Outward Foreign Direct Investment, Exporting and Firm-Level Performance in sub-Saharan Africa

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Abstract

We consider the relationship between how a firm serves foreign markets and performance, using survey data on manufacturing and services firms for African countries. Results for manufacturing industries indicate a clear productivity ordering with firms undertaking outward FDI performing best, followed by exporters and domestically oriented firms. Results for services firms are more nuanced indicating that while exporters and firms undertaking outward FDI are more productive than domestically oriented firms there is no significant difference in productivity between these two types of firms (some evidence suggests that the productivity of exporters is larger than that for firms undertaking outward FDI).

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1. Introduction

Exporting and FDI are alternative means of supplying a foreign market and are often considered to be substitute channels.[1] The choice between exporting and FDI has often been discussed in the context of the proximity-concentration trade-off (see Brainard, 1993). This approach suggests that FDI becomes more favourable relative to exporting as the size of the foreign market increases (and the costs of exporting increase), and less favourable as the cost of setting up foreign production grows. In this context, Helpman et al (2004) recently extended the seminal contribution of Melitz (2003) to consider the choice between serving the domestic market only, exporting and foreign production achieved through horizontal outward FDI. As with the Melitz model heterogeneity with respect to firm productivity is the main determinant of the decision to serve foreign consumers through exporting or outward FDI, implying that firms self-select into exporting and FDI. Due to fixed costs in serving foreign markets, only the most productive firms will export or undertake FDI. In the case of exporting these fixed costs are usually thought to include transport costs as well as those related to gathering information on product compliance, distribution networks, advertising and so on (Greenaway and Kneller, 2007). The costs of FDI are considered to be those associated with replicating production facilities abroad (though transport costs are eliminated). In the model of Helpman et al (2004) it is assumed that the costs of outward FDI are greater than those for exporting, which implies that only the most productive firms will undertake outward FDI, while those with intermediate productivity levels will export, and those with the lowest levels of productivity will serve the domestic market only.

Greenaway and Kneller (2007) note that when there are factor price and market size differences, firms may also undertake vertical rather than horizontal FDI. They further note that in this case the ordering of the productivity distribution can be reversed: if the foreign country is small and offers some cost advantage, the least productive firms locate abroad, while the more productive

ones remain at home. In this case, low productivity firms have an incentive to pay the sunk costs of FDI since they use the factor whose price is low abroad more intensively.

A small literature has tested whether this productivity ordering holds empirically. This literature tends to concentrate on firms in developed countries, and tends to use either standard regression analysis or non-parametric tests that consider differences in the whole productivity distribution rather than the conditional mean only. The results from a number of studies are summarised in Table 4 of the recent survey by Wagner (2012) and tend to provide support for the ordering hypothesised by Helpman et al (2004), with firms undertaking outward FDI having the highest productivity levels, followed by exporters, with firms serving the domestic market tending to have the lowest levels of productivity.[2] This evidence tends to be stronger for the ordering of exporting firms and firms that undertake outward FDI, with differences between exporters and firms serving only the domestic market found to be less pronounced.

All but one of the empirical studies listed in Wagner (2012) consider data on manufacturing firms only and all but two concentrate on high income countries only. Recently, Bhattacharya et al (2012) have extended the above model and approach by considering services trade, which has expanded rapidly in recent years, and by reporting results on a developing country, India (but for just two industries, chemicals and software). The focus on services trade has one important consequence, namely that trade in services is not associated with significant transport costs. In the case where transport costs are zero, Bhattacharya et al (2012) argue that there is little incentive to pay the fixed costs of outward FDI, since foreign consumers can be served by producing at home. If the only reason to undertake FDI is to avoid transport costs therefore, we would not expect to see services firms undertake outward FDI. Services have a number of intangible characteristics however, implying that there is substantial uncertainty over the true

characteristics of the service being provided. Bhattacharya et al (2012) argue that this uncertainty may encourage services firms to undertake outward FDI and develop a model in which transport costs are assumed to be zero, but where there is assumed to be a risk to the consumer due to uncertainty associated with consuming services produced far away. This risk encourages outward FDI since it is assumed that physical proximity reduces the risk perception of the consumer, implying that the probability of positive demand is larger for firms undertaking outward FDI compared with exporters. Bhattacharya et al (2012) show that in this case it can be that the productivity ordering is reversed with exporting firms being more productive than those engaged in outward FDI. This would be the case if the risk perception of consumers is high, since exporting firms that endogenise the risk of facing zero demand have to be more productive than firms undertaking outward FDI. The authors go on to test this hypothesis using data on the software industry in India and find support for their hypothesis, with productivity levels in firms undertaking outward FDI found to be lower than those for exporters. Recently, Wagner (2011) considers the productivity ordering of German firms in the services sector and finds results consistent with those of Bhattacharya et al (2012).

In this paper we use data from UNIDO's recently completed Africa Investor Survey (AIS), which collected data on over 6,000 domestically and foreign-owned manufacturing and services firms in 19 sub-Saharan African (SSA) firms, to examine the productivity ordering of domestically owned firms that serve only the domestic market, that serve foreign markets by exporting and that serve foreign markets through outward FDI.[3] In particular, we use data on the sub-sample of domestically owned firms, distinguishing between the three categories of firms mentioned above (i.e. domestic market, exporters, outward FDI). We further split our sample of domestically-owned firms into manufacturing and services firms to examine whether the productivity ordering differs between manufacturing and services firms, as hypothesised by Bhattacharya et al (2012). This is the first paper that we are aware of that examines this productivity ordering for SSA firms.

The remainder of this paper is set out as follows: In Section 2 we discuss the data employed in our analysis; Section 3 describes the various parametric and non-parametric methods used to examine the productivity ordering; Section 4 presents and discusses the results; and Section 5 concludes.

2. Data and Summary Statistics

The data are drawn from the most recent UNIDO Africa 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 (see UNIDO, 2012).[4] 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. The respondents were usually senior managers of the firm or – in case of foreign ownership – the local subsidiary. After the interview, the data were checked in the country by supervisors and re-checked at UNIDO headquarters. 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, with a number of the countries in the UNIDO dataset being surveyed for the first time. In addition, the survey is current having been conducted in 2010-2011. An obvious drawback is that the data have a country and industry dimension only, with no time dimension available. This means that we are unable to say anything on the direction of causality and limited ability to control for potential endogeneity. In terms of the hypotheses tested in this paper however, it is assumed in the models of Helpman et al (2004) and Bhattacharya et al (2012) that productivity differences arise due to

self-selection of more highly productive firms into exporting and FDI, meaning that the issue of causality is not of primary concern.

The AIS surveyed both domestically- and foreign-owned firms in both services and manufacturing industries. In our analysis, we concentrate on the sub-sample of domestically-owned firms who were asked whether they had subsidiaries abroad, and if so the number of such establishments and the value of these investments. Following existing studies firms are classified as domestically-owned if less than 10 per cent of a firm's equity is foreign-owned. We thus consider only those firms with less than 10 per cent foreign ownership in our sample.[5] Using these data we begin by searching for differences in productivity between firms serving the home market only, exporting firms and firms that have establishments outside of their home country (i.e. outward FDI) using the full sample of data. We then split the sample into manufacturing and services firms to examine whether the productivity ordering we find for the full sample holds for the two sub-samples and whether the results for the two sub-samples are consistent with the models of Helpman et al (2004) and Bhattacharya et al (2012) discussed above.

Services account for almost 75 per cent of GDP in OECD countries and for 66 per cent of value-added in Latin America in 2007 (see Francois and Hoekman, 2010) and there has been a marked shift in value added towards the service sectors in SSA, 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 SSA over the period 2000-2005 was accounted for by services, compared with 37% and 16% for industry and agriculture respectively. Whilst our dataset cannot provide information on the relative importance of services in the total economy of our sample of SSA countries we are able to say something about the relative performance of services and manufacturing firms in the sample. Table 1 reports information on the mean and

median values of various performance indicators for all firms, and for services and manufacturing firms separately (variable definitions are reported in Table A1 of the online appendix). The data reveal that while manufacturing firms tend to be larger in terms of employment and the capital stock, services firms have higher output, output per worker and total factor productivity (TFP) at both the mean and median and tend to pay higher wages on average.

