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Exchange Rates and Exports: Evidence from Manufacturing Firms in the UK

by

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Abstract

Our focus is the effects of exchange rate movements on firm decisions on export market entry and exit and export intensity. The analysis breaks down export adjustments between changes in export share by existing exporters and changes due to entry to and exit from export markets. Using data on a large sample of UK manufacturing firms, we find that exchange rate movements have little effect on firm's export participation and exit decisions. However, they do have a significant impact on export shares after entry. The responsiveness of the export share to exchange rate changes is not quantitatively small: one index point depreciation in the REER index will increase export share by about 1.28 percent. We also investigate the effects of exchange rate movements on the export behavior of multinationals, and find their export behavior is less likely to be affected by exchange rate changes than that of indigenous firms.

JEL classification: F23, F31, F36

Keywords: Exchange rate movements, export share, multinational firms

Outline

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Non-Technical Summary

When a firm invests in international markets, it faces new potential shocks including exchange rate fluctuations. Nominal and real exchange rates have fluctuated significantly since the early 1970s following the breakdown of the Bretton Woods System and greater volatility has led to increased interest in the effects of exchange rate movements on international trade. Over the past thirty years, there have been a large number of studies focusing on aggregate relationships between exchange rate variability and trade. Although many researchers and policy makers believe that exchange rate volatility has a negative impact on the level of trade, early empirical work did not yield consistent results: reporting little or no significant evidence for a negative effect. Recent empirical work adopting a gravity approach has found some evidence of a negative relationship. Most recently, a few papers have used firm level micro data to examine the relationship between exchange rate movements and the export behavior of firms. Evidence from this micro data is also ambiguous.

This paper uses firm-level data from a sample of UK manufacturing firms to investigate the effects of exchange rate changes on firms' export behaviour. It adds to the existing literature in three respects. First, it offers the first analysis of exchange rate movements and exports for a large panel of UK firms. Since the UK is the fifth largest exporter of merchandise globally, it is clearly a nontrivial case to investigate. Second, it applies an econometric technique that separately estimates the exchange rate effects on firms' decisions on export markets entry and the intensity of their exports (the share of exports in total sales) after entry. Third, we investigate whether ownership, as between foreign and domestic, matters, which among other things offers a new way of examining the export behaviour of multinationals in response to exchange rate variability. According to the standard textbooks of international business MNEs can internalise currency risk in many ways, and may be less affected by exchange rate movements. However, to our knowledge, there is no evidence on this issue so far.

Our results provide strong evidence for the presence of sunk costs in export markets. Although exchange rates have little effect on firm decisions to enter and exit, they significantly affect export shares. A one percentage point appreciation of the exchange rate causes a 1.28 percent reduction in export share. We find that exchange rate movements have little impact on export behaviour of multinationals, but a significant impact on indigenous firms. This difference between domestic and multinational firms offers one possible explanation for the mixed evidence of an effect from exchange rates at the macro level.

1. Introduction

When a firm invests in international markets, it faces new potential shocks including exchange rate fluctuations. Nominal and real exchange rates have fluctuated significantly since the early 1970s following the breakdown of the Bretton Woods System and greater volatility has led to increased interest in the effects of exchange rate movements on international trade. Over the past thirty years, there have been a large number of studies focusing on aggregate relationships between exchange rate variability and trade. Although many researchers and policy makers believe that exchange rate volatility has a negative impact on the level of trade, early empirical work (such as IMF 1984 and McKenzie 1999 for a survey) did not yield consistent results: reporting little or no significant evidence for a negative effect. Recent empirical work adopting a gravity approach has found some evidence of a negative relationship.[1] Most recently, a few papers (such as Campa 2004 and Bernard and Jensen 2004a) have used firm level micro data to examine the relationship between exchange rate movements and the export behavior of firms. Evidence from this micro data is also ambiguous.

Some theoretical work explores the effects of exchange rate changes on firm export decisions. As pointed out in Campa (2004), these models assume a sunk entry cost must be paid when a firm enters international markets. Baldwin (1988) introduced the idea that large enough temporary exchange rate fluctuations can have hysteresis effects on trade prices and quantities when market-entry costs are sunk, which generates a gap between a firm's entry and exit conditions.[2] That gap is crucial to hysteresis. Baldwin and Krugman (1989) further formalize and extend the idea of hysteresis effects.

Dixit (1989) and Krugman (1989) model investment decisions under uncertainty in an "option" approach. One of the model's applications is foreign trade under exchange rate uncertainty. An exporting firm is regarded as owning an option to leave the export market, and a non-exporter has an option to enter. The cost of exercising the option is considered when a firm decides to enter or exit. Since the value of the option increases with uncertainty, the gap between the

[1] See, for example, Frankel and Wei (1993), Wei (1999), Dell' Ariccia (1999), Rose (2000), and Tenryro (2003). See Clark et al (2004) for a survey.
[2] A firm's entry condition is that its expected profits from exporting exceed the sunk entry cost. The firm will exit when its expected profits is sufficiently negative.

trigger points for entry and exit increases with the degree of uncertainty. These gaps produce hysteresis which increases with exchange rate volatility.

This paper uses firm-level data from a sample of UK manufacturing firms to investigate the effects of exchange rate changes on firms' export behavior. It adds to the existing literature in three respects. First, it offers the first analysis of exchange rate movements and exports for a large panel of UK firms. Since the UK is the fifth largest exporter of merchandise globally, it is clearly a nontrivial case to investigate. Second, it applies a sample selection model which separately estimates the exchange rate effects on firms' decisions on export markets entry and their decision on export shares after entry (the extensive and intensive margins of trade). Third, we investigate whether ownership (as between foreign and domestic) matters, which among other things offers a new way of examining the export behavior of multinationals in response to exchange rate variability. According to the standard textbooks of international business such as Hill (2005) and Rugman and Collinson (2006), MNEs can internalise currency risk in many ways, and may be less affected by exchange rate movements. However, to our knowledge, there is no evidence on this issue so far.

The exchange rates we use are 3-digit industry specific real effective exchange rate (REER) indices from 1988 to 2004. Our dataset merges the Financial Analysis Made Easy (FAME) database with data from OneSource. The resulting dataset is the most comprehensive manufacturing firm level dataset among recent studies on export behavior of UK manufacturing firms. Our results provide strong evidence for the presence of sunk costs in export markets. Although exchange rates have little effect on firm decisions to enter and exit, they significantly affect export shares. A one percentage point appreciation of the industry specific REER causes a 1.28 percent reduction in export share. We find that exchange rate movements have little impact on export behavior of multinationals, but a significant impact on indigenous firms. This difference between domestic and multinational firms offers one possible explanation for the mixed evidence of an effect from exchange rates at the macro level.

The remainder of the paper is organized as follows. The next section presents the theoretical and empirical background. Section 3 deals with some estimation and econometric issues.

Section 4 introduces our method for computing industry specific REERs. Section 5 presents the firm level data and sample used to estimate the model. Section 6 reports our empirical findings. Finally, Section 7 concludes.

2. Economic Background

2.1 Theoretical background

To motivate our microeconometric analysis, we first model firm export entry decision. As noted before, sunk costs are vital to this. We characterize sunk costs using the dynamic setting introduced by Roberts and Tybout (1997), Bernard and Wagner (2001), Bugamelli and Infante (2003), Greenaway, Guariglia and Kneller (2005) and Das, Roberts and Tybout (2004). The firm's payoffs from exporting are as follows:

$$u(.) = \begin{cases} \pi_{it}(e_{it}, c_{it}, y_t) + \varepsilon_{it} & for \quad incumbent \\ \pi_{it}(e_{it}, c_{it}, y_t) - F + \varepsilon_{it} & for \quad entrant \\ 0 & for \quad non-exporter \end{cases}$$

where F denotes sunk costs; π_{it} is profits from export markets, in excess of those from the domestic market, which depends on the exchange rate (e_{it}), production costs (c_{it}), foreign demand (y_t), and a serially uncorrelated error term (ε_{it}).

The Bellman equation for the optimal pattern of export market participation is:

$$\begin{aligned} V(e_{it}, c_{it}, y_t, \varepsilon_{it}, EXP_{i(t-1)}) = \underset{EXP_{it} \in \{0,1\}}{MAX} \{ & \pi_{it}(e_{it,} c_{it}, y_t) - (1-EXP_{i(t-1)})F \\ & + \delta E_t V(e_{i(t+1)}, c_{i(t+1)}, y_{t+1}, \varepsilon_{i(t+1)}, EXP_{it}) \} \end{aligned} \qquad (1)$$

where EXP_{it} is a dummy variable for firm's export status, which is 1 if firm i exports in year t, and 0 otherwise; δ is the one-period discount rate.

To maximize its expected profit, the firm will export when:

$$\begin{aligned} \pi_{it}(e_{it,} c_{it}, y_t) + \delta \{ & E_t V(e_{i(t+1)}, c_{i(t+1)}, y_{t+1}, \varepsilon_{i(t+1)}, EXP_{it}/EXP_{it}=1) \\ & - E_t V(e_{i(t+1)}, c_{i(t+1)}, y_{t+1}, \varepsilon_{i(t+1)}, EXP_{it}/EXP_{it}=0) \} + \varepsilon_{it} > (1-EXP_{i(t-1)})F \end{aligned} \qquad (2)$$

A reduced-form approximation generates the dynamic binary choice of export market participation, where X_{it} are observable firm characteristics:

$$EXP_{it} = 1 \quad \text{if } \beta X_{it} + \theta e_{it} + \lambda EXP_{i(t-1)} + v_i + v_t + u_{it} > 0 \qquad (3)$$
$$= 0 \quad \text{otherwise}$$

Following Bernard and Wagner (2001), Das, Robert and Tybout (2004), and Greenaway, Guariglia and Kneller (2005), sunk costs are taken into account by adding the firm's lagged export status. A positive and significant λ implies the presence of sunk costs and the persistence of firm export behavior. A significant θ indicates the effects of exchange rates on firm's export entry decision.

