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

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Abstract

This paper has looked empirically at the role of exchange rate movements and exchange rate uncertainty in affecting the firm decisions on export participation and export share. The analysis breaks down export adjustments between changes in export share by existing exporters and movements due to changes of entry into export markets. Using data on a representative sample of UK manufacturing firms, the paper finds sunk costs hysteresis to be an important factor in determining export market participation. the firm's export participation decision does not appear to be related to movements of exchange rate faced by the exporter. The exchange rates have a significant and negative impact on the export share of the firms after entering export markets. The responsiveness of the export share on the degree of exchange rate changes is not quantitatively small: one index point depreciation in REER index will increases export share by about 1.28 percent. We also find that the export behavior of multinational firms is less likely affected by exchange rate changes. Evidences on exchange rate uncertainty suggest that the size of uncertainty has little impact on export behavior, whereas the direction of it has significant effects and the effects are nonlinear.

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1. Introduction

When a firm invests in an industry or in international markets, it faces the impact of macroeconomic shocks, such as exchange rate fluctuations. Nominal and real exchange rates have fluctuated greatly since the early 1970s following the breakdown of the Bretton Woods System and greater fluctuations have led to increased interest on the effects that exchange rate movements have on international trade. In the past thirty years, there are a large number of studies focusing on finding empirical evidences at an aggregate level for the relationship between exchange rate variability and aggregate trade. Although many researchers and policy makers believe that exchange rate volatility has a negative impact on the level of international trade, the early empirical work (such as IMF 1984 and McKenzie 1999 for a survey) on the effect of exchange rate variability and aggregate trade did not yield consistent results: they find little or no significant evidences for the negative effect. Recent work on this topic adopting the gravity model has found some significant evidence of a negative relationship.[1] Recently there are few papers (such as Campa 2004 and Bernard and Jensen 2004a) using firm level micro data to examine the relationship between exchange rate movements and the export behavior of firms. Evidences from micro data are ambiguous.

Some theoretical literature illustrates the impact of exchange rate movements on a firm's export decisions. These models assume that a non-exporter must incur an entry cost to enter export markets and that this cost is sunk. Baldwin (1988) introduced the idea that large exchange rate swings can cause hysteresis effects on trade prices and quantities when market entry costs are sunk. In a world in which exchange rate changes are perceived to be permanent, the firm will enter the export market when expected gross profits from participating in that market are greater than the sunk entry cost. The firm will not exit the market until the exchange rate reaches the point where the expected gross profits from remaining in the market are negative. Baldwin (1988) and Baldwin and Krugman (1989) emphasize this effect and suggest that an asymmetry exists between the exchange rates that trigger entry to and exit from the export market.

[1] See Frankel and Wei (1993), Wei (1999), Dell' Ariccia (1999), Rose (2000), and Tenryro (2003).

Dixit (1989) and Krugman (1991) explore the implications of sunk costs in the context of an "option" approach. The key idea is that an exporting firm can be viewed as owning an option to leave the export market, and a non-exporter can be regarded as owning an option to enter it. Sunk entry costs combined with uncertainty over market values cause the trigger point for entry to rise and that for exit to fall relative to their Marshallian equivalents, widening the region of hysteresis. The entry trigger exceeds the variable cost plus interest on the entry cost, and the exit trigger is less than the variable cost minus the interest on the exit cost. These gaps produce hysteresis. The decision to enter or exit the exporting market involves considering explicit fixed and variable costs, but also the cost of exercising the option. The greater the volatility in exchange rates, the greater the value of keeping the option, and hence the greater the range of hysteresis. The size of the gap between the exchange rates that trigger entry and exit is not constant but an increasing function of the uncertainty around current exchange rates.

Empirical evidence for this issue seems especially important given that the effects of exchange rate movements on exports are ambiguous from past studies, and also to evaluate many countries' policy favoring a system of fixed or managed exchange rates to avoid the negative effects of exchange rate movements on international trade. This paper uses firm-level data from a sample of UK manufacturing firms to investigate the effects of exchange rates on firms' export behavior. It adds to the existing literature in four 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 exports 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 of export markets entry and their decision on the export shares after entry. Third, we investigate the different effects of exchange rates on export behavior of different ownership types of firms, foreign firms and domestic firms, in the UK. It provides little evidence for the effect of exchange rate movements on the export behavior of multinational firms, whereas significant evidence for negative effect of exchange rate on that of domestic firms. This is a new way to examine the export behavior of multinationals in response to exchange rate variability. Four, the effect of exchange rate uncertainty on firms export behavior is examined. We measure exchange rate uncertainty and investigate the issue in a novel way. And our results provide

some evidence for that increased exchange rate uncertainty would increase the inertia in firms export decision.

The exchange rates used in this paper are 3-digit industry specific real effective exchange rate (REER) indices from 1988 to 2004. The dataset merges Financial Analysis Made Easy (FAME) database with data from OneSource from 1987 to 2004. 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 of the presence of sunk costs in export markets. Although exchange rates have little effect on firm decisions to enter the export markets, they significantly affect the export shares. A one index point appreciation of the industry specific REER causes a 1.28 percent reduction of export share for a firm. We find that exchange rate movements have little impact on export behavior of multinationals, whereas significant impact on domestic firms in the UK. Exchange rate uncertainty is investigated in two ways: the size of uncertainty and the direction of uncertainty. Results show that the size has little impact on export behavior of firms, whereas the direction has significant impact on firms. And the impact of uncertainty with direction is nonlinear: increased uncertainty would induce bigger negative effects on export share of firms.