<<Table 1 about here>>

Tables A2 and A3 in the online appendix report a breakdown of the domestically owned firms surveyed by country and ISIC revision 3.1 sector. The tables indicate that there is a fairly broad coverage of industries covered and that all countries are relatively well covered. Of the total sample of 3,254 domestically-owned firms, 1,817 are manufacturing firms and 1,437 are services firms. The minimum number of observations in a country is 52 (Niger) and the maximum is 365 (Ethiopia). In terms of sectoral coverage only one sector (manufacture of food products and beverages) has a share in the total sample greater than 10 per cent, though a number of sectors including Research and Development and the manufacture of radio, television and communication equipment unsurprisingly have very low shares. These tables also report the number of firms exporting and undertaking outward FDI by country and sector. In terms of our indicators of exporting firms and of firms that undertake FDI we define a firm serving the domestic market as one that does not export at all and that has not undertaken outward FDI, an exporting firm is one that exports any part of its output; and a firm undertaking outward FDI is one that has subsidiaries abroad, irrespective of whether the firm also exports or not.[6] Tables A2 and A3 indicate that exporting and outward FDI are relatively rare, a result found elsewhere in the literature. For the full sample of countries we observe that 15.4% of firms export, with 2.7% undertaking outward FDI. These figures are somewhat different when we consider manufacturing and services industries separately. In particular, we find that exporting is much

more common in manufacturing industries (22.5%) relative to services (6.5%), while for outward FDI the figures are similar though slightly higher in services (3.1% versus 2.5%). In our sample, exporting appears to be relatively common in the manufacture of food products and beverages, of tobacco products, and of textiles, as well as the tanning and dressing of leather and the manufacture of other transport equipment. Outward FDI is generally a rare activity in the sample though relatively high shares of firms undertaking FDI are found in manufacturing of medical, precision and optical instruments, watches and clocks, in manufacturing of electrical machinery and apparatus and in insurance and pension funding. Considering the data by country we observe that exporting tends to be relatively important in Kenya and Madagascar and relatively unimportant in Mozambique and Cape Verde. Outward FDI is relatively common in Mali and to a lesser extent Uganda and Niger, with little or no outward FDI being undertaken by the sampled firms in Mozambique, Cape Verde and Ethiopia.

Following much of the existing literature this paper uses a measure of labour productivity – defined as the log of the ratio of output to the labour force – as our main performance measure.[7] The mean and median values of logged labour productivity and other performance indicators are reported in Table 1. These values are reported for all firms in our sample, for manufacturing firms only and for services firms only, with the data further decomposed into domestically-oriented firms, exporting firms and firms undertaking outward FDI. Considering the mean and median values of labour productivity and the other performance indicators we find in the case of all firms and manufacturing firms only that output, labour productivity, TFP and the capital stock are largest for the sample of firms undertaking outward FDI, followed by exporters, with domestically-oriented firms having the lowest mean and median values. While this pattern also holds for employment and average wages in the case of manufacturing firms, in the case of all firms the mean (though not the median) values are higher for exporters only. Results for all firms and for manufacturing firms in particular therefore provide some initial support for the theory of

Helpman et al (2004). For services firms however we observe that the mean values of the performance indicators are largest for exporters only, usually followed by firms undertaking outward FDI, with domestically-oriented firms again having the lowest mean values of the performance indicators. Results when considering the median values are mixed, but when considering labour productivity and TFP at least, are consistent with the pattern displayed by the mean values. Results for services therefore are consistent with the hypothesis of Bhattarachyra et al (2010) indicating that exporters outperform firms undertaking outward FDI. We now address this further using more formal statistical techniques.

3. Methodology

In order to test for differences in performance between domestically oriented firms, exporting firms and firms undertaking outward FDI we employ a number of statistical methods. We begin by reporting results from a simple comparison of means test.[8] 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 Delgado et al (2002) and Girma et al (2004, 2005) and make use of the non-parametric one- and two-sided Kolmogorov-Smirnov (KS tests), which is described below.

Let F and G be two cumulative distribution functions, for example, the productivity of exporters and firms undertaking outward FDI. 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:

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

While the one-sided test can be formulated as:

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

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:

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

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

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

We further report results using regression analysis, which enables us to estimate the so-called productivity premium for different types of firm. The productivity premium for exporting firms for example is defined as the difference in labour productivity between exporting firms and firms that do not export after controlling for other relevant characteristics of firms. The additional

characteristics included in our regression model are dictated by existing empirical studies and include a measure of firm size (the log of employment) and its squared term, which accounts for any non-linear relationship between firm performance and firm size, and a variable capturing the firm's age.[9] In addition to these variables we account for country- and sector-differences through the inclusion of sector-country interaction dummies. The basic estimating equation therefore is of the following form:

$$\ln Y_{ijk} = \beta_1 \ln EMP_{ijk} + \beta_2 \left(\ln EMP_{ijk}\right)^2 + \beta_3 AGE_{ijk} + \beta_4 EXP_{ijk} + \beta_5 FDI_{ijk} + \tau_{ij} + \varepsilon_{ijk} \qquad (1)$$

where Y is output per worker in firm k in industry i in country j, EMP is the number of employees, AGE is firm age in years, EXP is a dummy equal to one if the firm is an exporter (but doesn't have establishments abroad), FDI is a dummy variable taking the value one if the firm has establishments abroad (irrespective of whether it is an exporter or not), and τ_{ij} are sector-country fixed effects. This specification closely follows other studies testing the relationship between exporting, outward FDI and firm-level performance, such as Wagner (2011). In additional specifications however, we include additional firm-level variables, namely a measure of human capital (HK) and the log of the capital-labour ratio (KL) to test the robustness of the results obtained.

The above regression equation is estimated using standard OLS techniques, including sector-country fixed effects. In addition to OLS, we further report results from an alternative robust regression method. The reason for this is that in firm-level studies of this sort we may expect outliers. A number of robust regression methods have been developed to deal with this problem, such as the M-estimator of Huber (1964), the class of S-estimators of Rousseeuw and Yohai (1987) and the MM-estimators of Yohai (1987). In a panel context, Bramatia and Croux (2007) have proposed two robust estimators, namely the Within Groups Generalized M-estimator and the Within Groups MS-estimator. These both involve centring the data in a manner similar to

that used in the standard within-groups estimator, but centring by removing the median rather than the mean. Once centred a robust estimator is applied to deal with outlying observations. In this paper we follow a similar approach suggested by Verardi and Wagner (2012) which proceeds in three steps. The first step is to centre the variables, which in our case implies removing the sector-country specific median from each of our variables. In the second step we regress the centred dependent variable on the centred explanatory variables using the robust S-estimator. Using the residuals from this regression and the estimated standard error of the residuals, we then identify outlying observations by flagging those firms that have robust standardised residuals that are larger than 2. Finally, we run a standard regression model with sector-country fixed effects awarding a weight of zero to the outliers.

Regression techniques such as those above 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 or of outward FDI 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 (QR) methods, which estimate the parameters of the model at different points on the (conditional) productivity distribution.[10] The method thus allows one to estimate different parameters on the EXP and FDI dummies 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. A further benefit relates to the fact that median regression methods can be more efficient than mean regression estimators in the presence of heteroscedasticity. QR is also robust with regard to outlying observations in the dependent variable.[11] The QR 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. Finally, when the error term is non-normal, QR estimators may be more efficient than least squares estimators.