We now turn to the firm's export share decision, conditional on the firm being an exporter. The firm chooses its export share to maximize expected profits from exporting. As an existing exporter, we assume the current export share has no effect on future export share decision.[3] So the share decision is static and depends on observable firm characteristics and exchange rates. The firm will choose the export share ρ that maximizes

$$MAX_{\rho}\, \pi_{it}(\rho_{it} \mid \rho_{it}, EXP_{it} = 1) \qquad (4)$$

We follow Campa (2004) and model the export share function conditional on being an exporter as the following reduced form:

$$\rho_i = \alpha_1 X_{it} + \alpha_2 e_{it} + w_{it} \qquad (5)$$

α_2 indicates the effects of exchange rates on firm's export share decision.

There is little systematic theoretical literature exploring the impacts of exchange rate movements on export behavior of multinationals. Clark et al (2004) briefly summarizes papers on the offsetting effects for multinationals, such as Cushman (1983), Clark (1973) and Makin (1978). More systematic explanation of this issue can be found in standard textbooks of international business, where an MNE can internalize exchange rates fluctuations and minimize the negative effects of exchange rate movements in a number of ways, such as internalising its foreign exchange transactions across the countries; internalising investment

[3] As pointed out in Campa (2004), due to some real rigidity such as to maintain market share as a favorable objective, there may be the presence of hysteresis on the quantity and export share of export. Froot and Klemperer (1989) provide an example. However, we regard the export share decision as static in this paper.

flows; varying the speed of payments; more opportunities to hedging currency risk by holding a portfolio of assets and liabilities in different currencies.

To understand the impact of exchange rate on the export behavior of different types of MNE, we need to investigate further whether there are differences in exchange rate exposure for different types of MNE, as well as differences in methods available to different MNEs. Received wisdom is that there are three types of exchange rate exposure: Transaction Exposure, most of which is short term;[4] Translation Exposure;[5] and Economic Exposure, which is the extent to which a firm's future international earning power is affected by changes in exchange rates. Translation exposure is the least important of the three. There are a number of strategies available to reduce exposure: hedging in forward markets, leading and lagging payables and receivables, transfer pricing, diversification. Some strategies such as hedging and diversification are available to most MNEs; others may be different for different type of firms.

2.2 Empirical background

We first review evidence from aggregate data examining the relationship between exchange rate volatility and trade.[6] In general, early work provides little or no evidence of a negative effect of aggregate exchange rate volatility on aggregate trade. Hooper, Johnson, and Marquez (2000), and Thursby and Thursby (1987) regress the change in log export volumes on the change in log exchange rates, and find the exchange rate coefficient is insignificant. Some studies on bilateral trade find some, but not robust, evidence for a negative effect. Recent studies employing gravity models such as Dell' Ariccia (1999) and Anderton and Skudelny (2001) find a negative link, but the effects are not dramatic: complete elimination of volatility would raise trade by a maximum of 15 percent. Rose (2000) finds a significant negative effect: reducing volatility by one standard deviation (7 percent) around the mean (5 percent) would increase bilateral trade by about 13 percent.

[4] Defined as the extent to which the income from individual transactions is affected by fluctuations in foreign exchange values. Such exposure includes obligations for purchase or sale of goods and services at previously agreed prices and the borrowing or lending of funds in foreign currencies.
[5] It is the impact of currency exchange rate changes on the reported consolidated results and balance sheet of a company. It is basically concerned with the present measurement of past events. It occurs when translating foreign currency financial statement into the reporting currency of the parent company.
[6] See Clark et al (2004) for a detailed discussion.

Although macro evidence focuses mainly on exchange rate volatility and trade rather than the level of exchange rate movements on exports, it provides a starting point and throws up some interesting issues, including different effects as between developed and developing countries and differences between multinational and non-multinational companies. As pointed out in Clark et al (2004), for developed countries where there are well developed forward markets, specific transactions can be hedged, reducing exposure to large exchange rates movements. For multinational firms engaged in a wide variety of trade and financial transactions across countries, fluctuations in different exchange rates may have offsetting effects on profitability, and may result in an ameliorated impact of exchange rate movements. However, to our knowledge, there is no direct evidence for the effects on export behavior of multinationals. There is an empirical literature on exchange rate variability and FDI decisions. Some studies provide evidence for MNEs abilities to internalize the financing of investments: Lipsey (2001) finds that FDI flows are much more stable during currency crises than other flows of capital; Desai, Foley and Forbes (2004) find that investment, sales and assets of U.S foreign affiliates are significantly more than those of local firms during and after a currency crisis. These papers provide indirect evidence for the internalized or offsetting effects for multinationals.

Studies using micro data have been more successful in finding a relationship between export volumes and exchange rates. Bernard and Jensen (2004a) and Bugamelli and Infante (2003) use the model in Equation (3) to examine the effects of exchange rate movements on export market entry. They employ a random-effects probit model, as well as a linear probability framework. The former requires that the firm specific effects be uncorrelated with the regressors. Potential problems of a linear probability method are well known and fully discussed in Bernard and Jensen (2004a) and Greenaway, Guariglia and Kneller (2005): notably that it fails to properly capture the curvature of the regression function in the proximity of 0 and 1. This problem may be particularly severe in a dataset with a large number of very high and very low probabilities of exporting. Bernard and Jensen (2004a) find no significant effect of the exchange rate on exports. Bugamelli and Infante (2003) find a small but significant effect: a 1 percent real depreciation raises the probability of exporting by 0.2 percentage points.

As the only paper focusing solely on this issue, Campa (2004) uses an alternative methodology to estimate the export supply equation with two components: first, export market participation; and second, conditional on being an exporter the relationship between export volume and exchange rate changes. The exchange rate and conditional variance of the exchange rate for firm *i* are both included. The model estimates export participation as a single equation, which is a dynamic random effects probit model estimated by maximum likelihood. It then estimates the export supply equation after controlling for self-selection into exporting implied by the export participation decision. The lagged export volume of the firm is also included in the export supply estimation to investigate the presence of hysteresis on the quantity of exports. He finds that exchange rate coefficients are significant in both estimation processes, whereas exchange rate volatility has insignificant effects. A 10% depreciation would cause a 7.7% change in export volume. Most of the change in export volume is due to existing exporters.

Das, Roberts, and Tybout (2004) find significant cross-industry variation in the effects of exchange rate movements. Simulating the effect of a 20 per cent devaluation for three Colombian industries they report that the magnitude of the industry response depends on previous export exposure, homogeneity of expected profit flows between firms and their proximity to the export market entry threshold. Ten years after the simulated devaluation, the industry level effect varies between 14 and 107 per cent. Bernard and Jensen (2004b) study the export response of US manufacturing plants to dollar depreciation in the 1980's. They report that 87 per cent of the expansion of exports was from expansion of export intensity amongst current exporters and only 13 per cent from entry of new firms. Forbes (2002) studies the impact of a large devaluation on export sales of over 13,500 companies around the world, and finds that on average export sales improve by 4 percent one year after devaluation. Micro evidence shows that changes in exports due to exchange rate movements come mainly from existing exporters adjusting production.

3. Econometric Specification and Estimation Methodology

We examine the effects of exchange rates on firm export decisions using a sample selection model. As firm characteristics are likely to be correlated with unobserved firm effects, we first estimate a reduced form model within a fixed effects linear probability framework:

$$EXP_{it} = a_0 + a_1 emp_{i(t-1)} + a_2 wage_{i(t-1)} + a_3 laborprod_{i(t-1)} + a_4 age_{i(t-1)} + a_5 foreign_i +$$
$$+ a_6 EXP_{i(t-1)} + a_7 inREER_{i(t-1)} + u_i + e_{it} \quad (6)$$

where the subscript *i* denotes firms; and *t*, time. emp_{it} represents the logarithm of number of employees as a proxy for firm size. $Wage_{it}$ is the ratio of firms' total wage bill to number of employees; $laborprod_{it}$ represents labor productivity and is the ratio of firm's total real sales to number of employees; $foreign_i$ is a dummy equal to 1 if the firm is foreign owned, and 0 otherwise; EXP_{it} is a dummy equal to 1 if firm *i* exported in year *t*, and 0 otherwise; $inREER_{it}$ is the 3-digit industry-specific REER. Finally, the error term is made up of two components: u_i, capturing time-invariant firm-specific effects not included among the regressors; and e_{it}, an idiosyncratic error term. All time-varying regressors are log lagged one period to reduce possible simultaneity problems. Industry dummies and time dummies are also included to control for any fixed effects common across industries and years. The definitions of variables are shown in Appendix 1. As noted earlier, one problem of linear probability estimation is that predicted probabilities may lie outside the 0-1 range. Moreover, as pointed out in Bernard and Jensen (2004a), fixed effects models produce biased and inconsistent parameter estimates, especially for the coefficient on the lagged dependent variable, but provide a lower bound for the importance of the lagged endogenous variable. Therefore we deploy a random effects probit model:

$$EXP_{it} = a_0 + a_1 emp_{i(t-1)} + a_2 wage_{i(t-1)} + a_3 laborprod_{i(t-1)} + a_4 age_{i(t-1)} + a_5 foreign_i +$$
$$+ a_6 EXP_{i(t-1)} + a_7 inREER_{i(t-1)} + u_i + u_t + e_{it}, \quad (7)$$

where u_t is a time-specific component. The use of random effects requires that the firm effects be uncorrelated with the regressors. As some papers have shown, some problems may remain, for example, plant characteristics may be correlated with unobserved plant effects, initial period export status may not be exogenous, and there may be sample selection bias.