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

2. Economic Background

Theoretical background

To motivate our empirical analysis of micro data, we deal with sunk costs using the dynamic setting introduced by Bernard and Wagner (2001), Bugamelli and Infante (2003), and Tybout (2003). Denoting with EXP_{it} as a dummy variable equal to 1 if firm i exports in year t, and 0 otherwise, and denoting with F the sunk costs, the firm's payoffs from exporting take the following form:

$$\begin{array}{ll} \pi_{it}(e_{it,}c_{it},y_t)+v_{it} & \text{if } EXP_{it}=1 \text{ and } EXP_{i(t-1)}=1 \\ \pi_{it}(e_{it,}c_{it},y_t)-F+v_{it} & \text{if } EXP_{it}=1 \text{ and } EXP_{i(t-1)}=0 \\ 0 & \text{if } EXP_{it}=0 \text{ and } EXP_{i(t-1)}=0 \end{array}$$

where π_{it} denotes profits made by exporting, in excess of those made on the domestic market. π_{it} depends on the exchange rate (e_{it}), on marginal production costs (c_{it}), on a foreign demand shifter (y_t), and on a serially uncorrelated error term (v_{it}).

Denoting with δ the one-period discount rate, the optimal pattern of export market participation over time should satisfy the following Bellman equation:

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

Firms will find it optimal to export when:

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

Using a reduced-form approximation for the first two terms on the left-hand side of (2), leads to the following dynamic discrete choice of export market participation:

$$\begin{array}{ll} EXP_{it} = 1 & \text{if } \beta X_{it} + \gamma\, e_{it} + \eta\, EXP_{i(t-1)} + u_i + u_t + v_{it} > 0 \\ = 0 & \text{otherwise} \end{array} \quad (3)$$

This dynamic specification, which is close to that used in Bernard and Wagner (2001) and Bernard and Jensen (2004a), takes into account sunk entry costs directly through persistence in the firm's export behavior. A positive and significant η indicates that sunk costs are present, and a positive and significant γ indicates the effects of exchange rates on firm's export entry decision.

Empirical background

We firstly take a look at the empirical evidences from the aggregate level data. Almost all macro evidences examine the relationship of exchange rate volatility and trade. The ways to

measure volatility may influence the empirical evidences.[2] Generally early work provides little or no evidence of a negative effect of aggregate exchange rate volatility on aggregate trade. Hooper, Johnson, and Marquez (1998), and Thursby and Thursby (1987) regress the change in log export volumes on the change in log exchange rates and other variables, and find that the coefficient on log exchange rates is statistically insignificant. Some studies on bilateral trade find some but not robust evidence for a negative effect. Recent studies employing gravity model such as Dell' Ariccia (1999) and Anderton and Skudelny (2001) find a negative link, but the effects are not very large: complete elimination of volatility would raise trade by a maximum of 15 percent. Rose (2000) finds a small but significant negative effect: reducing volatility by one standard deviation (7 percent) around the mean (5 percent) would increase bilateral trade by about 13 percent.

Although macro evidences mainly focus on the effect of exchange rate volatility on trade rather than that of exchange rate movements on exports we examine in this paper, they give us a rough picture for this issue and some interesting aspects to think about: different effects between developed and developing countries, and differences between multinational and non-multinational companies. For developed countries where there are well developed forward markets, specific transactions can be hedged, thus reducing exposure to large movements in exchange rates. For multinational firms engaged in a wide variety of trade and financial transactions across a number of countries, fluctuations in different exchange rates may have offsetting effects on their profitability, thus may incur less impact from exchange rate movements. In this paper, we investigate the effects of exchange rates on multinational firms.

We then turn to micro evidences from firm level panel data. Studies using micro data have been more successful in finding relationships between export volumes and exchange rates. Bernard and Jensen (2004a) and Bugamelli and Infante (2003) use the model in Equation (3), which includes level of exchange rates as determinants of export market participation decisions, to exam the effects of exchange rates movements on export market entry. They employ a random-effects probit model, as well as a linear probability framework, to estimate the equation. The use of random effects requires that the firm specific effects be

[2] See Clark et al (2004) for the discussion of measuring exchange rate volatility.

uncorrelated with the regressors. The potential problems of linear probability method are well known: they fail 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 to export. Bernard and Jensen (2004a) find no significant effect of exchange rate on exports. Bugamelli and Infante (2003) find small significant effect: 1 percent real depreciation raised the probability to export by 0.2 percentage points.

As the only paper focusing entirely on this issue, Campa (2004) uses an alternative methodology to estimate the export supply equation with two components: (1) the export market participation condition of a firm; and (2) conditional on being an exporter the relationship between export volume and exchange rate changes. The exchange rate e_{it} and the conditional variance of the exchange rate σ_{it} for firm *i* are both included in its estimation. The model estimates export participation as a single equation. This equation is a dynamic random effects probit model and is 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 included in the export supply (export volume) 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 in both estimation processes. A 10% depreciation would cause a 7.7% change in export volume. Most of the change in export volume is due to those from 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 the devaluation episodes. Micro evidences show that changes of exports due to exchange rate movements come mainly from export production adjustment of existing exporters.

3. Econometric specification and estimation methodology

We examine the effects of exchange rates on firm export decision by a sample selection model, as well as comparing the results with those from some other methods. As firm characteristics tend to be correlated with unobserved firm effects, we initially estimate the following reduced form model with a fixed effects linear probability framework:

$$EXP_{it} = a_0 + a_1 emp_{i(t-1)} + a_2 wage_{i(t-1)} + a_3 laborprod_{i(t-1)} + a_4 age_{i(t-1)} + a_5 foreign_i +$$

$$+ a_6 EXP_{i(t-1)} + a_7 inREER_{i(t-1)} + u_i + e_{it} \qquad (4)$$

where the subscript i indexes firms; and t, time. EXP_{it} is a dummy variable equal to 1 if firm i exported in year t, and 0 otherwise. emp_{it} represents the logarithm of number of employees. $Wage_{it}$ is given by the ratio of the firms' total wage bill to number of employees; $laborprod_{it}$ represents labor productivity and is measured as the ratio of the firm's total real sales to its total number of employees; $foreign_i$ is a dummy equal to 1 if the firm is foreign owned, and 0 otherwise; $inREER_{it}$ is the 3-digit industry-specific REER. Finally, the error term is made up of two components: u_i, which captures time-invariant firm-specific effects not included among the regressors (such as managerial ability); and e_{it}, which is an idiosyncratic error term. All time-varying regressors are log lagged once to avoid possible simultaneity problems. We include industry dummies in all regressions. This controls for any fixed effects common across industries. When the equation is estimated on the entire time period, time dummies are also included to account for business cycle effects. The definitions of variables are shown in the Appendix. The problem of linear probability estimation method is that predicted probabilities may lie outside of the 0-1 range. Most

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.