One problem with the use of QR methods arises when including a large number of fixed effects, such as in the case where we include sector-dummy fixed effects. 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 (i.e. sector-country fixed effects) 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 country 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 QR estimators, while Powell (2010) develops an unconditional QR estimator that allows for the inclusion of fixed effects. Both of these approaches are computationally intensive however. Recently, Canay (2011) has introduced an alternative method of estimating QR 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 for a standard panel with N cross-section units and T time periods:

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

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 no time dimension but does have country, sector and firm dimensions. In our analysis we account for sector-country fixed effects and so follow step 1 above to construct estimates for sector-country fixed effects and then use these to define the transformed dependent variable for use in step 2.

4. Results

We begin our comparison of firms that serve the domestic market only, that export, and that undertake outward FDI by conducting simple mean comparison tests for the full sample of firms and for the two sub-samples of manufacturing firms and services firms separately. To account for differences in our performance measure across sectors and countries we de-mean log productivity by constructing a variable equal to the logged value of productivity minus the mean of the logged value of productivity of all firms in the same country and sector. We also use this demeaning procedure when employing the non-parametric KS test below. Results from the comparison of means test are reported in Table 2, with DOM referring to domestically oriented firms and EXP and FDI as defined above. When considering the full sample of firms we observe

that there are significant differences in the mean values of productivity between all three types of firms, with the results supporting the productivity ordering of Helpman et al (2004). In particular, we find that mean productivity for exporters is larger than that for domestically oriented firms, but is significantly lower than the mean of productivity for firms undertaking outward FDI. This pattern is also observed when considering manufacturing firms only. When considering services firms however we observe that while exporting firms and firms undertaking outward FDI both perform better than domestically oriented firms there are no significant differences in productivity between exporting firms and firms undertaking outward FDI, though the mean value of productivity is somewhat larger for exporters.

<<Table 2 about here>>

While the results reported in Table 2 would seem to suggest that firms undertaking outward FDI and exporting perform better than domestically oriented firms, with firms undertaking outward FDI also performing better than exporters in the manufacturing sector the statistics only look at one moment of the distribution of the performance measures (i.e. the mean). The non-parametric KS test formally tests for significant differences between two distributions and we now turn to these results, which are reported in Table 3. In terms of significance we find that the results from the KS test are identical to those from the comparison of means test. In particular, we observe that there are significant differences in the productivity distributions of domestically oriented firms, exporters and firms undertaking outward FDI for both all firms and for manufacturing firms only (as indicated by the significant coefficients on the equality of the distributions). The table also indicates that the productivity distributions of both exporters and of firms undertaking outward FDI dominate those of domestically oriented firms, while the distribution of firms undertaking outward FDI dominates that of exporters for both the full sample and for manufacturing firms only. When considering services firms only we again find that the

distributions of both exporters and of firms undertaking outward FDI dominate that of domestically oriented firms but we find that there is no significant difference between the distributions of exporters and firms undertaking outward FDI.

<<Table 3 about here>>

Finally, we report results from regression analysis, which allows us to control for additional covariates that may help explain firm productivity. Table 4 reports OLS regression results for all firms, manufacturing firms only and services firms only. The first three columns of Table 4 report results from estimating the basic specification given by equation (1), with results for all firms, manufacturing firms only and services firms only reported. When considering all firms, we find a positive and significant coefficient on log employment and a negative and significant coefficient on the square of log employment. Such results are consistent with those found elsewhere in the literature. The coefficient on age is found to be positive, but not significant. Turning to our main coefficients of interest we find positive and significant coefficients on both the EXP and FDI variables, with the coefficient on FDI (0.942) being around 50% higher than that on EXP and the FDI premia being around 77% higher than that for EXP.[12] The two coefficients are not significantly different however. In the case of manufacturing we find coefficients on the control variables that are insignificant, but those of EXP and FDI are again positive and significant. The coefficient on FDI (1.142) is more than double the size of that on EXP (0.526) and there is a significant difference in the two coefficients. The control variables in the case of services firms display a similar pattern of coefficients to those for all firms, but the pattern of coefficients on EXP and FDI is somewhat different. In particular, the coefficient on EXP (0.688) is found to be larger than that for FDI (0.571), though not significantly so. These initial regression results thus support earlier results suggesting that the productivity ordering of

SSA firms supports the theory of Helpman et al (2004) for manufacturing, with the point estimates for services firms supporting those of Bhattacharya et al (2012).

The specification given by equation (1) is quite common in the literature, though parsimonious. The reason often given for such a parsimonious specification is that exporters or firms undertaking outward FDI are likely to differ from domestically-oriented firms in a number ways and controlling for these other firm characteristics in the regression specification may prevent one from obtaining a reliable estimate of the total exporter or outward FDI premium. For example, if exporters have higher capital-labour ratios, then controlling for the capital-labour ratio in the productivity equation may reduce the coefficient on the exporter dummy. Despite this, we test the robustness of our results by including measures of human capital and the capital-labour ratio in our regression model. The results are reported in the latter three columns of Table 4. The coefficients on the additional control variables display a similar pattern to those in the first three columns, though the coefficient on age is now negative (though not significant). The coefficients on the capital-labour ratio and the human capital term are both positive and significant, being somewhat larger for manufacturing firms. Coefficients on EXP and FDI are significantly reduced, as expected, though the pattern remains similar to that in the first three columns. In particular, the coefficient on FDI in the case of manufacturing firms is again twice as large as that for EXP, while the coefficient on EXP in the case of services is larger than that for FDI (which is no longer significant). None of the differences in the coefficients between EXP and FDI are significant however.

Table 5 reports a similar set of results using the fixed effects robust regression method of Verardi and Wagner (2012). While the size of the coefficients differs somewhat between tables 4 and 5, with the size of the coefficients on EXP and FDI in Table 5 being generally smaller than those in

Table 4, the overall pattern of results in terms of size and significance are very similar. In particular, the coefficient on FDI in manufacturing firms tends to be around double that of EXP, with the difference being significant when human capital and the capital-labour ratio are excluded from the regression. The coefficients on EXP in the case of services however are found to be larger than those on FDI, though the differences are, as in Table 4, never significant.

<<Tables 4 and 5 about here>>

Finally, we report results from the QR approach of Canay (2011). Rather than report results on our variables for specific quantiles in a table we report in figures 1-3 the coefficients on the EXP and FDI variables for all quantiles between the 10^{th} and 90^{th} quantiles when estimating equation (1). Figure 1 reports these coefficients in the case of all firms, with figures 2 and 3 reporting similar results for manufacturing firms only and services firms only respectively. Considering Figure 1 we observe that there is significant heterogeneity in the relationship between both EXP and FDI and productivity, and this is particularly the case for FDI. Coefficients on FDI tend to be relatively high at lower quantiles (i.e. for under-achievers; those whose labour productivity is low given values of the explanatory variables), fall as we move to higher quantiles and then increase again after the 50^{th} percentile. The figure also reveals that while there tends to be relatively large differences in coefficients on FDI and EXP at lower quantiles these differences tend to be much smaller at higher quantiles, though in most cases the coefficients are larger on FDI. A similar pattern is observed when we consider manufacturing firms (Figure 2), with the coefficient on FDI being much larger than that on EXP at lower quantiles, with the difference falling as we move to higher quantiles. Differences in the two coefficients tend to be more pronounced at lower quantiles in the case of manufacturing firms only however. A different pattern arises for services firms (Figure 3). Here firms undertaking FDI have a higher premium at

the lowest and highest quantiles, but exporting firms have the highest premium across much of the conditional productivity distribution. In particular, the coefficient on EXP is larger than that on FDI between the 20th and 80th percentiles, with the differences being pronounced between the 40th and 80th percentiles. Despite heterogeneity across quantiles therefore, the results are largely supportive of those when using OLS and robust regression. In particular, the results indicate that over a significant portion of the conditional productivity distribution, the premium from FDI exceeds that on EXP in the case of all and manufacturing firms, but that the reverse is the case in the case of services.