Because of sunk costs, exporting can be thought as a two-stage decision process whereby firms first decide whether to export or not, and second how much to export. The other methodology

in a nonstructural framework we employ is a two-stage sample selection model, to investigate the effects of some variables on export supply as well as on the decision to export. Our econometric analysis accounts for both decisions and the fact that they are interdependent. It thus avoids any bias resulting from considering them separately.[7] Two equations are estimated,

$y^*_{it} = x_{it}\beta + u_{it}$ (export share regression);

$d^*_{it} = z_{it}\gamma + v_{it}$ (export participation);

with

$y_{it} = y^*_{it}$ *if* $d_{it} = 1$

$y_{it} = 0$ *if* $d_{it} = 0$

and

$d_{it} = 1$ *if* $d^*_{it} > 0$

$d_{it} = 0$ *if* $d^*_{it} \leq 0$

Thus, the observed y_{it} is zero when the firm decides not to export ($d_{it} = 0$) and positive when the firm exports ($d_{it} = 1$). The distribution of the error terms (u_{it}, v_{it}) is assumed to be bivariate normal with correlation ρ. The two equations are related if $\rho \neq 0$. In this case estimating only the export share regression would induce sample selection bias in the estimate of β due to the error term u_{it}, and the regressor x would be correlated. To avoid this problem both equations must be estimated via maximum likelihood or a two-step method proposed by Heckman (1979). We employed the former as it is more efficient.[8] The industry-specific REER is included in both equations to examine the effects of exchange rates on export participation and export intensity respectively.

Due to limitations of the sample selection model, the firm's exit from export markets can not be examined within the above context. We follow Girma, Greenaway and Kneller (2003), and Alvarez and Görg (2005) to identify the probability of exit using the following discrete model:

$$\Pr(\text{Exit}_{it}=1) = \alpha + \beta X_{it} + \theta e_{it} + d_j + d_t + \varepsilon_{it}$$

[7] Kneller and Pisu (2005) and Karpaty and Kneller (2005) adopt the same methodology.
[8] See Greene (2003) for the discussion.

where $Exit_{it}$ is a dummy variable, equals 1 if the firm does not export at time *t* and 0 otherwise. We estimate this model using a Probit. A significant θ implies the effects of exchange rate movements on the export market exit decision.

4. Computation of Industry-specific Exchange Rates

To compute an industry-specific REER, we need to identify: the range of foreign countries to be included as trading partners, their relative weights and the price indices to be used. We use the following equation to compute the industry-specific REER index for each year:

$$REER = \prod_i [(e_i / e)(p / p_i)]^{w_i}$$

Where e_i: Exchange rate of currency *i* against Special Drawing Rights[9] (annual average)
(Units of Currency *i* per SDR in index form, 1995 as the base year)
e: Exchange rate of GBP against Special Drawing Rights (annual average)
(Units of GBP per SDR in index form, 1995 as the base year)
p: Price index of UK (using inflation index as a proxy, 1995 as the base year)
p_i: Price index of country *i* (using inflation index as a proxy, 1995 as the base year)
w_i: the share of exports UK export destination country *i* within an 3-digit industry

We express the exchange rate in terms of the foreign currency value of a unit of the domestic currency. An upward (downward) movement therefore represents appreciation (depreciation). We compute industry specific REER in UK for the period from 1988 to 2004.

Computing export weights: The current classification system of industries in the UK is SIC (2003). As noted already, commodity data is classified according to SITC Rev.3. So we converted SITC commodity data to SIC 3-digit manufacturing sector data, using the UK SIC (2003) - SITC Rev.3 concordance after aggregating 5 digit SITC codes to 3 or 4 digit SITC for each 3 digit SIC sector from a correlation list of associated 5 digit SITC codes for each 4 digit SIC industry on *www.uktradeinfo.com*. We then aggregated commodity data to the 3 digit industry level using this concordance, and calculated export weights for each export destination

[9] The Special Drawing Right (SDR), as defined by IMF, is an international reserve asset, created by the IMF in 1969 to supplement the existing official reserves of member countries. The SDR also serves as the unit of account of the IMF and some other international organizations. Its value is based on a basket of key international currencies. Since the exchange rate data for each currency from IMF is expressed as the value of units per SDR, we use SDR as an intermediary to calculate the exchange rate of each currency against GBP.

for each industry. The top 25 UK export destinations are chosen as weights. The total percentages of export value for these destinations are always between 80% - 97%, and therefore capture the main components of changes in REERs. Moreover, almost all individual trade (export) weights for the 26th export destinations in all industries are less than 1% during the period 1988-2004.

Data sources for price indices and exchange rates: Nominal exchange rates are annual averages from the IMF, *International Financial Statistics*. Since the exchange rate data from IFS are exchange rates of currencies in terms of Special Drawing Rights, we use exchange rates per SDR instead of US dollars or other currency. The exchange rates for Taiwan are from the Central Bank of China, Republic of China (Taiwan). The nominal exchange rates are converted to index form with 1995 as the base year.

Several price deflators could be used to calculate REERs: consumer price index (CPI), producer price index (PPI), wholesale price index (WPI), or inflation index and GDP deflator. We use the inflation index for about 170 countries from the IMF, *World Economic Outlook Database*. The data for the inflation indices are annual averages and the base year is 1995.

There are 103 three-digit industries. There is no export data for 8 industries and 17 industries with more that 5 percent export value with unknown destination (denoted as 'secret and differences') in some or all of the years. So we exclude those and end up with REER indices for 78 industries.

Results for REER: Broadly speaking, the indices have moved together and appear to be highly correlated. The distribution of average correlations for each industry is shown in Table 1. The only 6 industries with an average correlation below 0.8 are Industries 172, 183, 267, 283, 335 and 362.[10]

[10] These industries are: 172 Textile weaving; 183 Dress and dye of fur, and manufacture of fur articles; 267 Cutting,shaping and finishing of stone; 283 Manufacture of steam generators,except boilers; 335 Manufacture of watches and clocks; 362 Manufacture of jewellery and and related articles.

Turning to movements of industry specific REERs, troughs appear in 1995 for 72 out of 78 industries, and peaks in 1999 for 63 out of 78 industries. To fully understand REER movements, we need information on export destinations. Table 2 shows each industry's 17 year average of the normalized weights of UK exports to four groups of destinations: the US, Euro area, other European countries, and rest of the world. The average shares of exports to the Euro area and other main European countries are higher than 50% for almost all industries. The average shares of rest of the world are lower than 25% for 63 out of 78 industries. Only 5 industries (160, 183, 283, 335 and 362)[11] have average shares greater than 40%, most of which are industries with the lowest mean correlation with other industries. Although US shares are not large compared to the Euro area, the US is among the top destinations in many industries. For other countries such as Canada, China, Hong Kong and Singapore, their currencies peg the US dollar during most of the period. So we expect movements of Euro and USD to exert a significant influence on UK REERs.

Changes across all industries before 2001 are quite similar, whereas changes after 2001 are quite different, probably because changes in the USD and Euro broadly follow the same pattern before 2001, whereas after 2001, the shocks of these two are opposite. So the combined effects of shocks for the two are mixed. The statistics of percentage changes of REER across all industries are shown in Table 3. The biggest average change is in 1995-1996: a 13.56% appreciation. Other large percentage changes are a 12.16% appreciation in 89-90 and a 11.79% depreciation in 88-89. The most stable periods are 03-04 and 00-01. Having large appreciations, depreciations and periods of exchange rate stability within the data makes the period 1988-2004 both interesting and information rich, and provides us with an excellent dataset to examine the impact of exchange rate uncertainty on firm export behavior.

5. Firm Data and Summary Statistics

We construct our firm level panel dataset from profit and loss and balance sheet data gathered by Bureau Van Dijk in the Financial Analysis Made Easy (FAME) database and from OneSource. Due to the lack of availability of trade data for service industries, we focus only on manufacturing firms. Since firm level data from FAME only covers ten years from 1994 to

[11] 160 Manufacture of tobacco products.

2004, we merge the dataset with OneSource which covers 1987 to 2000. Our panel includes a total of 188,986 annual observations on 23,171 companies.[12] It has an unbalanced structure, with an average of 8 observations per firm. Table 4 reports the structure of the panel. There are missing values for each key variable. The last figure in each box of Column 1 of Appendix 2 reports the number of observations for each of our variables, with the largest number of observations for firm age and smallest for firm intangible assets with about half of the overall observations missing. Table 5 shows the distribution of firm size for the entire sample. Half the observations come from medium-sized firms, micro and small-sized firms take up 27% and large firms account for 23%. Our dataset has an oversampling of large firms,[13] which could result in sample selection problems.