Then we turn to a random effects probit model:

$$EXP_{it} = a_0 + a_1 emp_{i(t-1)} + a_2 wage_{i(t-1)} + a_3 laborprod_{i(t-1)} + a_4 age_{i(t-1)} + a_5 foreign_i +$$

$$+ a_6 EXP_{i(t-1)} + a_7 inREER_{i(t-1)} + u_i + u_t + e_{it}, \qquad (5)$$

where u_t is a time-specific component, accounting for business cycle effects. The use of random effects requires that the firm effects be uncorrelated with the regressors. As many papers have shown, some problems remain, such as plant characteristics may be correlated with unobserved plant effects, initial period export status may not be exogenous, and there may be sample selection bias. We follow Bernard and Jensen (2004a) to compare the results of random effects probit with fixed effects linear probability model.

Because of sunk costs of export market entry, 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. 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 assumes a positive value 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. The estimation can be conducted via maximum likelihood or a two-step method proposed by Heckman (1979). We employed the former as it is more efficient.[3] Here we estimated the two equations adding in the selection equation (equation modeling the decision whether to export or not) the lagged export dummy. The industry-specific REER is included in both equations to examine the effects of exchange rates on export participation and on export intensity respectively.

4. Computation of Industry-specific Exchange Rates

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

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

Where e_i: Exchange rate of currency *i* against Special Drawing Rights (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

An exchange rate can be expressed either in terms of the national currency value of a unit of foreign currency (price quotation system) or foreign currency value of a unit of the national currency (volume quotation system). While it is customary to express the exchange rate in the former, the latter is a more transparent indicator to assess the extent of appreciation and depreciation of the national currency. Here we express the exchange rate

[3] See Greene (2003) for the discussion.

in terms of foreign currency value of a unit of the domestic currency. An upward movement here represents appreciation and a downward movement represents depreciation.

We choose the period from 1988 to 2004 to compute industry specific REER in UK. There are two reasons for this: one is that the trade data available is OECD bilateral trade commodity data and trade commodity data from *www.uktradeinfo.com*. In this dataset, commodity trade date before 1988 uses SITC Rev.2 classification system, whereas data from 1988 to 2001 adopts SITC Rev.3. Trade data from *www.uktradeinfo.com* also uses SITC Rev.3, and there are obvious attractions to using the same classification system. The other reason is that the firm level data available to us is from 1987 to date, which is consistent with the period.

Computing the export weights

The current classification system of industries in the UK is UK SIC (2003). As noted already, commodity data is classified according to SITC Rev.3. So firstly we need to convert original SITC commodity data to SIC 3-digit manufacturing sector data. To do so, we use the UK SIC (2003) - SITC Rev.3 concordance after aggregating 5 digit SITC code to 3 or 4 digit SITC code 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*. Then we aggregate the commodity data to the 3 digit industry level data according to the concordance, calculated the export weights for each export destination country for each industry. Following Bernard and Jensen (2004a), the top 25 UK export destinations are chosen as the weights to calculate industry specific REERs. The weights we use to computer REER are normalized weights from the original ones for top 25 UK export destinations. The total percentages of export value for these destinations are always between 80% - 97%, and therefore capture the main changes in REERs. Moreover, almost all the individual trade (export) weights for the 26th export destinations in the industries are less than 1% during the period 1988-2004. So the remaining 3% to 20% can be confidently disregarded.

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 dollar 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; 1995 is also the base year for price indices.

There are a few price deflators which can be used to calculate REER: the consumer price index (CPI), the producer price index (PPI) or wholesale price index (WPI), or inflation index and GDP deflator. Due to the availability of data for price index for most comprehensive countries, 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. Some data for small countries are unavailable. So we ignore these data since the percentages of the small countries are quite small.

There are 103 three-digit industries. There is no export data for 8 industries. There are 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 them and end up with REER indices for 78 industries.

Results for REER

Figures 1 shows the REERs for 2-digit industries 31 to 36 as a typical example of the REER index movements during the period. 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.

Turning to the movements of industry specific REERs, troughs are in 1995 for 72 out of 78 industries, peaks are in 1999 for 63 out of 78 industries. To understand REER movements, we need information on export destinations. Table 2 shows each industry's 17 years average of the normalized weights of UK's exports to four groups of destinations: the US, Euro area, other main European countries, and the 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 (Industries 160, 183, 283, 335 and 362) have average shares greater than 40%, all of which are industries with the lowest mean correlation with other industries. Although shares of the US are not large compared to the Euro area, the US is among the top destinations in many industries. For many other countries such as Canada, China, Hong Kong and Singapore, their currencies peg the US dollar during most of the period 1988-2004. So we expect movements of Euro and USD to influence the REERs in UK significantly.

Figure 2 show the first differences of the logarithms of the REER index for the industries 31-36 to investigate changes of REERs for each year. Big shocks occurred between 1988-1993 and 1995-2000. Changes across all industries before 2001 are quite similar, whereas changes after 2001 are quite different. From Figure 3 for log differences of USD and Euro, superficially it is not difficult to find an explanation: the changes of USD and Euro broadly follow the same pattern before 2001, whereas after 2001, the shocks of these two are opposite. So the combination effects of shocks for the two are mixed. The statistics of the percentage changes of REER across all industries are shown in Table 3. The biggest average percentage change is in 1995-1996: 13.56% of appreciation. Other top percentage changes are 12.16% appreciation in 89-90 and 11.79% depreciation in 88-89. The most stable periods are 03-04 and 00-01 with low standard deviations. 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 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 Electronic Publishing in the Financial Analysis Made Easy (FAME) database and from OneSource. Due to the unavailability of trade data for service industries, we focus on data for manufacturing firms. Since firm level data from FAME only covers ten years from 1994 to 2004, we merge the dataset with OneSource which covers 1987 to 2000. This provides information on companies for the period 1987-2004.

