	0.315***	0.303***	0.326***	0.311***	0.298***
	(0.0215)	(0.0221)	(0.0240)	(0.0210)	(0.0217)	(0.0235)
HK	0.0106***	0.00688***	0.00629***	0.0101***	0.00665***	0.00598***
	(0.00104)	(0.00112)	(0.00126)	(0.00103)	(0.00110)	(0.00125)
$START$	0.759***	0.427*	0.302	0.703***	0.364	0.238
	(0.252)	(0.240)	(0.252)	(0.247)	(0.241)	(0.248)
$CONTINUE$	0.747***	0.727***	0.781***	0.657***	0.644***	0.685***
	(0.135)	(0.122)	(0.135)	(0.134)	(0.120)	(0.132)
$EXIT$	-0.143	-0.320	-0.550	-0.215	-0.383	-0.614
	(0.462)	(0.474)	(0.517)	(0.460)	(0.467)	(0.499)
IMP	0.564***	0.339***	0.339***	0.507***	0.270***	0.258***
	(0.0704)	(0.0781)	(0.0862)	(0.0699)	(0.0769)	(0.0847)
TWO	0.497***	0.193	0.127	0.424**	0.124	0.0525
	(0.184)	(0.167)	(0.184)	(0.183)	(0.164)	(0.178)
$FOREIGN$				0.506***	0.511***	0.530***
				(0.0693)	(0.0690)	(0.0760)
$H_0: START = CONTINUE$	0.55	0.81	1.63	0.84	0.60	1.31
$H_0: START = EXIT$	4.28**	3.74*	3.89**	4.33**	3.71*	3.98**
$H_0: CONTINUE = EXIT$	3.48*	6.54**	7.77***	3.17*	6.25**	7.60***
Sector and Country Fixed Effects	No	Yes	No	No	Yes	No
Sector-Country Fixed Effects	No	No	Yes	No	No	Yes
Observations	2,125	2,125	2,125	2,125	2,125	2,125
F-Statistic	72.08***	24.13***	5.05***	72.07***	25.43***	5.36***
R-squared	0.254	0.372	0.459	0.273	0.390	0.475

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Finally, we turn to the regression approach to search for productivity differences between export starters, continuers and exiters. Results from OLS regressions are reported in Table 9 with quantile regression results reported in Table 10. Concentrating on the exporter variables we observe that across the different specifications there is an insignificant (negative) coefficient on the export exiter dummy. As such, export exiters are not found to perform differently to non-exporters. For export continuers we find coefficients that are consistently large, positive and significant. In the case of export starters we obtain consistently positive coefficients that are in half of the cases are significant. The coefficients tend to be significant until country-sector fixed effects are included. Given these results we would be tempted to conclude that export continuers perform better than export starters, a result that would point

towards learning-by-exporting effects. Our results further indicate however that there are no significant differences between the coefficients for export starters and export continuers. For the comparison between both continuers and exiters and between starters and exiters however, we do consistently observe significant differences in the coefficients. When considering the quantile regression results (Table 10) we again find large, positive and significant coefficients on the dummy variables for export starters and continuers (except at the highest quantiles), though the coefficients tend to be larger for export continuers. The coefficients for exiters are generally insignificant across quantiles, though at the lowest quantile (10th percentile) the coefficient is actually negative and significant. Despite these differences in coefficients, few are found to be significant. Only at the lowest percentile do we find significant differences in coefficients in the case of both starters and exiters, and continuers and exiters. The result that continuers perform better than exiters, for some firms at least, is consistent with results found by Girma et al. (2003) for manufacturing firms who argue that such results imply that domestic output does not compensate for the loss of foreign market share.

Table 10

Quantile Regression Results for Export Starters, Continuers and Exiters

	(1) 10th	**(2)** 30th	**(3)** 50th	**(4)** 70th	**(5)** 90th
$\ln EMP$	0.325*	0.515***	0.427***	0.258**	0.195
	(0.182)	(0.0956)	(0.132)	(0.108)	(0.189)
$\ln EMP^2$	-0.0528**	-0.0714***	-0.0624***	-0.0449***	-0.0442*
	(0.0237)	(0.0121)	(0.0166)	(0.0135)	(0.0236)
AGE	0.0155***	0.0139***	0.0121***	0.0114***	0.0108***
	(0.00486)	(0.00246)	(0.00319)	(0.00249)	(0.00403)
KL	0.395***	0.334***	0.340***	0.314***	0.268***
	(0.0383)	(0.0179)	(0.0239)	(0.0198)	(0.0364)
HK	0.00676***	0.00898***	0.0106***	0.0111***	0.0111***
	(0.00194)	(0.00103)	(0.00144)	(0.00117)	(0.00185)
$START$	0.795*	0.795***	0.786**	0.362	0.387
	(0.470)	(0.259)	(0.346)	(0.280)	(0.407)
$CONTINUE$	1.013***	0.828***	0.478**	0.625***	0.483
	(0.257)	(0.165)	(0.232)	(0.191)	(0.308)
$EXIT$	-2.828***	0.191	0.433	0.119	-0.304
	(0.565)	(0.348)	(0.490)	(0.384)	(0.550)
IMP	0.505***	0.614***	0.675***	0.525***	0.398***
	(0.129)	(0.0712)	(0.0971)	(0.0783)	(0.125)
TWO	-0.0986	0.118	0.560**	0.645***	0.806**
	(0.322)	(0.195)	(0.270)	(0.223)	(0.345)
$FOREIGN$	0.339***	0.462***	0.398***	0.502***	0.610***
	(0.124)	(0.0676)	(0.0929)	(0.0758)	(0.122)
$H_0: START = CONTINUE$	0.26	0.02	0.73	0.82	0.04
$H_0: START = EXIT$	24.81***	1.96	0.35	0.27	1.06
$H_0: CONTINUE = EXIT$	39.27***	2.78*	0.01	1.41	1.59
Observations	2,260	2,260	2,260	2,260	2,260
Psuedo R^2	0.180	0.185	0.170	0.155	0.123