Table 6 shows the transition of firms in the sample from being an exporter/nonexporter in year 0 to either being an exporter/nonexporter again in year 1 or stopping export/starting exporting. The average percentage of switchers from nonexporter to exporter is about 22% across the sample, and average percentage of switchers from exporter to nonexporter is less than 5%. This shows persistence of firm export behavior. Appendix 2 reports means, standard deviations, medians and number of observations for the main variables considered. Column 1 refers to the entire sample; column 2 to firms which never exported; column 3 to firms that always exported; column 4 to firms which changed export status. Appendix 3 shows t-tests of differences in means, conditional export premium and t- statistics. At the mean, exporters are larger than non-exporters, in terms of employees, intangible assets, wages, and sales, and typically older. Export shares are bigger for exporters than switchers. Although labor productivity is larger for nonexporters, t-tests of differences in means show that the difference between nonexporters and always exporters is statistically insignificant. All the medians are lower than the means, indicating positively skewed distributions, highly skewed for sales, size, intangible assets, labor productivity, export share and switchers (compared with nonexporter and always exporter). Almost all the t-tests of the differences in means are statistically significant. In the last row of Appendix 3 we follow Bernard and Jensen (1999) in running a regression

[12] This is our original number of observations after merging the two datasets. To calculate summary statistics, we use the original one. In order to run our regressions, we have to drop those observations with missing values for each variable in our regressions. So we end up with 44,215 observations in our later regressions.
[13] See Greenaway, Guariglia and Kneller (2005) appendix for the data reporting requirement regulations for partly explanation of the sample selection problem.

controlling for other firm level characteristics (employment, wage, age and labor productivity), fixed industry effects and fixed time effects to investigate the conditional export premium and its t-statistic. The export premiums are generally positive and significant. The premium for the real wage is significantly negative.

Although sales and labor productivity for switchers are the largest among the three categories, the medians are below those of exporters. This is a better measure than the mean for highly skewed distributions. The statistics for the remaining variables for switchers are all between non-exporters and exporters. We further report statistics for the sub-sample of firms which entered export markets for the first time, firms which stopped exporting for the first time across the period, and firms which switched export status more than twice. These show that except for age, intangible assets and real wage, all are highest for firms which stopped exporting (except for the median of labor productivity). T-tests of differences in means are significantly negative compared to firms that always export. Since these statistics are calculated without separating exporting and nonexporting periods, we further report in Appendix 4 summary statistics of the variables for switchers, calculating statistics which distinguish exporting from nonexporting firm-year within each subgroup of switchers. The table confirms that medians for export-year observations are all higher than that for nonexport-year observations in the three cases.

Appendix 5 compares summary statistics and percentages of exporters by 2-digit industry. The last column shows that the sectors characterized by the highest average percentages of exporting firm-years are medical, precision and optical instruments (83%), chemicals and chemical products (81%), and machinery and equipment (81%). Those characterized by the lowest are wood and products of wood, cork, and plaiting materials (31%), publishing, printing and reproduction of recorded media (37%), and food and drink (45%). The remaining columns report the overall mean of key variables within each industry, the export premium (at the mean) and number of observations. Motor vehicles, trailers and semi-trailers has the highest average annual sales; tobacco products employed the biggest number of employees; fabricated metal products and publishing, printing and reproduction of recorded media have the largest number of observations at an average of 20,000. There are some negative export premiums and quite large premiums we believe are due to highly positively skewed distributions.

6. Main Results

Effects of exchange rate movements: Columns 1 and 2 in Table 7 present the results from estimating Equation (4) for the linear probability model and Equation (5) for the random effects probit. We compare the results with those from a Heckman selection model. For each estimation, results with and without lagged export status dummies are reported in Columns (a) and (b). Of the firm level determinants, a number are consistent with those found in the previous literature. Size and labor productivity always have a significantly positive effect on export participation. The effects of wage and age are insignificant. Foreign owned firms are more likely to export than other firms. The lag of the export dummy in both Column (b)'s has a significant impact on export status next year, which suggests the existence of sunk costs. The coefficient of REERs shows that exchange rate movements did not significantly affect firms' participation behavior, which is consistent with Bernard and Jenson (2004a). Our results are also consistent with those who use subsamples of the same dataset for the UK such as Girma, Greenaway and Kneller (2004), Greenaway and Kneller (2004), and Greenaway, Guariglia and Kneller (2005). Excluding the lagged export dummy allows us to check for robustness of the remaining explanatory variables. The results from this specification are similar to those in column (b) (only the age coefficients become significant), with generally higher levels of statistical significance. Exchange rate movements again have little impact on firm export participation.

Column 3 in Table 7 shows the effects of exchange rates on firm export market exit. We exclude nonexporters and new exporters in our sample. The only significant coefficient is foreign ownership, which is negative and implies a foreign owned firm is less likely to exit from export markets. The coefficient for industry specific REER is insignificant, which shows little impact of exchange rate changes on exit decisions. However, rest of coefficients for firm characteristics are insignificant, which is inconsistent with the related literature. All the industry dummies have highly significant coefficients, suggesting that industry heterogeneity may play an important role on a firm's exit decision as shown in Das, Roberts, and Tybout (2004).

Table 8 reports results for the sample selection model. Column 1 report results from a specification in which we exclude the exchange rate variable. In the first subcolumn, the

coefficient on previous export experience is always positive and highly significant suggesting that export participation depends strongly on previous export status. The statistics indicate that the probability of exporting is increasing in the size of the firm. This may reflect the fact that large firms are more likely to be able to compete successfully in international markets. The coefficients of wage and labor productivity are positive as expected, but insignificant. This may be due to controlling for selection bias and is consistent with Kneller and Pisu (2005) using the same methodology for a subsample of the data.

The second subcolumn reports results for the export share equation. It tells a different story: the effect of size becomes insignificant, the effects of wages become significant, and the coefficient of age is negative as before but significant. Foreign ownership has a significant coefficient in both equations as expected. Foreign country dummies are very important both in the participation and export share decision, which is consistent with Kneller and Pisu (2005) and the theory of Baldwin and Ottaviano (2001). Multiproduct firms use trade costs to reduce inter-variety competition by placing production of some varieties abroad. Since the varieties are differentiated, all varieties are sold in all markets. Thus FDI/multinationals create trade via reverse imports. Foreign firms in the host country are more likely to be involved in exporting to other countries.

Column 2 reports the effects of including the exchange rate as an independent exogenous variable. Adding this has little impact on other coefficients, which shows that the level of the exchange rate is independent of other variables. The coefficients on the exchange rate are never significant in the export participation equation, which is not consistent with the Campa (2004), but is consistent with other empirical evidence referred to in Section 2. However, exchange rate movements have a significant impact on firms' export share decisions with expected signs and significant coefficients in the export share equation even after controlling for industry clustering.[14] The results suggest that although the exchange rate does not significantly affect a firm's decision on export participation, it does significantly influence the intensity of exports. Or put differently, adjustment is primarily on the intensive margin of trade. Export adjustments

[14] Since our exchange rate is industry-specific REER, industry clustered adjustment may mitigate the effects of exchange rate on export.

to changes of exchange rates are mainly made by existing exporters. This is consistent with the microeconomic findings of Campa (2004) and Bernard and Jensen (2004b).

There may be an effect on the most productive non-exporting firms (i.e. firms whose productivity is just below the cut-off necessary to make positive profits from exporting). To capture this we interact firms' labor productivity with the industry specific REER. The results in Column 3 of Table 8 show the interaction term is insignificant and positive in the export participation regression.

To understand the economic magnitude of the effects we report in Table 9 the marginal effect of the Heckman selection model calculated at the mean of each variable. Concentrating on the effect of exchange rates on export share, the table shows that adding 1 index point (1995=100) to the REER will decrease the export share by about 0.0034 percentage points, which is equivalent to a decrease of about 1.28 percent.[15] As the REER index mainly changes between 3 and 10 index points each year, it therefore induces changes of export share between 5 and 13 percent at the mean. Big changes of REERs in some years may cause a change of 25 percent in export share at the mean, for example in 1995-1996. The evidence shows a higher negative exchange rate impact on export shares, compared with those of other studies from micro data such as Campa (2004), in which a 10 percent depreciation results in increases in export volume due to the increase in export intensity of 6.3 percent.

Effects of REER: foreign vs. domestic firms: We are also interested in the effects of exchange rate movements on different type of firms: foreign owned firms and domestic firms. To capture this we interact the foreign ownership dummy and domestic ownership dummy with the industry specific REER. The results in Column 1 of Table 10 show the interaction terms are both significant in the export share equation and insignificant in the export participation decision. Although in the former, the coefficients and z statistics for domestic and foreign firms are different, the differences are small. However, we find that the coefficient on the foreign ownership dummy becomes insignificant. We checked the correlation between the

[15] This is computed using the mean of export share. From the estimates in table 12 the mean of export share is 0.2662. so the change in percentage terms is (0.0034/0.2662)100=1.28.

interaction terms and foreign ownership dummy, and found a correlation of more than 0.99. The interaction term may therefore be picking up the direct effect of the foreign ownership dummy.

An alternative approach to dealing with this is to estimate the selection model separately within the two subsamples. Columns 2 and 3 of Table 10 report the results of doing so. Column 2 shows the results for foreign owned firms. The coefficients of the exchange rate in the export share equation become insignificant with the expected signs. The results in Column 3 for domestic firms show that exchange rate changes have more significant effects on export shares than those in Table 8. Exchange rates have little impact on firm export participation decisions in both cases. The results are consistent with the idea that exchange rate changes have less impact on multinationals due to the offsetting effects of their extensive financial transactions.

Different effects of REER for different ownership types may be due to other factors such as size and country of origin. Size is the best and most obvious discriminator to use. As pointed out in some papers on financial factors such as Greenaway, Guariglia and Kneller (2005), size has been extensively used as a proxy for financial constraints faced by firms. It plays some role in affecting the firm's ability to finance export market entry and impact of macro shocks. Big firms are less likely to face financial constraints and less likely to be influenced by shocks. As a robustness check, we examine the effects of REER on big/small firms, using number of employees to separate two groups by the median of size. We interact the size dummies with REER and include the interaction terms in the Heckman selection model. Column 1 of Table 11 reports our results. Size does not seem to matter: the coefficients of exchange rates in export share equations are both significant and negative. In the export participation equation, the coefficients of interaction terms become positive and significant, whereas the coefficient of size becomes insignificant in the export participation equation. Since the different size groups are divided according to number of employees, the interaction term is likely to be correlated with size. The correlation is 0.78. So the significant coefficients of the interaction terms partly capture the direct effects of size in our regression.