The firms in our dataset operate in the manufacturing sector. Our panel includes a total of 188,986 annual observations on 23,171 companies. It has an unbalanced structure, with an average of 8 observations per firm. Table 4 reports the structure of the panel for the entire economy. There are missing values for each key variable we focus on. The last figure in each box of Column 1 of Table 7 reports the number of observations for each of our variables, with the largest number of observations for firm age and the 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 of the observations come from medium-sized firm. Micro and small-sized firms take up 27% and large firms account for 23%. Our dataset has an oversampling of large firms,[4] which may 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 the average percentage of switchers from exporter to nonexporter is less than 5%. This shows high persistence of firm export behavior. Table 7 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. Table 8 shows t-tests of differences in means, conditional export premium and t- statistics. As frequently found in the literature, at the mean, exporters are larger than non-exporters, in terms of employees, intangible assets, wages, and sales, and are typically older. Export shares are bigger for exporters than those of switchers. Although labor productivity is larger for nonexporters in our sample, t-test of differences in means shows that the difference between nonexporters and always exporters is statistically insignificant. All the medians are lower than the means, which indicates 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 at standard levels. In the last row of Table 8 we follow Bernard and Jensen (1999) in running a regression controlling for other firm level characteristics

[4] See Greenaway, Guariglia and Kneller (2005) appendix for the data reporting requirement regulations for partly explanation of the sample selection problem.

(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, which confirms the general findings in this area. The premium for real wage is significantly negative, which is not consistent with other papers.

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 rest variables for switchers are all between non-exporters and exporters. We further report the 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 for more than twice. The statistics show that except for age, intangible assets and real wage, all the statistics are the highest for firms which stopped exporting (except for the median of labor productivity). T-tests of difference in means are significantly negative compared to firms always export. Since these statistics are calculated without separating out those between the exporting periods and nonexporting periods, we further report in Table 9 the summary statistics of the variables for switchers, calculating statistics which distinguish exporting firm-year from nonexporting firm-year within each subgroup of switchers. The table confirms that the statistics for export-year observations are all higher than that for nonexport-year observations in the three cases.

Table 10 compares summary statistics and percentages of exporters by 2-digit industry. The last column shows that the industrial 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 percentages 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. The industry of motor vehicles, trailers and semi-trailers has the highest average annual sales; tobacco products industry employed the biggest number of employees; fabricated metal products

industry and the industry of publishing, printing and reproduction of recorded media have the largest number of observations at an average of 20,000 observations. There are some negative export premiums and quite large premiums we believe due to highly positively skewed distributions.

6. Main Results

Effects of exchange rate movements

Column 1 and 2 in Table 11 presents the results from estimating Equation (4) for linear probability model and Equation (5) for random effects probit respectively. As pointed out in Section 3, we will compare the results with those from heckman selection model to examine the effects of exchange rates. For each estimation, results without and with lagged export status dummies are reported in column (a) and (b). Of the firm level determinants, a number are consistent with those found in the previous literature. In all of the columns, size, as measured by the logarithm of number of employees, and labor productivity always have a significantly positive effect on export participation. The effects of wage and age are insignificant. Foreign owned firms in Column 2 are more likely to export than other firms (significant at 1%). The lag of the export dummy in both of Column (b) has a significant impact on export status next year, which confirms the existence of sunk costs. The coefficient of REER shows that exchange rate movements did not significantly affect the firms' behavior of export participation, which is consistent with Bernard and Jenson (2004a) using the same econometric methodology. Our results are also consistent with whose who use subsample of the same dataset for the UK firms such as Girma, Greenaway and Kneller(2004), Greenaway and Kneller(2004), and Greenaway, Guariglia and Kneller(2005) employing similar methodology. In both of Column (a), excluding the lagged export dummy allows us to check for the robustness of the effects of the remaining explanatory variables in our model. The results from this specification are quite similar to those in column (b) (only the age coefficients become significant), with generally higher levels of statistical significance of the coefficient estimates. Exchange rate movements have little impact on firm export participation adopting the estimation equations, which is consistent with the evidences we mentioned before. The limitation of the estimation models has been discussed in previous section. And these estimations only examine the export participation of firms.

Table 12 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 the previous export status of the firm: if a firm exported the year before it is much more likely to export this period also. This is consistent with the presence of sunk costs of export market entry, since they create hysteresis in export behaviour. 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 due to the control for selection bias of the selection model and is consistent with Kneller and Pisu (2005) using the same methodology for a subsample of the data.

The second subcolumn reports results for export share equation. It tells a different story: the effect of size becomes insignificant, the effects of wage become fairly significant at 1%, and the coefficient of age is negative as before and becomes significant. The foreign owner dummy has a significant coefficient in both equations as expected, suggests a strong effect of foreign ownership on firm export behavior. Foreign country dummies are very important both in the participation decision 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 host country are more likely to involve in exporting to other countries.