<<Figures 1-3 about here>>

5. Conclusions

In this paper we add to the small but growing literature that considers whether there is a relationship between the type of outward orientation a firm undertakes and firm performance. The current paper is the first to consider this issue for a sample of SSA countries and is the first that we are aware of to comprehensively distinguish between manufacturing and services firms in a developing country context, with the paper of Bhattacharya et al (2012) being the only other that we are aware of that does this for another developing countries. Results from a number of parametric and non-parametric tests for manufacturing industries are broadly consistent with the theory of Helpman et al (2004) and indicate that there is a clear productivity ordering with firms undertaking outward FDI performing best, followed by exporters with domestically oriented firms bringing up the rear. This is generally also the case when looking at quantiles of the conditional productivity distribution other than the mean, though the coefficients display a great deal of heterogeneity. The results for services firms are more nuanced and indicate that while exporters and firms undertaking outward FDI are more productive than domestically oriented firms there is no significant difference in productivity between these two types of firms. Despite

this, average productivity and point estimates from the regression analysis suggest that the productivity of exporting firms is larger than that for firms undertaking outward (albeit not significantly so), which provides partial support for the hypothesis of Bhattacharya et al (2012). Such results again hold across most quantiles, though the degree of heterogeneity across quantiles suggests that further work identifying the sources of such differences could be useful.

In future years as the UNIDO AIS develops it would be hoped that these issues will be examined in a panel setting for SSA, which will allow us to control for firm heterogeneity in a more appropriate manner and say something on the direction of causality between firm performance and the means of serving foreign markets. While the theories tested in this paper rely upon the assumption of self-selection, the result that firms that are outwardly oriented perform better than domestically oriented points to the policy conclusion that facilities and policies should be in place that help firms to enter foreign markets through either exporting or foreign investment (examples being the organisation of trade fairs and missions, and so on).

[1] A separate literature – largely at the aggregate level – has addressed the issue of whether exports and FDI are substitutes or complements (see for example Head and Ries, 2004).
[2] See also Bernard et al (2012) for a discussion of the literature on this issue.
[3] This dataset has been used elsewhere to consider different aspects of the relationship between firm performance and the way that a firm serves a foreign market in sub-Saharan Africa. Foster et al (2014) for example use this dataset to estimate the exporter and importer premium for manufacturing firms in SSA firms, with results indicating that two-way traders (i.e. simultaneous exporters and importers) perform better than exporters or importers only, which in turn perform better than non-trading firms.
[4] The data used in this paper are confidential, but not exclusive. In order to gain access to the data researchers will need to contact UNIDO and sign a confidentiality agreement. Once this agreement has been signed the authors would be happy to share the sample of data used in their analysis. The Stata programmes used to estimate all of the results in the paper are also available from the authors on request.
[5] Despite choosing a relatively low cutoff (10%) there remains the possibility that firms with some level of foreign ownership are more productive than firms with no foreign ownership, and that this may affect the results we obtain. Unfortunately, information on the exact share of foreign ownership for the sub-sample of domestically-owned firms is not available, meaning that we cannot examine whether there are differences in performance between firms with no foreign ownership and those with some – albeit small – level of foreign ownership.
[6] There are only 44 observations in the dataset that have a foreign subsidiary but that do not export (of which 31 are services firms). It is thus not possible to consider firms that undertake FDI but do not export as a separate category.
[7] As a robustness test, we further report results when using a measure of Total Factor Productivity. For reasons of brevity these results are not reported in the main text, but are available in an online appendix. In general, the results

using TFP are found to be qualitatively similar to those found using labour productivity as our measure of firm performance.

[8] 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.

[9] In his analysis Wagner (2011) includes employment and employment squared (alongside fixed effects) while Castellani and Zanfei (2007) includes variables capturing a firm's age and size (alongside sector and region fixed effects).

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

[11] Unlike the MM regression, QR protects only against vertical outliers, i.e. observations that are outlying in the y-dimension but not in the space of explanatory variables, and not bad leverage points, which are observations that are both outlying for the error term and the space of explanatory variables (Verardi and Croux, 2009).

[12] The premium is calculated from the estimated coefficients on the FDI and exporter dummy as $100(e^{\beta} - 1)$, where β is the estimated coefficient.

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Table 1: Mean and Median Values of Performance Indicators by Firm Type

	All firms	Domestically-oriented only	Exporters only	Outward FDI
All Firms				
Log Output per Worker	9.71 (9.76)	9.60 (9.66)	10.13 (10.08)	10.54 (10.56)
Log Output	13.25 (13.25)	13.0 (13.03)	14.36 (14.55)	14.51 (14.74)
Log TFP	5.94 (5.94)	5.89 (5.91)	6.01 (5.96)	6.76 (6.83)
Employment	93 (30)	78 (26)	162 (66)	138 (47)
Average Wages	5974.2 (2304.4)	5232.0 (2174.7)	9525.6 (2704.5)	8181.9 (4768.2)
Log Capital Stock	12.56 (12.67)	12.32 (12.40)	13.64 (13.73)	13.82 (13.86)
Manufacturing Firms				
Log Output per Worker	9.48 (9.53)	9.30 (9.38)	9.95 (9.95)	10.59 (10.55)
Log Output	13.12 (13.15)	12.72 (12.80)	14.29 (14.45)	14.82 (14.62)
Log TFP	5.64 (5.65)	5.54 (5.55)	5.88 (5.84)	6.57 (6.66)
Employment	98 (36)	68 (29)	178 (76)	193 (65)
Average Wages	5650.9 (1900.2)	4433.1 (1717.5)	9046.0 (2510.7)	9313.5 (4924.3)
Log Capital Stock	12.68 (12.83)	12.31 (12.47)	13.69 (13.85)	14.29 (14.28)
Services Firms				
Log Output per Worker	10.01 (10.08)	9.93 (10.01)	10.94 (11.06)	10.48 (10.59)
Log Output	13.40 (13.42)	13.30 (13.34)	14.66 (14.88)	14.17 (14.77)
Log TFP	6.50 (6.52)	6.45 (6.47)	7.24 (7.33)	7.08 (6.88)
Employment	89 (25)	89 (25)	93 (41)	78 (42)
Average Wages	6258.5 (2949.7)	6030.8 (3011.9)	11539.7 (3205.4)	7022.9 (3766.1)
Log Capital Stock	12.43 (12.42)	12.32 (12.33)	13.41 (13.17)	13.30 (13.66)

Note: The table reports the mean values of the performance indicators along with the median reported in brackets. All monetary values are expressed in US dollars.

Table 2: Comparison of Means Test – Demeaned Log Labour Productivity

Group 1 v Group 2	Mean for Group 1	Mean for Group 2	Alternative Hypothesis (p-value)		
			Unequal Means	Difference favourable to Group 1	Difference favourable to Group 2
All Firms					
DOM v EXP	-0.079	0.316	0.0000***	1.0000	0.0000***
DOM v FDI	-0.079	0.595	0.0000***	1.0000	0.0000***
EXP v FDI	0.316	0.595	0.0523*	0.9739	0.0261**
Manufacturing Firms					
DOM v EXP	-0.112	0.285	0.0000***	1.0000	0.0000***
DOM v FDI	-0.112	0.799	0.0000***	1.0000	0.0000***
EXP v FDI	0.285	0.799	0.0085***	0.9957	0.0043***
Services Firms					
DOM v *EXP*	-0.045	0.451	0.0008***	0.9996	0.0004***
DOM v FDI	-0.045	0.387	0.0412**	0.9794	0.0206**
EXP v FDI	0.451	0.387	0.7847	0.3923	0.6077

Notes: The means for the two groups are the mean values of log productivity for each group after subtracting the country-sector mean value of log productivity.