As before, we then separately examine the effects of REER for subsamples of firms. The results are shown in Columns 2, 3 and 4 in Table 11. Column 2 shows that the effects of REER on big firms are significant, whereas those on small firms are not, which is not consistent with the hypothesis of financial constraints. However, it suggests that the insignificant effects of REER are not due to size but to ownership, as the size of foreign firms is generally bigger than that of domestic firms. Further splitting big firms into foreign and domestic, we find the coefficient for foreign firms is insignificant and significant for domestic big firms in Columns 3 and 4. We only report the results for export share decisions since those on export participation are always insignificant. This confirms the role of ownership. Splitting small firms by ownership, the coefficients are all insignificant. [16]

7. Conclusions

This paper examines the effects of exchange rate movements on firm decisions on export entry, exit and export share. The analysis breaks down export adjustments between changes in export share by existing exporters and those due to changes in entry into and exit from export markets. Using data on a sample of UK manufacturing firms, the paper finds evidence for the presence of sunk costs. Results show that firm export participation and exit decisions are not strongly related to exchange rate movements. The exchange rate has a significant and negative impact on the export share of firms after entry. The responsiveness of export share on the degree of exchange rate changes is not quantitatively as small as in Campa (2004). One index point depreciation in REER index will increase export share by about 1.28 percent. Generally, the evidence suggests that export adjustments due to exchange rate changes mainly occur through export share by existing exporters rather than changes in the number of exporting firms. We also find the export behavior of multinational firms is less likely to be affected by exchange rate changes than that of non-multinationals. The results provide the first direct evidence for the hypothesis of the offsetting effect of multinationals.

[16] Real sales is an alternative proxy for size. For our sample, the differences in sales between foreign and domestic firms are much bigger than those in the number of employees. So we then separate firms into two groups by the median of real sales to check the effects of REER. The results are similar to those in Table 11: size does not matter. Results suggest that the difference in the effects of REER we find between domestic and foreign firms comes mainly from the different ownership of firms rather than the different firm size.

References

Alvarez, Roberto and Görg, Holger(2005), "Multinationals and Plant Exit: Evidence from Chile', *GEP Research Paper 05/16*, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

Anderto, R. and Skudelny, F. (2001), "Exchange Rate Volatility and Euro Area Imports," ECBWorking Paper No. 64.

Baldwin, Richard (1988), "Hysteresis and the Beachhead Effect," *American Economic Review* 78: 773-85.

Baldwin, Richard and Paul Krugman (1989), "Persistent Trade Effects of Large Exchange Rate Shocks," *Quarterly Journal of Economics* 104:635-54.

Baldwin, Richard and Ottaviano, G. (2001), "Multiproduct Multinationals and Reciprocal FDI Dumping," *Journal of International Economics*, Vol. 54, issue 2: 429-448

Bernard, A. and J. Jensen (1999), "Exceptional Exporters Performance: Cause, Effect or Both?" *Journal of International Economics*, 47: 1-25.

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

Bernard, A. and Jensen, J. (2004b), "Entry, Expansion and Intensity in the U.S. Export Boom, 1987-1992" *Review of International Economics*, 2004, Vol. 12: 662-675.

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

Bugamelli, M. and Infante L. (2003), "Sunk costs to exports", Bank of Italy Discussion Paper No. 469.

Campa, J. M. (2004), "Exchange Rates and Trade: How Important is Hysteresis in Trade?" *European Economic Review* 48: 527-548.

Clark, Peter B. (1973), "Uncertainty, Exchange Risk, and the Level of International Trade," *Western Economic Journal* 11, September, pp. 302-13.

Clark et al (2004), "Exchange Rate Volatility and Trade Flows - Some New Evidence", IMF working paper

Cushman, David O. (1983), "The Effects of Real Exchange Rate Risk on International Trade," *Journal of International Economics* 15, August, pp. 43-63.

Das, S., Roberts, M.J. and Tybout, J. (2004), "Market entry costs, producer heterogeneity, and export dynamics", NBER Working Paper 8629.

Dell'Ariccia, G. (1999). "Exchange Rate Fluctuations and Trade Flows: Evidence from the European Union," IMF *Staff Papers* 46(3): 315-334.

Desai, Mihir A., Fritz C. Foley, and Kristin J. Forbes. (2004) "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Crises," *NBER Working Paper No. 10545.*

Dixit, Avinash, "Entry and Exit Decisions Under Uncertainty," *Journal of Political Economy* 97 (1989):620-38.

Forbes, K., (2002), "How Do Large Depreciations Affect Firm Performance", *NBER working Paper* No. 9095.

Frankel, Jeffrey A., and S. J. Wei (1993), "Trade Blocs and Currency Blocks," Working Paper No. 4335,(Cambridge,Massachusetts: National Bureau of Economic Research).

Greene (2003), *Econometric Analysis*, fifth edition, Prentice-Hall.

Girma, S., Greenaway, D. and Kneller, R. (2003), "Export Market Exit and Performance Dynamics: A Causality Analysis of Matched Firms", *Economic Letters,* 80:181-187.

Girma, S., Greenaway, D. and Kneller, R.(2004), "Does exporting lead to better performance? A microeconometric analysis of matched firms", *Review of International Economics* 12(5): 855-866.

Greenaway, D., Guariglia, A. and Kneller, R. (2005), "Do financial factors affect exporting decisions?', *GEP Research Paper 05/28*, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

Greenaway, D. and Kneller R. (2004),"Exporting and Productivity in the UK", *Oxford Review of Economic Policy*, Vol.20: 358-71.

Heckman, James J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica*, Vol. 47:153-61.

Hill, CW (2005), *International Business: Competing in the Global Marketplace*, 5th ed, McGraw-Hill.

Hooper, P., K. Johnson, and J. Marquez (2000), "Trade Elasticities for G-7 Countries", Princeton Studies in International Economics No. 87.

IMF (1984), "The Exchange Rate System: Lessons of the Past and Options for the Future", IMF Occasional Paper No. 30 (Washington: IMF).

Karpaty, P. and Kneller, R. (2005), "Demonstration or Congestion? Export Spillovers in Sweden", *GEP Research Paper 05/44*, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

Krugman, Paul (1989), *Exchange Rate Instability* (MIT Press, Cambridge, MA: MIT Press

Kneller, Richard and Pisu, Mauro (2005), "Industrial Linkages and Export Spillovers from FDI", *GEP Research Paper 05/20*, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

Lipsey, Robert E. (2001) "Foreign Direct Investors in Three Financial Crises," *NBER Working Paper No. 8084.*

Makin, John H. (1978), "Portfolio Theory and the Problem of Foreign Exchange Risk," *Journal of Finance* 33, May, pp. 517-34.

McKenzie, Michael D. (1999), "The Impact of Exchange Rate Volatility on International Trade Flows," *Journal of Economic Surveys*, Vol. 13, No. 1: 71-106.

Roberts, Mark and Tybout, James (1997), "The Decision to Export in Colombia," *American Economic Review,* Vol.87: 545-564

Rose, Andrew K (2000), "One Money, One Market: The Effect of Common Currencies on Trade," *Economic Policy*, April: 9-45.

Rugman, AM and S Collinson (2006), *International Business*, 4th ed, FT Prentice Hall.

Tenreyro, Silvana (2003), "On the Trade Impact of Nominal Exchange Rate Volatility, unpublished, Federal Reserve Bank of Boston.

Thursby J.G., and M.C. Thursby (1987), "Bilateral Trade Flows, the Linder Hypothesis, and Exchange Risk", *The Review of Economics and Statistics* 69: 488-495.

Wei, Shang-Jin (1999), "Currency Hedging and Goods Trade," *European EconomicReview*, 43: 1371-1394.

Appendix 1: Definitions of the variables used:

Export dummy*:* dummy variable equal to 1 if the firm's overseas turnover is positive

Real intangible assets: the firm's intangible assets deflated by RPI indices (Source: Office of National Statistics)

Real Sales*:* includes both UK and overseas turnover deflated by PPI indices (Source: Office of National Statistics)

Labor productivity: the ratio of the firm's total real sales to its total number of employees.

Real Wage: the ratio of the firms' total wage bill (which includes wages, salaries, social security and pension costs) to number of employees, deflated by RPI indices.

Foreign owner dummy*:* dummy variable equal to 1 if the firm's primary ownership country is not UK, and 0 otherwise. This variable is only available in the last year of observations available for each firm. So we have to assume that a firm which was foreign owned in its last available year was foreign owned throughout the period in which it was observed.

Log of employment: Number of employees

Export Share: ratio between overseas turnover and total turnover

Age: the subtraction of current year and the incorporation year for each firm in each year

Industry REER: 3-digit manufacturing industry level real effective exchange rate

Appendix 2: Summary statistics of the key variables (mean, overall SD, median and #obs.)