Column 2 report the effects of including the exchange rate as an independent exogenous variable. Adding this has little impact on the other coefficients, which shows that level of 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 findings of Campa (2004), but is consistent with other empirical evidences mentioned in Section 2. This may also be regarded as the inertness of firms export participation to exchange rate movements due to uncertainty (as shown in Baldwin and Krugman 1989, Dixit 1989 and Krugman 1991) and/or price stickiness. However, exchange rate

movements have a significant impact on firm export shares decision with expected signs and significant coefficients in the export share equation even after the standard errors being controlled for the industry cluster.[5] The results suggest that the exchange rate does not significantly affect a firm's decision of export participation, but significantly influence the intensity of exports after the firm enters the export market. Export adjustments to changes of exchange rates are mainly made by the existing exporters. This is consistent with the microeconomic findings of Campa (2004) and Bernard and Jensen (2004b). The results may suggest that exchange rate changes have a significant effect on variable trade costs rather than on sunk entry costs.

Since there may be an effect on the most productive non-exporting firm (i.e. the firm whose productivity is just below the cut-off value necessary to make positive profits from exporting). To capture this we interact the firms' labor productivity with the industry specific REER. The results in Column 3 of Table 12 show that the interaction term is insignificant and positive in the export participation regression, which suggest little effects of REER on export entry for marginal firms. Due to the high collinearity between the direct effect of productivity and the interaction term, we include only the interaction term in the regressions. The results in Column 4 show that the interaction term is still insignificant and positive in the export participation regression. Adding the interaction term has little impact on the estimation of other coefficients. It is suggestive that the lowering of REERs led to little additional export market entry amongst the most productive nonexporters. Overall the evidence shows little effects of REER changes on marginal firms.

To understand the economic magnitude of the effects we report in Table 13 the marginal effect of the Heckman selection model whose results are reported in Table 12. The marginal effect is calculated at the mean of each of the variables. Concentrating on the effect of the exchange rates on export share, the table shows that adding 1 index point (1995=100) to the REER will increase the export share by about 0.0034 percentage points, which is equivalent to an increase of about 1.28 percent.[6] As the REER index mainly

[5] Since our exchange rate is industry-specific REER, industry clustered adjustment may mitigate the effects of exchange rate on export.
[6] 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.

changes between 3 and 10 index points each year, it therefore induces the 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 impacts on export shares, compared with those of other studies from micro data such as Campa (2004), in which 10 percent depreciation results in increases in export volume due to the increase in export intensity of 6.3 percent. We should note that Campa (2004) uses export volume instead of export share in his regression.

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. Here we regard foreign owned firms as the proxy of multinationals and domestic firms as non-multinationals, though we believe some of the domestic firms are multinationals but with a much smaller ratio of multinationals than that of foreign firms. To capture this we interact the foreign owner dummy and domestic owner dummy with the industry specific REER. The results in Column 1 of Table 14 show that the interaction terms are both significant in export share equation and insignificant in export participation decision as before. Although in export share equation, the coefficients and z statistics for domestic firms and foreign firms are different from each other, the differences are quite small, which shows little different impacts of REER on different types of firms. However, we find that the coefficient of foreign owner dummy becomes insignificant in this case. We check the correlation between the interaction terms and foreign owner dummy, and find that the correlation is more than 0.99. The interaction term may be picking up the direct effect of foreign owner dummy.

Alternative approach to dealing with this correlation is to estimate the selection model separatedly within the two subsamples. Column 2 and 3 of Table 14 reports the results separating the different types of the firms. Column 2 shows the results for the subsample of foreign owned firms in UK. The coefficients of exchange rate in export share equation become insignificant with expected signs. The results in Column 3 for the subsample of domestic firms show that exchange rate changes have more significant effects on export shares than those in Table 12. Exchange rates have little impact on firm export participation

decision in both cases as before. 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 of firms may be due to other factors such as firm size and country of origin. Size is the best and most obvious discriminator to use. As pointed out in some papers on financial factors of firms such as Greenaway, Guariglia and Kneller (2005), size has been extensively used in the financing constraints literature as a proxy for the financial constraints faced by firms. Size plays some role in affecting the firm's ability to finance export market entry costs and impacts of macro shocks. Big sized firms less likely to face financial constraints are less likely to be influenced by shocks. Obtaining external finance is likely to be particularly costly for smaller firms which facing more financial constraints. In order to check the robustness of the different effects of REER on different ownership types of firm, we examine the effects of REER on big/small firms. We use number of employees as the proxy for firm size and firms are divided into 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 2 of Table 15 reports the results. We find that 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 positively significant, whereas the coefficient of size (number of employees) becomes insignificant in 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 former regression.

As has done before, we then separately examine the effects of REER for subsamples of firms. The results are shown in Table 16. Column 1 and 4 show 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 firm size but due to ownership, as the size of foreign firms is generally

bigger than that of domestic firms (shown in Table 17). Further splitting the big firms into foreign and domestic, we find that the coefficient for foreign firms is insignificant and significant for domestic big firms in Column 2 and 3. This confirms the role of ownership. Splitting small firms by ownership, the coefficients are all insignificant. A possible explanation for the insignificant coefficients for small firms is that the export share is very small for these firms, and thus they are less likely to be impacted by exchange rate movements. The mean and median of export share for small domestic firms are 0.178 and 0.05 respectively, whereas those for big domestic firms with significant coefficient are 0.20 and 0.10. Those for all the foreign firms reach 0.29 and 0.19. All of them are positively skewed distributed, but much highly skewed for small domestic firms with half of them below 0.05.

Real sales is an alternative proxy for size. Table 17 reports the summary statistics of size for foreign and domestic firms. The differences in the statistics of sales between foreign and domestic firms are much larger 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 16: size does not matter. Results above 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. The evidence confirms the results and argument of the effects of ownership of firms we present before.