Table 3: KS Test

Group 1 v Group 2	Observations		Equality of Distribution		Differences favourable to group 1		Differences favourable to group 2	
	Group 1	Group 2	Statistic	p-value	Statistic	p-value	Statistic	p-value
All Firms								
Domestic v Exporter	2663	501	0.1214	0.000***	0.1214	0.000***	-0.0003	1.000
Domestic v FDI	2663	89	0.2589	0.000***	0.2589	0.000***	-0.0008	1.000
Exporter v FDI	501	89	0.1545	0.054*	0.1545	0.027**	-0.0085	0.989
Manufacturers								
Domestic v Exporter	1364	408	0.1269	0.000***	0.1269	0.000***	0.000	1.000
Domestic v FDI	1364	45	0.3582	0.000***	0.3582	0.000***	0.000	1.000
Exporter v FDI	408	45	0.2703	0.005***	0.2703	0.003***	-0.0025	1.000
Services								
Domestic v Exporter	1299	93	0.2425	0.000***	0.2425	0.000***	-0.0131	0.971
Domestic v FDI	1299	44	0.2339	0.019**	0.2339	0.010**	-0.0096	0.992
Exporter v FDI	93	44	0.1559	0.462	0.1026	0.533	-0.1559	0.234

Notes: The KS tests are run on the demeaned values of log productivity, with the variable of interest being the mean values of log productivity for each group after subtracting the country-sector mean value of log productivity.

Table 4: OLS Regression Results

	All	Manufacturing	Services	All	Manufacturing	Services
$\ln EMP$	0.310**	0.124	0.594***	0.306***	0.190	0.547***
	(0.122)	(0.147)	(0.187)	(0.109)	(0.120)	(0.182)
$\ln EMP^2$	-0.0394**	-0.000341	-0.0946***	-0.0344**	-0.00709	-0.0817***
	(0.0160)	(0.0177)	(0.0254)	(0.0141)	(0.0140)	(0.0245)
AGE	0.00206	0.000324	0.00326	-0.00123	-0.000725	-0.00279
	(0.00208)	(0.00221)	(0.00391)	(0.00196)	(0.00205)	(0.00378)
K/L				0.372***	0.403***	0.324***
				(0.0199)	(0.0249)	(0.0310)
HK				0.00607***	0.00677***	0.00557***
				(0.00119)	(0.00175)	(0.00163)
EXP	0.633***	0.526***	0.688***	0.395***	0.303***	0.416**
	(0.0944)	(0.111)	(0.175)	(0.0903)	(0.106)	(0.171)
FDI	0.942***	1.142***	0.571**	0.517***	0.600***	0.279
	(0.186)	(0.234)	(0.291)	(0.172)	(0.218)	(0.276)
$H_0: EXP = FDI$	2.62	7.06***	0.13	0.48	1.92	0.21
EXP premia (%)	88.33	69.22	98.97	48.44	35.39	51.59
FDI premia (%)	156.51	213.30	77.00	67.70	82.21	32.18
Observations	3,227	1,807	1,420	3,012	1,689	1,323
F-Statistic	3.01***	3.10***	2.66***	4.90***	5.38***	4.13***
R-squared	0.371	0.342	0.389	0.505	0.490	0.512

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; All regressions include unreported sector-country fixed effects.

Table 5: Fixed Effects Robust Regression Results

	All	Manufacturing	Services	All	Manufacturing	Services
$\ln EMP$	0.348***	0.182	0.576***	0.291***	0.149	0.563***
	(0.116)	(0.132)	(0.180)	(0.0977)	(0.106)	(0.159)
$\ln EMP^2$	-0.0425***	-0.00647	-0.0886***	-0.0314**	-0.00248	-0.0807***
	(0.0152)	(0.0160)	(0.0246)	(0.0128)	(0.0125)	(0.0220)
AGE	0.00228	0.000639	0.00309	-0.000164	0.00110	-0.00265
	(0.00195)	(0.00207)	(0.00368)	(0.00182)	(0.00195)	(0.00348)
K/L				0.380***	0.404***	0.329***
				(0.0181)	(0.0225)	(0.0288)
HK				0.00619***	0.00743***	0.00530***
				(0.00109)	(0.00170)	(0.00146)
EXP	0.547***	0.447***	0.648***	0.311***	0.212**	0.352**
	(0.0885)	(0.102)	(0.171)	(0.0825)	(0.0946)	(0.161)
FDI	0.726***	1.009***	0.357	0.370**	0.422**	0.173
	(0.164)	(0.207)	(0.259)	(0.156)	(0.181)	(0.267)
$H_0: EXP = FDI$	1.11	7.55***	1.00	0.14	1.38	0.38
EXP premia (%)	72.81	56.36	91.17	36.48	23.61	42.19
FDI premia (%)	106.68	174.29	42.90	44.77	52.50	18.89
Observations	3,167	1,769	1,394	2,952	1,655	1,298
F-Statistic	3.63***	3.65***	3.26***	5.86***	6.28***	4.98***
R-squared	0.421	0.385	0.444	0.554	0.535	0.563

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; All regressions include unreported sector-country fixed effects.