	Total sample	Firms that never exported	Firms that always exported	Switchers			
				Total sample	entrants	Firms stop exporting	Firms keep switching
Real sales	55655.21 (780411) 7297.26 171,823	19924.23 (141024) 4341.20 35,744	56001.53 (337331) 11112.72 64,624	62782.94 (392866) 7666.72 48,129	62303.16 (406631) 7519.95 37,279	65650.33 (334050) 7864.56 10,080	73846.41 (340587) 8636.49 4,398
Number of employees	451.934 (3414.92) 95 175,174	205.75 (669.013) 68 33,494	518.97 (2783.65) 132 65,021	500.91 (2697.79) 96 49,094	486.88 (2731.15) 94 38,421	522.64 (2607.12) 105 9,961	654.98 (3080.5) 105 4,538
Real intangible assets	7416.11 (117634) 0 98, 875	3043.65 (33840.9) 0 18,674	7086.97 (101749) 0 38,196	9440.014 (137548) 0 28,340	10469.99 (151083) 0 22,180	8238.54 (74857.9) 0 5,830	5559.24 (64796) 0 2,713
Age	26.35 (24.33) 18 187, 376	23.51 (22.71) 16 38,040	29.24 (25.93) 21 65,185	26.44 (23.815) 19 51,558	25.90 (23.48) 18 40,208	28.77 (25.11) 20 10,510	27.80 (23.9) 20 4,711
Labor productivity	172.22 (2297) 78.41 160,101	155.2667 (1264.97) 71.98 31,504	147.5264 (1520.13) 80.13 63,400	204.0278 (3607.44) 80.23 45,814	169.1388 (1346.05) 80.14 35,612	172.5871 (1819.53) 79.72 9,528	548.8256 (11133) 79.64 4245
Real Wage	20.17 (65.33) 17.91 174, 048	19.54068 (16.69) 17.24 33,267	19.80354 (14.83) 18.12 64,815	20.34578 (22.29) 18.08 48,859	20.34565 (23.105) 18.12 38,239	20.79101 (37.24) 18.18 9,919	19.86549 (11.83) 17.75 4,520
Export Share	0.221 (0.278) 0.184 121,665	0	0.332 (0.284) 0.257 60,069	0.1876 (0.264) 0.164 36,972	0.249 (0.292) 0.217 4,160	0	0.142 (0.2636) 0.119 1,163

Note: In each box, mean, overall standard deviation (in the parentheses), median and number of observations are reported from top to bottom respectively.

Appendix 3: T-test of difference in means and conditional export premium

	Real sales	*Number of employees*	*Real intangible assets*	*Age*	*Labor productivity*	*Real Wage*
Always Export vs. Never export	23.7**	27.2**	7.01**	37.02**	-0.83	2.43*
Always Export vs. Switcher	-3.04**	1.104	-2.43*	19.11**	-3.15**	-4.66**
Conditional export premium (t-statistic)	12.52% (26.14)**	21.14% (37.34)**	10.49% (2.76)**	1.16% (4.24)**	2.10% (5.49)**	-1.206% (-4.30)**

Note: 1. Row 1 and Row 2 show the t-test of difference in means. * indicates significant at 5%; ** indicates significant at 1%.

2. Row 3 shows the conditional export premium, t-statistic is in the parentheses. The regression equation is: $\ln Y_{it} = a_0 + a_1 EXPDUM_{it} + a_2 \ln Z_{it-1} + \sum a_j IND_j + \sum a_t T_t + \varepsilon_{it}$

Appendix 4: Summary statistics of the key variables for switchers

Switchers	Entrants		Firms stop exporting		Firms keep switching	
	Before entering	After entering	Before exiting	After exiting	During export	During nonexport
Real sales	49841.29 (344213.4)	60821.28 (365691.7)	70171.14 (330658.5)	55357.03 (316789.7)	74741.85 (318398.8)	65179.81 (335253.9)
Number of employees	394.0086 (2322.577)	486.5733 (2498.998)	619.0179 2972.069)	380.43 (1821.007)	705.8433 (3338.539)	544.0265 (2487.915)
Real intangible assets	6395.223 (105398.5)	10881.12 (159768.2)	8682.342 (79419.6)	7221.213 (68319.4)	4598.824 (29263.9)	3362.022 (30937.5)
Age	23.42 (22.68)	27.03 (23.71)	29.96 (26.0666)	27.14 (23.81)	29.21 (24.18)	25.48 (23.55)
Labor productivity	148.05 (495.02)	163.87 (1546.93)	188.86 (2387.62)	148.88 (420.08)	664.88 (13118.61)	422.46 (8065.89)
Real Wage	20.04 (23.76)	20.07 (12.38)	19.59 (12.82)	21.60 (35.70)	19.83 (9.32)	19.43 (13.00)

Note: Mean and overall standard deviation (in the parentheses) are shown in each box.

Appendix 5: Summary statistics and percentages of exporters by industry

	Real sales	Number of employees	Real intangible assets	Age	Labor productivity	Real Wage
15. food products and beverages	98837.01 77.548% 13306 45.06%	860.5301 74.831% 13923 45.23%	16692.03 80.505% 7298 43.44%	29.48596 21.115% 14849 43.47%	227.9302 44.278% 12501 46.49%	17.15078 16.346% 13841 45.34%
16. tobacco products	1012110 -11.648% 271 71.88%	6080.582 76.809% 249 71.70%	428111 165.874% 122 74.16%	44.52055 -20.223% 292 68.86%	1592.351 370.605% 232 75.00%	24.52172 -26.533% 244 72.15%
17. textiles	20116.88 105.689% 6084 76.88%	385.4021 98.428% 6526 76.64%	424.407 -1.275% 3345 78.83%	37.29179 10.925% 6820 74.89%	101.6006 -3.672% 5799 78.48%	15.4031 4.852% 6507 76.75%
18. wearing apparel; dressing and dyeing of fur	25543.5 65.784% 3711 68.53%	470.3145 23.609% 3720 69.27%	1006.62 174.382% 1933 68.74%	26.0266 23.760% 4060 66.54%	158.8678 -5.445% 3354 70.92%	19.76481 -15.432% 3691 69.39%
19. Tanning and dressing of leather	25607.73 51.106% 1291 71.36%	396.5324 -8.071% 1313 73.18%	849.0834 3194.41% 722 70.14%	37.34468 12.401% 1381 70.40%	265.0157 154.365% 1213 73.60%	15.04919 31.661% 1306 73.12%
20. wood & products of wood, cork, and plaiting materials	16114.08 209.703% 3385 31.13%	178.4721 169.006% 3423 32.39%	272.8243 258.830% 1684 33.72%	27.35183 0.459% 3874 29.74%	122.9501 14.226% 2982 33.77%	16.66377 7.916% 3406 32.47%
21. pulp,.paper & paper products,publishing and printing	44673.98 175.716% 5032 56.36%	334.9411 182.563% 5350 56.22%	2379.209 566.377% 2533 59.19%	31.06548 37.119% 5544 54.51%	136.4919 -32.348% 4811 57.56%	19.35055 2.983% 5314 56.28%
22. Publishing, printing and reproduction of recorded media	25357.69 188.900% 20730 36.87%	239.9735 123.249% 19894 37.33%	14913.04 273.264% 12284 37.26%	25.00072 0.718% 22149 35.76%	159.9755 55.915% 18629 38.04%	23.98517 4.521% 19750 37.37%
23. coke, refined petroleum products and nuclear fuel	1602887 19.261% 730 66.49%	2080.313 75.444% 718 68.91%	63997.66 -390.732% 426 70.13%	41.73571 26.270% 787 65.21%	959.8132 -34.135% 658 70.06%	26.63382 -4.542% 709 69.11%
24. chemicals and chemical products	114219.8 39.038% 13036 80.54%	778.0224 43.619% 13352 80.99%	13505.27 -4.085% 7884 81.95%	28.43709 21.954% 13997 79.06%	272.4934 -22.612% 12395 82.09%	24.08016 -5.385% 13255 81.17%
25. rubber and plastic products	22837.85 159.834% 9444 70.22%	267.9583 119.019% 9888 70.35%	1043.916 177.698% 5727 70.54%	23.68672 36.877% 10371 68.49%	93.68361 6.028% 8991 71.79%	17.33123 0.836% 9852 70.54%