Exchange rate uncertainty

Most empirical work on aggregate trade and exchange rates examines the impact of exchange rate volatility on aggregate trade volume. Most equate volatility with uncertainty. We then examine the effects of exchange rate uncertainty on firm export behavior. The first problem in estimating the effects of exchange rate uncertainty on export behavior is choosing an appropriate variable to represent instability. The literature has used a number of measures of exchange rate volatility and variability as a proxy for risk. Some papers use conditional variances from GARCH model as Campa (2004) or the standard deviation of the first differences of the logarithmic exchange rate. This latter measure has the property

of being zero in the presence of an exchange rate that follows a constant trend, and it gives a larger weight to extreme observations (consistently with the standard representation of risk-averse firms). Others (such as Dell'Ariccia 1999) consider the average absolute difference between the previous period forward rate and the current spot to be the best indicator of exchange rate risk. The advantage of this measure is that, under a target zones regime, or under pegged but adjustable exchange rates, it would pick up the effect of the presence of a "peso problem" or the lack of credibility of the official parity. It also takes firms' hedge behavior into consideration. When hedging instruments are available, the predicted part of exchange rate volatility can be hedged away and hence may not have much effect on trade. The extent to which exchange rate volatility is a source of uncertainty and risk depends on the degree to which exchange rate movements are predictable. This suggests that the appropriate measure of risk/uncertainty should be related to deviations between actual and predicted exchange rates. Another possibility is to use the percentage difference between the maximum and the minimum of the nominal spot rate over the t years preceding the observation, plus a measure of exchange rate misalignment. This index stresses the importance of medium-run uncertainty. The idea is that large changes in the past generate expected volatility. It is worth noting that the measures proposed as proxies for risk are backward-looking, the assumption being that firms use past volatility to predict present risk. Moreover, there are many other issues that need to be considered: data frequency such as weekly, monthly or quarterly changes; which temporal window; etc.

Here we use the difference between the previous forward and current spot rates to measure exchange rate uncertainty. The use of this difference assumes that hedging is a viable alternative to cover foreign transactions. This measure reflects uncertainty only insofar as hedging is costless (which it is not), or can cover all foreign transactions (which it cannot). So spot rates and forward rates for the currencies of UK's main export destinations are needed. Since we have shown before that the changes in the REER mainly depend on two currencies: Euro (German Mark) and US dollar, we use exchange rate data for these two currencies and compute weighted average industry specific exchange rate volatility by using normalized export weights for the two currency areas in each 3-digit industry. We include China, Hong Kong, Taiwan, Singapore and Canada into the US dollar area as the

currencies in these areas pegged US dollar in most of the period we investigate. The data we use to calculate two types of exchange rate volatility is from *Datastream*. We focus on differences between the spot rate and previous 3 month forward rate. Since the period between placing an order and receiving the payment for firms is usually three months, we follow Dell'Ariccia (1999) choosing 3 month forward rate to compute the uncertainty. The data we use is monthly exchange rates (spot and 3 month forward rates) at the mid-of-month (the 13^{th} of each month), expressed as foreign currency per GBP. The uncertainty for each year is calculated in two ways: the average of the 12 monthly differences between logarithms of spot rate and logarithms of 3 month forward rate predicted 3 months earlier (positive if appreciation, negative if depreciation), and the average of the absolute value of the12 monthly differences. To capture short run volatility, we lagged 3 months to calculate uncertainty, i.e. for each year the 12 monthly data is from October of the previous year to September of the current year. The use of average differences is novel as no existing literature takes the sign of differences into consideration.

The results of the selection model with uncertainty are shown in Table 18. Column 1 reports the results using average of monthly differences, column 2 using average of absolute value of monthly differences. In Column 1, the coefficient of uncertainty is negative as expected and significant in the export share decision, whereas insignificant in the export participation decision. In Column 2, the coefficient is always negative and insignificant. Although the value of uncertainty using average absolute value is generally bigger than that using average value, the latter can capture the main direction of exchange rate uncertainty by offsetting shocks with different directions across a year, whereas the former cannot. This suggests that the direction of uncertainty has little effect on firm export participation decision, but has significant negative effects on the export share decision. The size of uncertainty has little impact on firm export behavior according to the results in Column 2. However, Dell'Ariccia (1999) on macro data using the sum of squares of the forward errors as uncertainty finds significant and negative effects of exchange rate uncertainty on trade. Whether or not the uncertainty changes greatly in size, it has little impact on the export behavior of firms. What really matters is the main direction of uncertainty movements. The comparison of the different impacts between average and average absolute uncertainty gives us a novel way to examine the role of uncertainty on the

export behavior of firms. The results in Column 1 and 2 together provide some evidence for the hypothesis in Dixit (1989) and Krugman (1991) that the size of hysteresis gap for firms to response to exchange rates uncertainty shocks is not constant but an increasing function of the uncertainty. Increased exchange rate uncertainty would increase the inertia in firms export decision according to the "option" approach. However, the hypothesis focuses on the export participation decision rather than the export share decision shown in our results.

We further investigate possible nonlinearity in uncertainty. Table 19 reports the results when adding the square of uncertainty in the selection model. Only the coefficient of uncertainty using average value in the export share equation is significant. Moreover, the square of uncertainty is negative and significant, which suggests that increased shocks/uncertainty would induce bigger negative effects on the export share decision of firms.

In the end, we examine the effects of uncertainty on different types of firms (foreign vs. domestic). As before, we separately examine the effects of uncertainty for two groups of firms. The coefficients of uncertainty using absolute value are both insignificant in the two subsample selection models, as is in the former regression. So the results using this measure cannot provide any valuable evidence for this. So we use average value as uncertainty and Table 20 shows the results. As with REERs, the coefficient of uncertainty in the export share decision for foreign firms becomes insignificant, whereas that for domestic firm becomes much more significant. Uncertainty is always insignificant in the export participation decision. The evidence shows that exchange rate uncertainty only negatively affects the export share decision. Multinationals are less likely to be influenced by exchange rate uncertainty. The results together with those from level of REER provide evidences for the hypothesis of the offsetting effects of multinationals.