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusions

This paper adds to the firm-level literature on international trade and performance by using a recent and broad survey of firms in a large number of SSA countries. It provides the first evidence on the relationship between a firm's international trade status and its performance for firms in the services sector in SSA and as such is one of the first for developing countries more generally. Using a variety of parametric and non-parametric statistical techniques we find that services firms that are engaged in international trade perform significantly better than those firms that sell and purchase in the domestic market only. The estimated premium from engaging in trade is usually found to be large, and in the case of two-way traders often exceeds 100 per cent. As found elsewhere the productivity premium is found to differ for exporters, importers and two-way traders, though the pattern found in the current paper differs from that found in other studies considering mainly manufacturing firms. In particular, rather than observing that exporters are the worst performing of all trading firms, we observe that both two-way traders and exporters perform better than importers. Indeed, for some performance criteria we find that exporters only also outperform two-way traders.

The data available – which is a single cross-section – are unable to say much on the issue of whether these differences arise due to self-selection or learning-by-trading in SSA. It is hoped that future African Investor Surveys could be combined with the current survey to provide a panel dataset with time-series variation that could help us address this question more fully as well as control for firm heterogeneity more adequately. The data do allow us to examine productivity differences between export starters, continuers and exiters however. Results suggest that exiters perform less well than starters and continuers. The coefficients on continuers tend to be larger than those for starters, which is a result consistent with learning-by-exporting. Despite the coefficients often being quite different in terms of their size, there are no significant differences between the two coefficients however. This weakens the evidence in favour of learning-by-exporting, though the lack of significant differences may reflect the small number of export starters in the dataset. Yet, we can conclude that there is evidence of self-selection into exporting, since export starters outperform non-exporters, and that there may be some limited evidence in favour of learning-by-exporting. Self-selection suggests that policies that enhance firms' competitiveness should be pursued. In addition, to the extent that learning-by-exporting is present our results would suggest that policies encouraging international exposure of services firms – for exporters in particular – should be promoted.

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Appendix

Table A1

Number of Firms in Sample by Country

Country	No. of Firms (% of Total)	Exporters	Importers	Two-way Traders	Foreign-owned
Burkina Faso	43 (1.89)	4	8	0	6
Burundi	96 (4.22)	3	18	3	24
Cameroon	125 (5.49)	11	33	13	67
Cape Verde	232 (10.19)	4	83	6	63
Ethiopia	101 (4.44)	7	37	3	22
Ghana	117 (5.14)	5	44	7	59
Kenya	197 (8.65)	18	35	23	49
Lesotho	67 (2.94)	0	41	2	16
Madagascar	99 (4.35)	9	19	6	54
Malawi	42 (1.84)	0	18	2	18
Mali	113 (4.96)	6	28	7	43
Mozambique	111 (4.87)	2	87	2	38
Niger	37 (1.62)	1	11	0	10
Nigeria	130 (5.71)	0	27	3	19
Rwanda	67 (2.94)	3	20	5	36
Senegal	128 (5.62)	9	28	11	51
Tanzania	119 (5.23)	5	31	4	42
Uganda	348 (15.28)	19	100	24	173
Zambia	105 (4.61)	5	41	7	27
Total	2,277 (100)	111	709	128	817

Table A2

Number of Firms in Sample by Industry

Industry	No. of Firms (% of Total)	Exporters	Importers	Two-Way Traders	Foreign-Owned
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	202 (8.87)	8	91	17	64
Wholesale trade and commission trade, except of motor vehicles and motorcycles	353 (15.50)	19	193	49	151
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	333 (14.62)	8	195	23	105
Hotels and restaurants (281), Land transport; transport via pipelines	281 (12.34)	4	61	0	87
Land transport; transport via pipelines	140 (6.15)	13	30	10	39
Water transport	22 (0.97)	2	5	2	14
Air transport	19 (0.83)	1	2	3	11
Supporting and auxiliary transport activities; activities of travel agencies	85 (3.73)	7	5	2	25
Post and telecommunications	80 (3.51)	6	20	7	44
Financial intermediation, except insurance and pension funding	170 (7.47)	7	9	1	87
Insurance and pension funding, except compulsory social security	86 (3.78)	6	3	1	38
Activities auxiliary to financial intermediation	21 (0.92)	0	0	0	5
Real estate activities	66 (2.90)	0	10	0	21
Renting of machinery and equipment without operator and of personal and household goods	16 (0.70)	0	3	1	5
Computer and related activities	37 (1.62)	4	9	6	14
Research and development	1 (0.04)	0	0	0	0
Other business activities	269 (11.81)	23	45	5	88
Public administration and defence; compulsory social security	4 (0.18)	1	0	0	0
Education	23 (1.01)	0	1	0	8
Health and social work	11 (0.48)	0	3	0	2
Sewage and refuse disposal, sanitation and similar activities	32 (1.41)	2	12	0	2
Recreational, cultural and sporting activities	18 (0.79)	0	7	1	6
Other service activities	7 (0.31)	0	5	0	1
Activities of private households as employers of domestic staff	1 (0.04)	0	0	0	0
Total	2,277 (100)	111	709	128	817

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