	Real sales	Number of employees	Real intangible assets	Age	Labor productivity	Real Wage
26. other non-metallic mineral products	67336.27 81.941% 4723 57.35%	680.2011 100.086% 4952 57.48%	5672.406 315.335% 2685 58.17%	29.45587 7.314% 5234 55.25%	98.54662 -15.149% 4445 58.99%	18.52681 -2.467% 4877 57.76%
27. basic metals	66150.1 96.154% 5069 74.54%	457.4458 77.626% 5238 74.46%	1529.135 338.828% 2964 75.65%	28.056 10.347% 5393 73.15%	459.6961 -26.034% 4863 75.52%	24.48454 -5.313% 5180 74.58%
28. fabricated metal products, except machinery and equipment	21102.42 215.078% 21808 66.51%	273.4015 168.428% 22729 67.45%	1592.126 368.874% 12713 68.31%	28.07062 37.115% 24525 64.58%	95.00948 -0.857% 20119 69.17%	19.18857 -3.182% 22554 67.60%
29. machinery and equipment not elsewhere clasified	44926.18 178.007% 15071 77.89%	417.6743 133.461% 15358 78.60%	3175.522 51.075% 8993 79.76%	26.4155 36.346% 15935 76.21%	129.6248 -9.704% 14335 79.83%	20.43715 -5.523% 15273 78.70%
30. office machinery and computers	86319.5 128.522% 3144 68.82%	425.1414 81.422% 3013 71.23%	3023.364 137.939% 1696 70.53%	14.76321 33.523% 3235 67.78%	167.3065 -1.757% 2936 71.75%	25.09631 -5.324% 2996 71.50%
31. electrical machinery and apparatus not elsewhere classified	42325.07 57.904% 9226 75.90%	511.9408 66.544% 9327 76.90%	5750.179 132.425% 5269 79.53%	22.60907 27.722% 10012 74.03%	121.9972 13.785% 8594 78.48%	19.62564 -4.141% 9279 77.01%
32. radio, television and communication equipment and apparatus	45890.84 116.734% 5663 80.88%	356.7592 63.781% 5635 81.57%	10045.72 405.336% 3377 82.20%	20.04688 36.085% 5930 79.67%	144.7865 -16.295% 5340 82.41%	20.41039 -1.345% 5621 81.62%
33. medical, precision and optical instruments, watches and clocks	28423.08 64.727% 6934 83.28%	341.7175 69.070% 7013 83.01%	1517.58 144.490% 4384 84.66%	22.28633 35.919% 7383 81.19%	98.0916 -21.105% 6611 84.36%	21.66466 -8.416% 6986 83.14%
34. motor vehicles, trailers and semi-trailers	134845.5 1.653% 4166 71.57%	906.643 47.070% 4280 71.02%	6191.136 76.188% 2540 70.55%	22.37166 45.573% 4383 70.04%	115.838 -23.999% 4025 71.96%	19.07651 0.683% 4254 71.14%
35. other transport equipment	66921.83 173.855% 3792 68.86%	746.0013 127.243% 3722 69.97%	21027.1 1912.7% 2203 70.88%	25.8367 70.146% 3913 67.32%	694.2221 -26.940% 3548 71.19%	20.66197 -8.668% 3683 70.17%
36. furniture; manufacturing not elsewhere classified	20939.05 82.968% 15207 64.22%	235.6704 59.679% 15551 65.30%	2376.74 314.278% 8093 67.26%	22.81749 25.840% 17309 61.82%	125.4626 -19.541% 13720 67.34%	18.76894 -5.967% 15470 65.38%

Note: The overall mean within an industry is listed in the first row, the export premium (measured at mean) is listed in the second row, number of observations in the third row, and the percentage of exporters for firm-year is in the last row in each box.

Table 1: Mean of correlations of REER for each industry

Average Correlation	Number of industries
≥ 0.9	46
0.8—0.9	26
<0.8	6

Max average correlation: 0.998 Min average correlation: 0.403

Table 2: Average shares of UK export destinations for each industry (1988-2004)

SIC code	US	Euro Zone	Other EC	Rest	SIC code	US	Euro Zone	Other EC	Rest
151	0.73%	82.25%	2.40%	10.90%	265	3.05%	62.94%	9.59%	15.75%
152	2.67%	77.57%	4.88%	10.41%	266	7.73%	66.19%	4.94%	12.97%
153	2.86%	71.00%	6.65%	11.71%	267	28.05%	41.24%	3.59%	21.14%
155	2.93%	69.35%	2.13%	14.94%	268	9.65%	57.17%	6.24%	13.79%
156	1.51%	75.56%	9.33%	7.52%	271	8.44%	56.44%	10.85%	15.20%
157	2.10%	72.55%	8.84%	7.46%	273	12.62%	53.20%	9.14%	13.37%
158	7.52%	53.06%	7.31%	18.14%	274	11.00%	47.62%	9.12%	25.04%
159	15.89%	40.42%	1.83%	25.60%	281	4.78%	43.96%	8.11%	24.23%
*160	0.61%	47.03%	0.29%	42.47%	282	7.27%	56.54%	7.87%	16.58%
171	5.12%	63.75%	5.45%	15.04%	*283	4.27%	21.91%	5.49%	49.99%
172	7.25%	42.99%	5.43%	28.13%	287	9.78%	53.23%	10.68%	13.71%
174	7.69%	63.70%	8.88%	9.96%	291	15.82%	36.56%	8.55%	22.82%
175	9.71%	52.96%	7.82%	15.04%	292	13.24%	43.27%	6.77%	17.61%
176	3.17%	60.27%	6.26%	21.06%	293	16.88%	47.04%	7.13%	16.82%
177	8.39%	67.30%	7.36%	12.33%	294	16.31%	44.74%	6.38%	18.33%
181	6.55%	72.42%	8.56%	9.46%	295	16.40%	35.17%	6.37%	19.38%
182	4.88%	60.20%	9.22%	14.95%	286	11.34%	52.71%	6.91%	14.28%
*183	1.77%	42.71%	9.31%	43.80%	297	6.04%	67.73%	5.33%	11.99%
191	13.54%	40.22%	3.56%	37.51%	300	11.51%	64.58%	8.51%	9.15%
192	9.76%	55.04%	10.10%	16.94%	311	12.98%	35.47%	5.54%	24.60%
193	14.47%	57.60%	4.55%	14.80%	312	11.90%	37.25%	6.54%	26.86%
201	3.69%	78.24%	4.98%	8.20%	314	7.50%	59.46%	9.76%	11.41%
202	3.60%	74.13%	6.18%	10.60%	315	7.90%	53.03%	9.35%	16.24%
203	2.58%	75.14%	3.32%	12.98%	321	9.97%	59.78%	5.08%	20.61%
204	2.20%	83.62%	7.21%	4.89%	323	6.76%	62.57%	7.66%	12.72%
205	15.82%	52.52%	7.90%	13.85%	331	17.31%	44.29%	6.85%	17.84%
212	9.85%	64.05%	5.28%	11.44%	*335	6.62%	26.24%	16.40%	44.35%
221	13.96%	40.82%	6.67%	24.07%	341	14.23%	65.51%	3.45%	10.28%
222	9.72%	51.97%	8.67%	13.39%	342	5.29%	71.22%	5.41%	11.61%
231	1.99%	29.60%	55.12%	11.22%	343	11.01%	60.33%	5.49%	14.10%
242	8.86%	47.10%	4.80%	17.73%	352	4.50%	45.43%	11.89%	30.66%
244	14.62%	48.76%	4.71%	18.68%	354	13.79%	65.15%	7.92%	9.48%
245	4.34%	55.98%	9.41%	16.36%	355	4.67%	51.17%	8.09%	27.72%
246	10.35%	49.33%	6.81%	15.92%	361	17.92%	55.98%	7.57%	11.22%
252	8.32%	58.31%	9.24%	10.94%	*362	13.98%	21.88%	15.22%	43.30%
261	9.14%	58.82%	7.90%	13.91%	363	20.42%	47.08%	6.28%	17.41%
262	18.31%	37.97%	4.20%	25.06%	364	10.31%	60.50%	13.22%	9.56%
263	12.04%	50.07%	2.01%	27.22%	365	8.79%	68.97%	7.35%	9.03%
264	1.85%	67.33%	1.73%	25.47%	366	10.92%	48.65%	7.90%	17.78%

Note: Euro zone: Austria, France, Germany, Finland, Italy, Belgium, Spain, Greek, Portugal, Netherlands, Ireland, and Luxembourg. Other EC: Denmark, Norway, Switzerland, and Sweden

Table 3: Statistics of percentage changes of REER across all industries

year	mean	max	min	SD
88-89	-11.79%	-8.93%	-15.07%	0.0132
89-90	12.16%	21.20%	6.70%	0.0276
90-91	0.89%	8.41%	-4.41%	0.0187
91-92	-12.59%	-6.47%	-17.89%	0.0206
92-93	6.27%	14.73%	-3.48%	0.0324
93-94	-3.55%	1.42%	-8.25%	0.0162
94-95	-6.48%	-4.16%	-9.47%	0.0100
95-96	13.56%	16.22%	7.46%	0.0160
96-97	9.27%	14.71%	-1.29%	0.0221
97-98	-3.02%	13.05%	-7.38%	0.0256
98-99	7.38%	16.83%	-2.04%	0.0300
99-00	-3.52%	6.65%	-8.89%	0.0204
00-01	0.40%	5.65%	-5.43%	0.0170
01-02	-3.49%	5.85%	-8.29%	0.0329
02-03	-5.30%	3.17%	-9.92%	0.0239
03-04	0.56%	4.63%	-6.10%	0.0176

Table 4: Structure of the unbalanced panel for the entire economy:

Number of Obs. Per Firm	Number of Firms	Percent	Cumulative
1	1,099	4.74	4.74
2	1,387	5.99	10.73
3	1,334	5.76	16.49
4	1,360	5.87	22.36
5	1,646	7.10	29.46
6	1,595	6.88	36.34
7	1,426	6.15	42.49
8	1,399	6.04	48.53
9	1,702	7.35	55.88
10	5,580	24.08	79.96
11	536	2.31	82.27
12	595	2.57	84.84
13	626	2.70	87.54
14	865	3.73	91.27
15	957	4.13	95.4
16	395	1.70	97.1
17	422	1.82	98.92
18	247	1.07	100.00
Total	23,171	100.00	

Table 5: Distribution of firm size for the entire sample

Size	Number of Employee	Number of Observations	Percent	Cum.
Micro	1-9	7,122	4.07	4.07
Small	10-49	40,611	23.18	27.25
Medium	50-249	86,912	49.61	76.86
Large	>=250	40,529	23.14	100.00
Total		175,174	100.00	

Table 6: Transition of firms in the sample

year	Total firms	Non-exporter	New exporter	Always exports	Firms exit
87-88	1520	185	162	1082	91
88-89	2214	313	178	1609	114
89-90	3494	504	358	2319	313
90-91	4389	955	295	2964	175
91-92	4898	1140	291	3338	129
92-93	5460	1212	329	3747	172
93-94	6701	1453	538	4439	271
94-95	8761	1990	768	5641	362
95-96	9929	2532	627	6490	280
96-97	9841	2534	565	6533	209
97-98	10099	2649	529	6691	230
98-99	9979	2738	411	6607	223
99-00	8573	2353	417	5573	230
00-01	8507	2358	446	5554	149
01-02	8609	2426	428	5588	167
02-03	8407	2436	367	5438	166
03-04	5012	1512	209	3203	88