7. Conclusion

This paper has looked empirically at the role of exchange rate movements and exchange rate uncertainty in affecting the firm decisions on export participation and export share. The

analysis breaks down export adjustments between changes in export share by existing exporters and movements due to changes of entry into export markets. Using data on a representative sample of UK manufacturing firms, the paper finds sunk costs hysteresis to be an important factor in determining export market participation. We find that the firm's export participation decision does not appear to be related to movements of exchange rate faced by the exporter. The exchange rate has a significant and negative impact on the export share of the firms after entering export markets. The responsiveness of the export share on the degree of exchange rate changes is not quantitatively as small as that in Campa (2004). One index point depreciation in REER index will increases export share by about 1.28 percent. We also find that the export behavior of multinational firms is less likely affected by exchange rate changes than that of non-multinationals. The results provide evidences for the hypothesis of the offsetting effects of multinationals. Evidences on exchange rate uncertainty suggest that the size of uncertainty has little impact on export behavior, whereas the direction of it has significant effects and the effects are nonlinear.

The results in the paper suggest that trade adjustments due to exchange rate changes mainly occur through the adjustment of export share by existing exporters rather than through changes in the number of exporting firms. We realize that firm exit decision is not examined in our study. Exchange rate changes may have impact on firm exit as well as firm export entry. Since the percentage of quitters in our sample is averagely less than 5 percent and the limitation of Heckman selection model in estimating firm exit behavior, we do not investigate exit decision in this paper.

Although we examine the effects of exchange rates uncertainty on export, our results are quite rough and do not provide sufficient evidence to test the hypothesis of hysteresis of firms export behavior responding to exchange rates uncertainty. The existing theoretic literature does not provide any information for the export share decision of firms in response to exchange rate uncertainty. Continuing work in these directions will help us better understand the dynamics of firm export behavior in international markets.

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Appendix: 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. We therefore 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