Figure 1: Quantile Results for All Firms

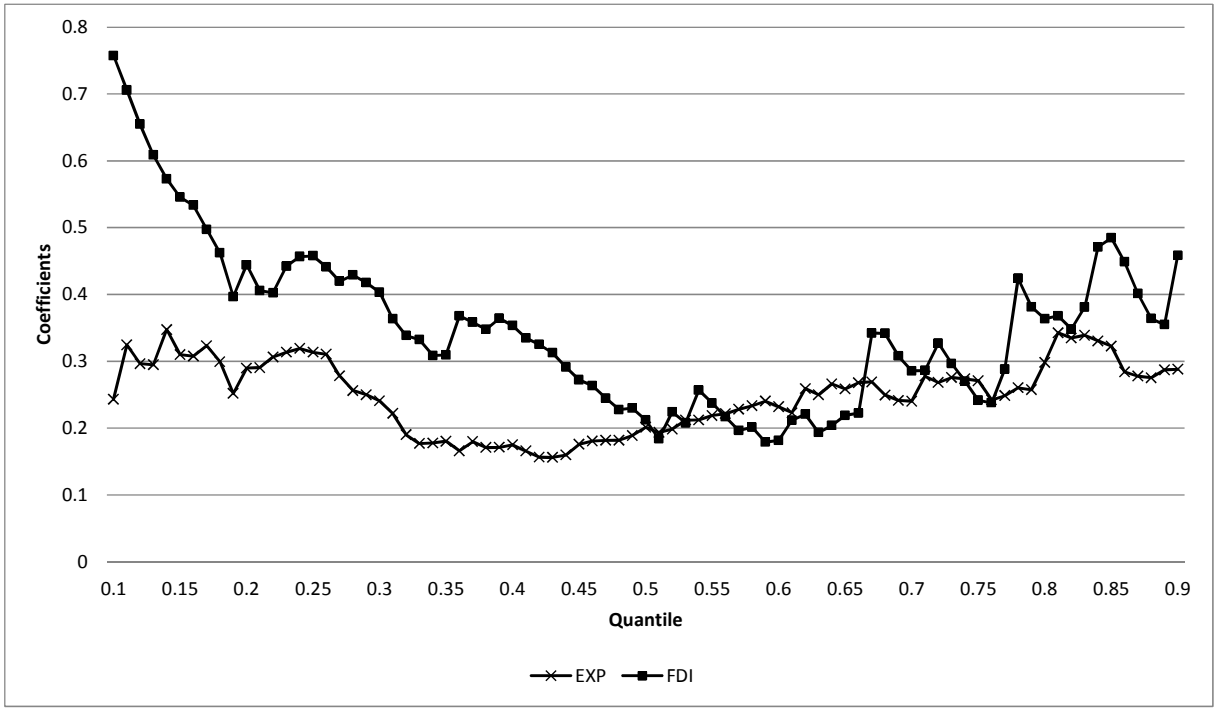


Figure 2: Quantile Results for Manufacturing Firms Only

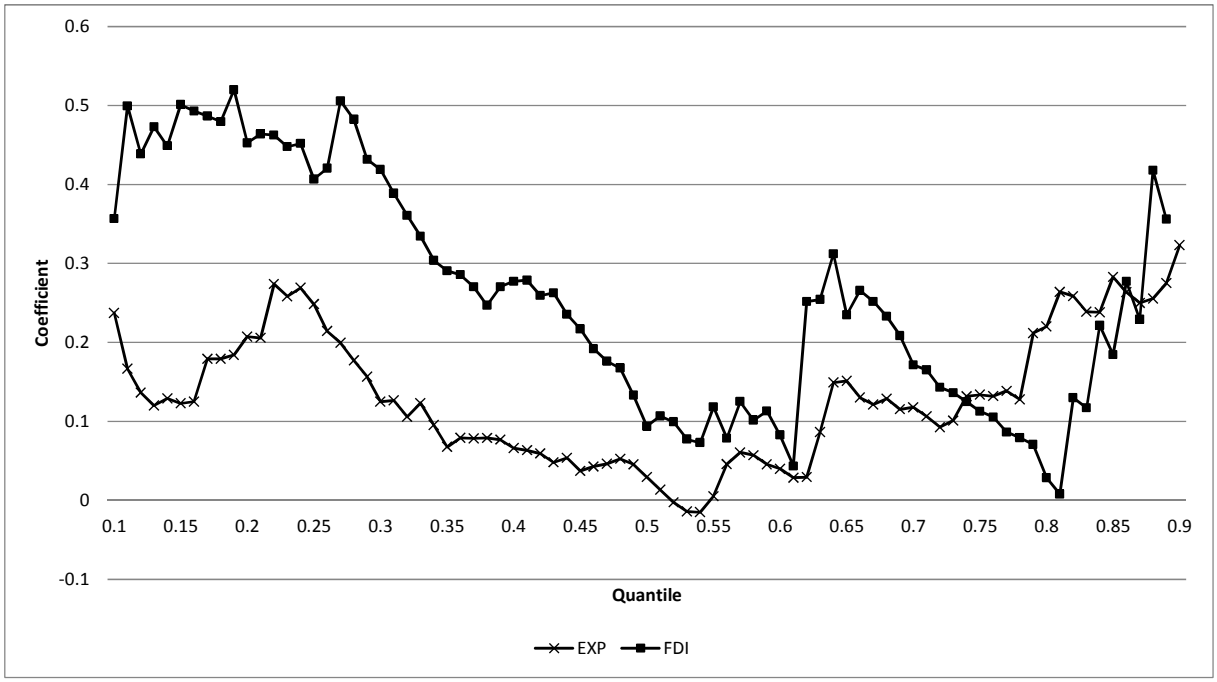
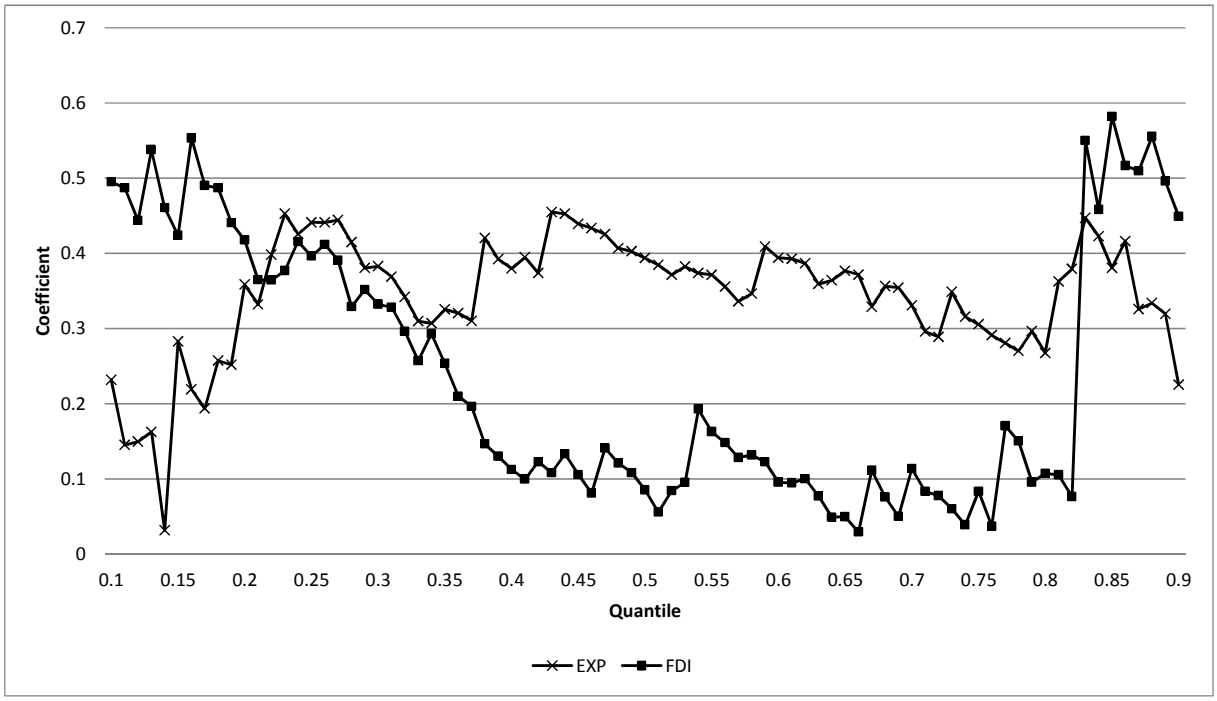


Figure 3: Quantile Results for Services Firms Only



ONLINE APPENDIX

Appendix A: Variable Definitions and Descriptive Statistics

Table A1: Variable Definitions

Variable	Description
Log Output per Worker	The log of the ratio of output to the total number of employees
Log Output	The log of sales plus the change in the stock of final goods minus sales of good bought for resale
Log TFP	TFP is estimated by assuming a constant capital share of one third, i.e. $TFP = VA \,/\, (EMP^{2/3} FA^{1/3})$, where VA is value-added, EMP refers to total employment and FA to total fixed assets.
Employment	Total number of employees
$\ln EMP$	The log of the total number of employees
Average Wages	Ratio of the wage bill to total employment
Log Capital Stock	The log value of total fixed assets
AGE	Age of the firm in years
K/L	The log of the ratio of total fixed assets to total employment
HK	Defined as the ratio of technical, administrative and sales workers in total employment.
EXP	Dummy variable taking the value one if the firm exports any of its output
FDI	Dummy variable taking the value one if the firm has undertaken outward FDI

Notes: All monetary values are expressed in US dollars.

Table A2: Breakdown of Firms by Country

Country	No. of Firms (% of Total)	Manufacturing (Services) Firms	Manufacturing Firms		Services Firms	
			Exporters	FDI	Exporters	FDI
Burkina Faso	70 (2.15)	31 (39)	13	0	2	2
Burundi	100 (3.07)	28 (72)	8	0	4	2
Cameroon	100 (3.07)	44 (56)	11	4	3	2
Cape Verde	236 (7.25)	67 (169)	6	1	6	0
Ethiopia	365 (11.22)	285 (80)	48	0	7	1
Ghana	196 (6.02)	138 (58)	27	4	6	0
Kenya	275 (8.45)	133 (142)	68	11	20	11
Lesotho	79 (2.43)	30 (49)	10	1	1	1
Madagascar	95 (2.92)	49 (46)	27	1	5	0
Malawi	69 (2.12)	46 (23)	12	2	1	0
Mali	172 (5.29)	103 (69)	9	7	3	8
Mozambique	126 (3.87)	53 (73)	2	0	2	0
Niger	52 (1.6)	24 (28)	3	1	0	1
Nigeria	358 (11.0)	256 (102)	27	3	2	0
Rwanda	81 (2.49)	54 (27)	16	0	1	3
Senegal	136 (4.18)	57 (79)	24	1	7	4
Tanzania	239 (7.34)	163 (76)	40	2	3	1
Uganda	331 (10.17)	159 (172)	37	5	11	8
Zambia	174 (5.35)	97 (77)	20	2	9	0
Total	3,254 (100)	1,817 (1,437)	408	45	93	44