Table 7: Models of export entry and exit

	(1)Entry: Fixed-effects Linear probability (t statistic)		(2)Entry: Ramdom-effects Probit (z statistic)		(3)Exit: Ramdom-effects Probit (z statistic)
	(a)	(b)	(a)	(b)	
Lag Industry REER	0.00048 (0.94)	0.00037 (0.80)	0.0037 (0.54)	0.0026 (0.42)	-0.0086 (-1.00)
Lag log of wage	-0.0082 (-1.36)	-0.0033 (-0.60)	-0.062 (-0.95)	0.0365 (0.76)	-0.045 (-0.70)
Lag log of employment	0.045 (17.39)***	0.0186 (7.74)***	0.368 (18.80)***	0.0857 (6.53)***	-0.0029 (-0.20)
Lag log of labor productivity	0.026 (6.82)***	0.0075 (2.16)**	0.274 (7.43)***	0.064 (2.52)**	0.0451 (1.39)
Lag log of age	0.011 (2.71)***	0.00006 (0.02)	0.0953 (3.56)***	0.00134 (0.09)	-0.0003 (-0.02)
Foreign owner dummy			0.4001 (5.49)***	0.2022 (5.43)***	-0.152 (-3.82)***
Lag Export dummy		0.3565 (87.56)***		2.888 (93.18)***	
Wald chi2			1885.63	11095.08	107.18
Number of firms	5, 876		5, 876		4, 238
Number of observations	44, 215		44, 215		33, 529

Note: (i) (a) reports results without lagged export status dummy, (b) reports those with lagged export status dummies.
(ii) * indicates significant at 10%; ** indicates significant at 5%; *** indicates significant at 1%

Table 8: Heckman selection model (MLE)

	(1) Heckman Selection Without REER		(2) Heckman Selection with REER		(3) Heckman Selection (interact with productivity)	
	Export Dummy	Export Share	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	**3.04 (39.85) *****		**3.04 (39.94) *****		**3.04 (39.95) *****	
Lag Industry REER			**0.00214 (0.33)**	**-0.0039 (-2.02) ****	**-0.00206 (-0.23)**	**-0.0024 (-0.77)**
Lag log of employment	**0.0435 (2.32)****	**0.0019 (0.39)**	**0.0435 (2.32)****	**0.00207 (0.44)**	**0.0436 (2.32)****	**0.0021 (0.43)**
Lag log of wage	**0.0358 (0.73)**	**0.0927 (3.12) *****	**0.0362 (0.73)**	**0.0916 (3.09) *****	**0.037 (0.75)**	**0.0913 (3.09) *****
Lag log of labor productivity	**0.0375 (1.20)**	**-0.011 (-1.14)**	**0.0375 (1.20)**	**-0.0102 (-1.09)**	**-0.0719 (-0.47)**	**0.0284 (0.48)**
Lag log of age	**-0.025 (-1.57)**	**-0.01 (-2.50) ****	**-0.0244 (-1.56)**	**-0.0096 (-2.53) ****	**-0.0246 (-1.57)**	**-0.0096 (-2.52) ****
Foreign owner dummy	**0.1317 (4.27) *****	**0.058 (6.82) *****	**0.1316 (4.26)*****	**0.058 (6.80) *****	**0.1315 (4.26) *****	**0.058 (6.80) *****
InREER* Labor prod					**0.00093 (0.71)**	**-0.00033 (-0.64)**
Lambda (standard error)	**-0.034 (0.006) *****		**-0.0341 (0.0057) *****		**-0.0341 (0.0057) *****	
Rho (standard error)	**-0.133 (0.02) *****		**-0.1331 (0.0210) *****		**-0.1331 (0.0210) *****	

Observations: 44, 251 **Firms:** 5, 876

Note: (i) Z statistics in parentheses, robust standard errors adjusted for 83 clusters in 3-digit industries.
(ii) *significant at 10%; ** significant at 5%; *** significant at 1%
(iii) ρ is the estimated correlation between the error terms of the two equations; if it is different from zero it suggests that the two equations are related and that the selection model is appropriate; λ is the estimated coefficients of the inverse Mills ratio; if it is different from zero it suggests that there is sample selection.

Table 9: Marginal effects of the Heckman selection model (clustered) from Table 8

(i)

	(1)		(2)	
	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	**0.817 (0.0116)*** **		**0.817 (0.0115)*** **	
Lag Industry REER			**0.00038 (0.00115)**	**-0.0034 (0.002)***
Lag log of employment	**0.0078 (0.0035)** **	**0.00440 (0.00462)**	**0.0078 (0.0035)** **	**0.00456 (0.00455)**
Lag log of wage	**0.0064 (0.0087)**	**0.085 (0.0275)*** **	**0.0065 (0.0087)**	**0.084 (0.027)*** **
Lag log of labor productivity	**0.0067 (0.0055)**	**-0.0072 (0.00879)**	**0.0067 (0.0055)**	**-0.0068 (0.00876)**
Lag log of age	**-0.00438 (0.0027)**	**-0.01004 (0.0036)*** **	**-0.00437 (0.0027)**	**-0.01015 (0.0036)*** **
Foreign owner dummy	**0.0234 (0.00567)*** **	**0.0606 (0.0086)*** **	**0.0234 (0.00567)*** **	**0.0605 (0.0086)*** **

Note: *significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Heckman selection model: foreign vs. domestic firms

	(1) Heckman Selection (interact with home and foreign dummy)		(2) Heckman Selection (foreign owned firms)		(3) Heckman Selection (UK owned firms)	
	Export Dummy	Export Share	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	**3.04 (40.11)*** **		**3.03 (39.27)*** **		**3.05 (34.56)*** **	
Lag Industry REER			**0.0015 (0.19)**	**-0.00306 (-1.40)**	**0.00246 (0.34)**	**-0.0049 (-2.47)** **
Lag log of employment	**0.0437 (2.32)** **	**0.00207 (0.44)**	**0.047 (2.27)** **	**0.0046 (0.79)**	**0.045 (1.95)* **	**-0.00137 (-0.26)**
Lag log of wage	**0.0368 (0.75)**	**0.0916 (3.10) *** **	**0.0103 (0.12)**	**0.1136 (4.76)*** **	**0.0515 (1.11)**	**0.074 (1.55)**
Lag log of labor productivity	**0.0375 (1.20)**	**-0.0102 (-1.09)**	**0.06 (1.54)**	**-0.01504 (-1.46)**	**0.0239 (0.62)**	**-0.00448 (-0.36)**
Lag log of age	**-0.0242 (-1.55)**	**-0.0096 (-2.52)** **	**-0.02996 (-1.68)* **	**-0.0109 (-2.38)** **	**-0.0217 (-0.94)**	**-0.0066 (-1.11)**
Foreign owner dummy	**-0.278 (-0.94)**	**0.0552 (1.24)**				
InREER* foreignown dummy	**0.00063 (0.59)**	**-0.00392 (-2.00)** **				
InREER* home dummy	**0.00413 (0.10)**	**-0.00395 (-2.02)** **				
Lambda (standard error)	**-0.0341 (0.004)*** **		**-0.0249 (0.0105)*** **		**-0.0402 (0.0059)*** **	
Rho (standard error)	**-0.1332 (0.0209)*** **		**-0.0924 (0.0388)*** **		**-0.167 (0.0245)*** **	
Observations	**44, 251**		**20, 572**		**23, 679**	

Notes for Table 10 and Table 11, see note for Table 8.

Table 11: Heckman selection model: big vs. small firms

	(1) Heckman Selection (interact with #emp dummy)		(2) Size (seperated): Big firms	(3) Size (seperated): Big & domestic	(4) Size (seperated): Big & foreign
	Export Dummy	Export Share	Export Share	Export Share	Export Share
Lag Export dummy	3.26 (40.57)***				
Lag Industry REER			-0.0045 (-1.88)*	-0.0057 (-2.14)**	-0.00315 (-1.28)
Lag log of employment	0.0176 (0.97)	0.0037 (0.53)	0.0185 (2.49)**	0.0074 (0.86)	0.0258 (2.66)***
Lag log of wage	0.0325 (0.77)	0.0991 (3.33) ***	0.091 (1.84)*	0.078 (0.93)	0.121 (3.42)***
Lag log of labor productivity	0.0432 (1.40)	-0.0106 (-1.06)	-0.0244 (-1.78)*	-0.0319 (-1.50)	-0.0202 (-1.09)
Lag log of age	0.0153 (0.95)	-0.0094 (-2.07)**	-0.0049 (-0.86)	0.0032 (0.46)	-0.0102 (-1.28)
Foreign owner dummy	0.09 (2.79)***	0.057 (6.28)***	0.0451 (3.78)***		
InREER* bigsize dummy	0.0126 (2.13)**	-0.004 (-2.02)**			
InREER* smallsize dummy	0.0122 (2.08)**	-0.00391 (-2.00)**			
Lambda (standard error)	-0.0574 (0.006)***		-0.0423 (0.006)***	-0.0383 (0.007)***	-0.049 (0.013)***
Rho (standard error)	-0.2247 (0.0217)***		-0.172 (0.024)***	-0.165 (0.035)***	-0.193 (0.048)***
Observations	44, 215		19, 488	9, 706	9, 782