Table A3: Breakdown of Firms by Sector

Sector	No. of Firms (% of Total)	Exporting (FDI) Firms
Manufacture of food products and beverages	416 (12.78)	101 (9)
Manufacture of tobacco products	4 (0.12)	2 (0)
Manufacture of textiles	72 (2.21)	29 (1)
Manufacture of wearing apparel; dressing and dyeing of fur	99 (3.04)	29 (2)
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	58 (1.78)	38 (0)
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	90 (2.77)	22 (2)
Manufacture of paper and paper products	56 (1.72)	14 (2)
Publishing, printing and reproduction of recorded media	197 (6.05)	21 (3)
Manufacture of coke, refined petroleum products and nuclear fuel	3 (0.09)	0 (0)
Manufacture of chemicals and chemical products	140 (4.3)	33 (10)
Manufacture of rubber and plastics products	133 (4.09)	36 (3)
Manufacture of other non-metallic mineral products	98 (3.01)	5 (1)
Manufacture of basic metals	36 (1.11)	10 (0)
Manufacture of fabricated metal products, except machinery and equipment	193 (5.93)	22 (2)
Manufacture of machinery and equipment n.e.c.	52 (1.6)	12 (3)
Manufacture of electrical machinery and apparatus n.e.c.	21 (0.65)	4 (2)
Manufacture of radio, television and communication equipment and apparatus	1 (0.03)	0 (0)
Manufacture of medical, precision and optical instruments, watches and clocks	9 (0.28)	2 (1)
Manufacture of motor vehicles, trailers and semi-trailers	16 (0.49)	2 (2)
Manufacture of other transport equipment	7 (0.22)	3 (0)
Manufacture of furniture; manufacturing n.e.c.	112 (3.44)	21 (2)
Recycling	4 (0.12)	2 (0)
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	133 (4.09)	7 (3)
Wholesale trade and commission trade, except of motor vehicles and motorcycles	209 (6.42)	30 (10)
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	224 (6.88)	17 (4)
Hotels and restaurants	195 (5.99)	2 (3)
Land transport; transport via pipelines	98 (3.01)	7 (8)
Water transport	7 (0.22)	1 (0)
Air transport	8 (0.25)	3 (0)
Supporting and auxiliary transport activities; activities of travel agencies	61 (1.87)	6 (0)
Post and telecommunications	37 (1.14)	0 (3)
Financial intermediation, except insurance and pension funding	83 (2.55)	2 (1)
Insurance and pension funding, except compulsory social security	47 (1.44)	2 (4)
Activities auxiliary to financial intermediation	15 (0.46)	0 (1)
Real estate activities	40 (1.23)	0 (0)
Renting of machinery and equipment without operator and of personal and household goods	9 (0.28)	1 (0)
Computer and related activities	23 (0.71)	3 (0)
Research and development	1 (0.03)	0 (0)
Other business activities	174 (5.35)	9 (5)
Public administration and defence; compulsory social security	4 (0.12)	1 (0)
Education	13 (0.4)	0 (0)
Heath and social work	8 (0.25)	0 (0)
Sewage and refuse disposal, sanitation and similar activities	29 (0.89)	2 (0)
Recreational, cultural and sporting activities	12 (0.37)	0 (2)
Other service activities	6 (0.18)	0 (0)
Activities of private households as employers of domestic staff	1 (0.03)	0 (0)
Total	3,254 (100)	501 (89)

Appendix B: Additional Material

Total Factor Productivity (TFP) as a Measure of Firm-Level Performance

In addition to the measure of labour productivity used in the main text we also report as a robustness test results when using a measure of TFP as our indicator of firm-level performance. TFP is estimated by assuming a constant capital share of one third. In particular, TFP is defined as: $TFP = VA \,/\, (EMP^{2/3} FA^{1/3})$, where VA is value-added, EMP refers to total employment and FA to total fixed assets.

We saw in Table 1 of the main text that the pattern of the mean and median values of TFP largely followed those for labour productivity. In particular, the mean and median values of TFP were found to be highest for firms undertaking outward FDI and lowest for firms serving the domestic market only in the case of all firms and manufacturing firms only, and were found to be highest for exporters only and lowest for firms serving the domestic market only in the case of services firms. In this additional section we report results from the regression analysis when replacing the log of labour productivity with the log of TFP. Tables B1 and B2 report OLS and fixed effects robust regression results when using TFP as the dependent variable. Coefficients on the additional control variables in both tables tend to be insignificant, though there is some indication of a positive impact of age in the manufacturing sector when using robust regression. In both tables there is also some indication of a positive and significant coefficient on the measure of human capital, suggesting (unsurprisingly) that the simple definition of TFP used doesn't account for differences in human capital use across firms. Turning to our main variables of interest we find a pattern that is very similar to that when using labour productivity. In particular, the coefficients on FDI tend to be larger than those on EXP when considering all firms and manufacturing firms only, while the reverse is the case when considering services firms

only. Despite these differences in point estimates there are no significant differences in the coefficients.

Table B1: OLS results for TFP

	All	Manufacturing	Services	All	Manufacturing	Services
$\ln EMP$	-0.0266	-0.0957	0.117	0.0921	0.0642	0.192
	(0.139)	(0.156)	(0.245)	(0.143)	(0.153)	(0.269)
$\ln EMP^2$	9.49e-05	0.0194	-0.0343	-0.0101	0.00544	-0.0420
	(0.0170)	(0.0190)	(0.0298)	(0.0175)	(0.0187)	(0.0327)
AGE	0.00256	0.00283	-0.00104	0.00166	0.00251	-0.00315
	(0.00229)	(0.00255)	(0.00436)	(0.00235)	(0.00256)	(0.00466)
K/L				0.0437	0.0408	0.0146
				(0.0266)	(0.0346)	(0.0435)
HK				0.00589***	0.00821***	0.00341
				(0.00151)	(0.00209)	(0.00225)
EXP	0.499***	0.382***	0.885***	0.414***	0.300**	0.758**
	(0.113)	(0.123)	(0.312)	(0.117)	(0.125)	(0.328)
FDI	0.672***	0.759**	0.354	0.602***	0.648**	0.342
	(0.219)	(0.320)	(0.226)	(0.224)	(0.322)	(0.232)
$H_0: EXP = FDI$	0.56	1.40	2.07	0.65	1.20	1.20
EXP premia (%)	64.71	46.52	142.30	51.29	34.99	113.40
FDI premia (%)	95.81	113.61	42.48	82.58	91.17	40.78
Observations	2,294	1,508	786	2,220	1,462	758
F-Statistic	2.44***	1.79***	2.29***	2.47***	1.88***	2.28***
R-squared	0.369	0.256	0.446	0.378	0.274	0.452

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; All regressions include unreported sector-country fixed effects.

Table B2: Fixed Effects Robust Regression results for TFP

	All	Manufacturing	Services	All	Manufacturing	Services
$\ln EMP$	-0.0384	-0.150	0.149	0.0788	0.0239	0.274
	(0.126)	(0.140)	(0.201)	(0.122)	(0.133)	(0.202)
$\ln EMP^2$	0.00344	0.0272	-0.0337	-0.00781	0.0112	-0.0480*
	(0.0157)	(0.0173)	(0.0252)	(0.0152)	(0.0165)	(0.0255)
AGE	0.00410*	0.00510**	-0.00141	0.00344	0.00473*	-0.00349
	(0.00218)	(0.00244)	(0.00399)	(0.00223)	(0.00244)	(0.00414)
K/L				0.0492*	0.0465	0.0140
				(0.0251)	(0.0329)	(0.0405)
HK				0.00621***	0.00872***	0.00365*
				(0.00140)	(0.00201)	(0.00194)
EXP	0.347***	0.232**	0.858***	0.311***	0.158	0.581**
	(0.0995)	(0.108)	(0.288)	(0.103)	(0.109)	(0.285)
FDI	0.453***	0.363	0.436**	0.382**	0.237	0.401*
	(0.174)	(0.247)	(0.214)	(0.177)	(0.247)	(0.213)
$H_0: EXP = FDI$	0.32	0.27	1.49	0.14	0.10	0.28
EXP premia (%)	41.48	26.11	135.84	36.48	17.12	78.78
FDI premia (%)	57.30	43.76	54.65	46.52	26.74	49.33
Observations	2,232	1,469	761	2,162	1,427	734
F-Statistic	3.03***	2.17***	3.04***	3.07***	2.28***	3.04***
R-squared	0.429	0.301	0.527	0.439	0.320	0.535

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; All regressions include unreported sector-country fixed effects.

Figures B1-B3 report QR results when using TFP as dependent variable. Once again, results are largely similar to those in the main text when using a measure of labour productivity as our dependent variable. In the case of all firms (Figure B1) coefficients on FDI tend to be larger than those on EXP, though these differences are often quite small. For manufacturing firms only (Figure B2) coefficients on FDI are generally larger than those on EXP, with the differences being relatively large (i.e. often three times larger or more) except at the highest quantiles. The coefficient on EXP in this case is generally small and usually insignificantly different from zero. Finally, in the case of services firms only (Figure B3) the coefficient on EXP is usually larger than that on FDI. In this case the coefficients on FDI begin relatively high, but tend to become smaller, being insignificant at various points on the conditional distribution and actually negative at the highest quantiles. Overall, the results when using TFP as our dependent variable are qualitatively similar to those when using labour productivity. The results suggest that the productivity ordering hypothesised by Helpman et al (2004) holds in the case of manufacturing, with that of Bhattacharya et al (2012) holding in the case of services.

Figure B1: Quantile Results for TFP (All Firms)

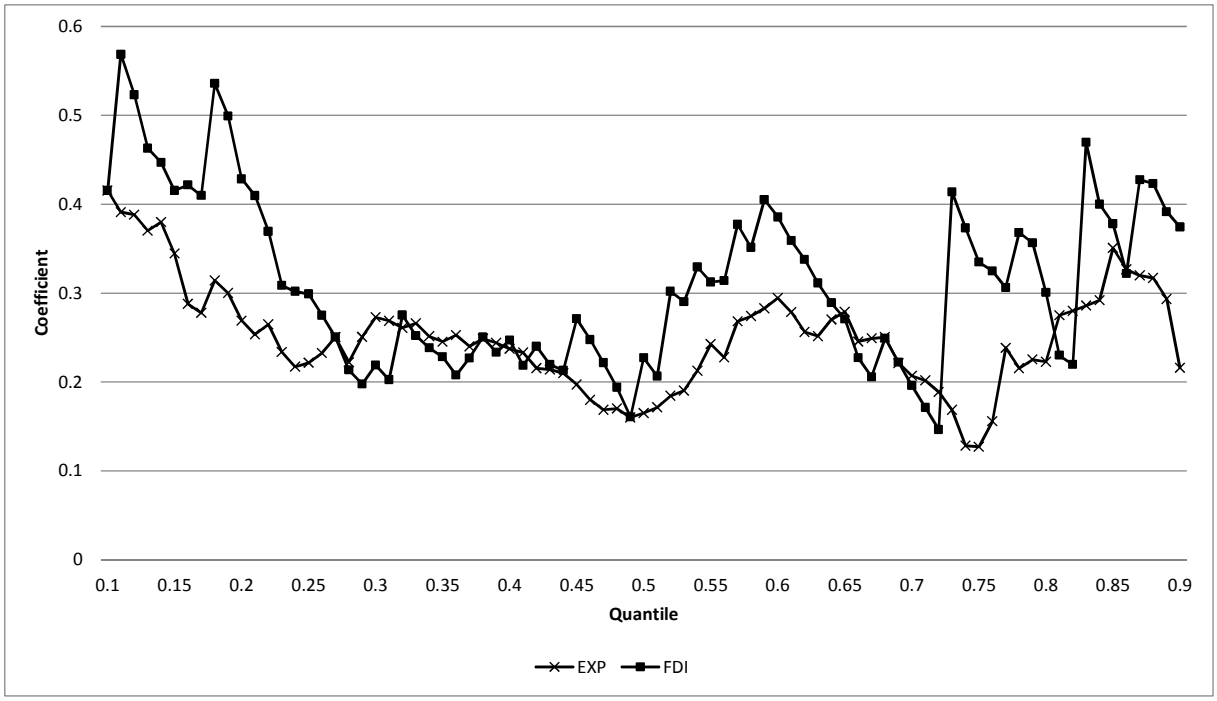


Figure B2: Quantile Results for TFP (Manufacturing Firms)

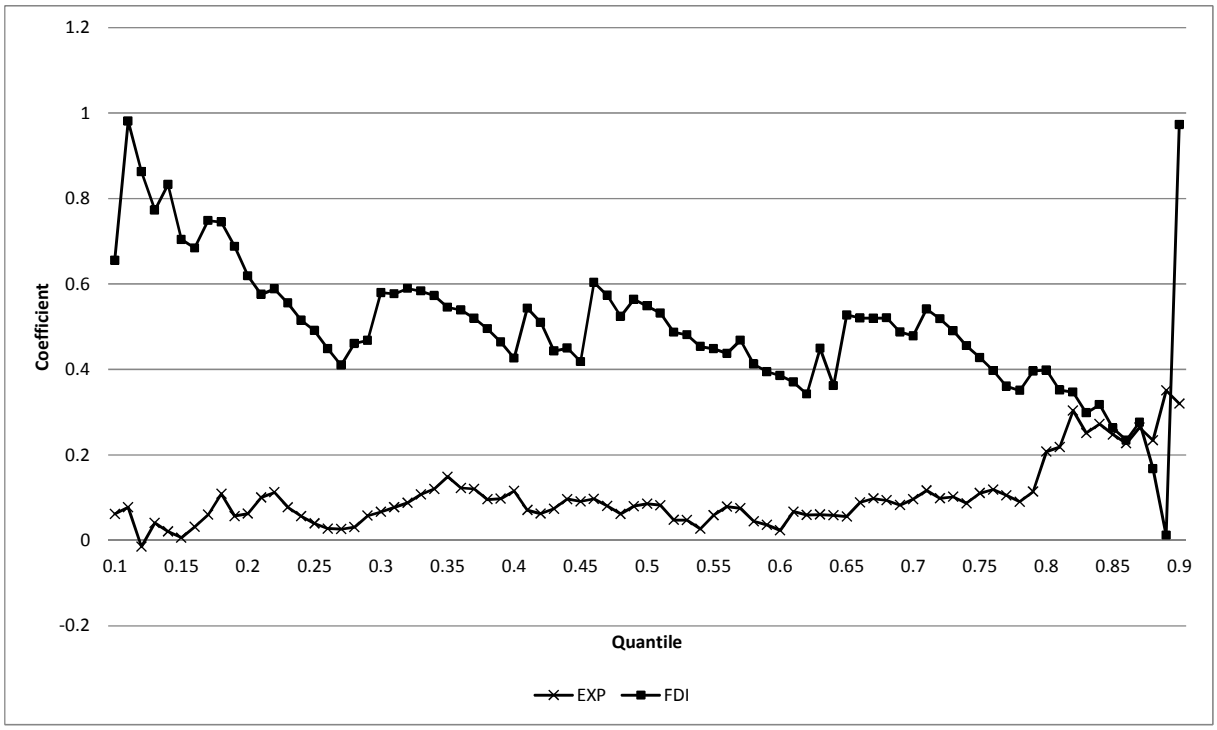


Figure B3: Quantile Results for TFP (Services Firms)