Figure 1: Industry-specific REER for SIC industry 31-36

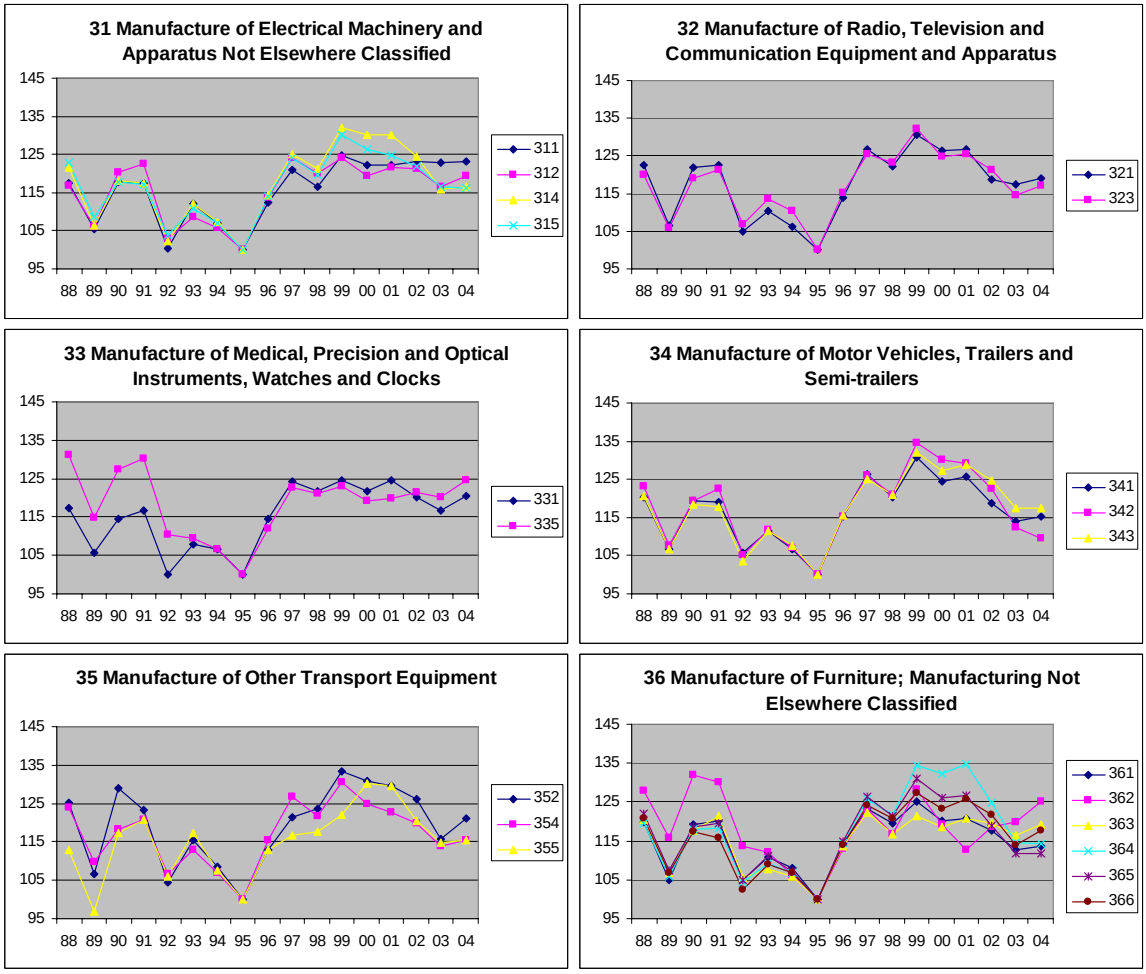

Table 1: Mean of Correlations of REER for Each Industry

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%

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

Figure 2: First Differences of REER for SIC industry 31-36

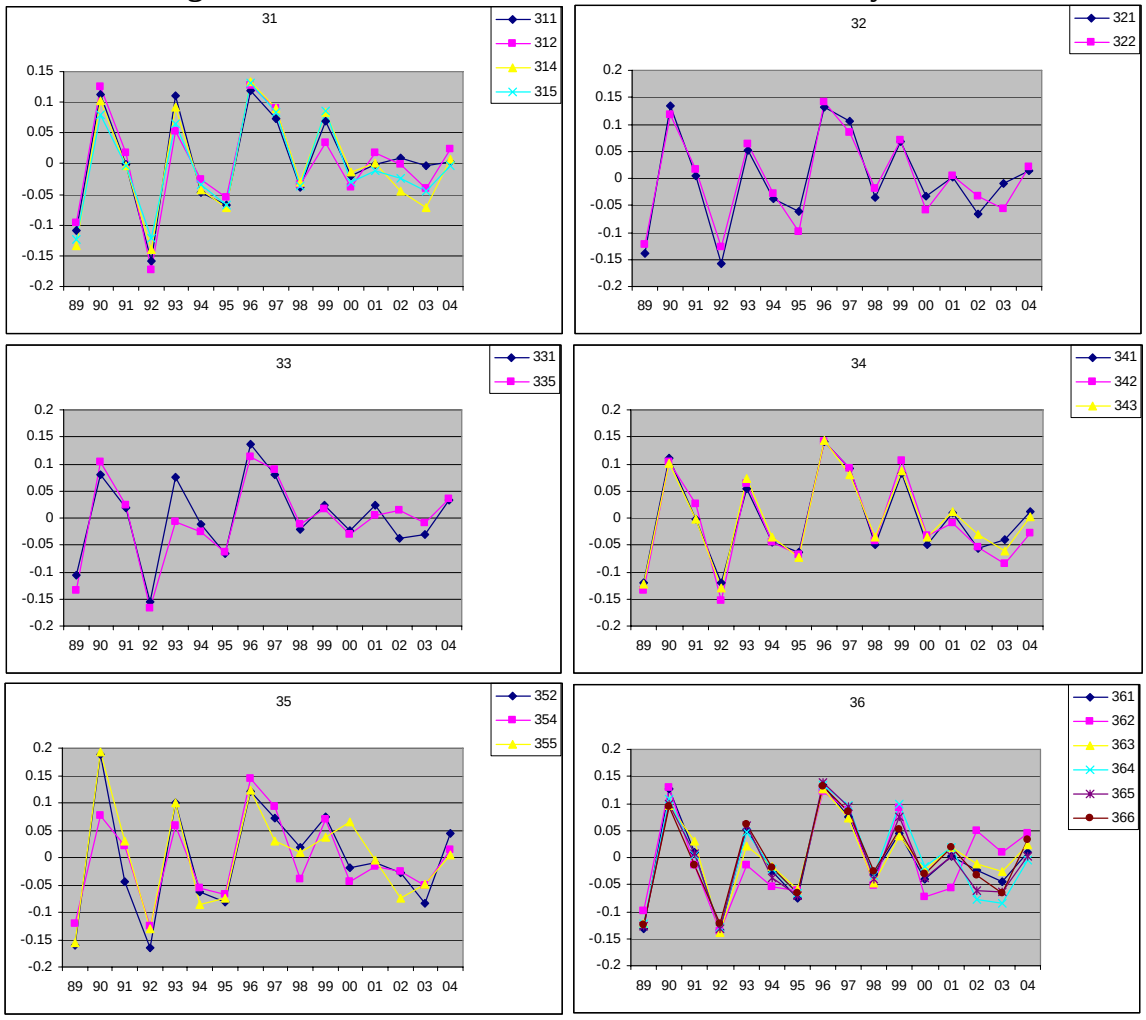

Figure 3: First Differences of Log USD/GBP and EUR(DM)/GBP

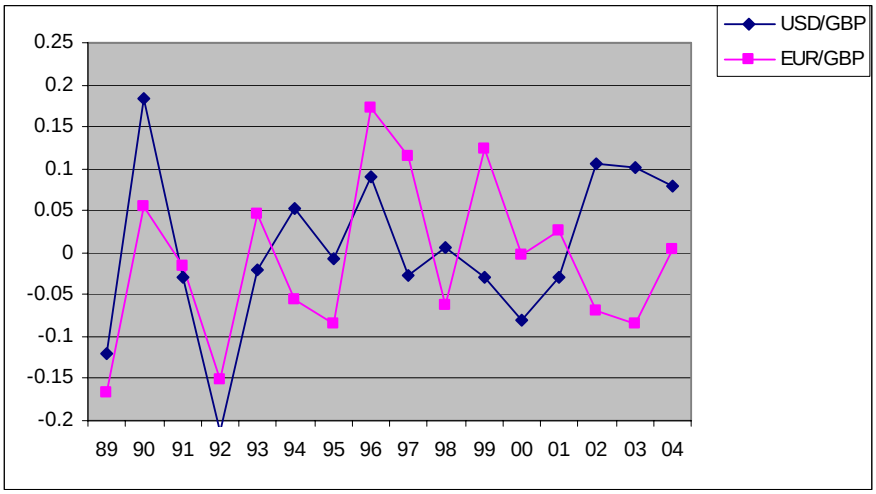

Table 3: Statistics of Percentage Changes of REER across All Industries

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: 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.

Table 8: 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: $\ln Y_{it} = a_0 + a_1 EXPDUM_{it} + a_2 \ln Z_{it-1} + \sum a_j IND_j + \sum a_t T_t + \varepsilon_{it}$

Table 9: 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.

Table 10: 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 11: models of export participation

	(1)Fixed-effects Linear probability (t statistic)		(2)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)
Lag log of wage	-0.0082 (-1.36)	-0.0033 (-0.60)	-0.062 (-0.95)	0.0365 (0.76)
Lag log of employment	0.045 (17.39)***	0.0186 (7.74)***	0.368 (18.80)***	0.0857 (6.53)***
Lag log of labor productivity	0.026 (6.82)***	0.0075 (2.16)**	0.274 (7.43)***	0.064 (2.52)**
Lag log of age	0.011 (2.71)***	0.00006 (0.02)	0.0953 (3.56)***	0.00134 (0.09)
Foreign owner dummy			0.4001 (5.49)***	0.2022 (5.43)***
Lag Export dummy		0.3565 (87.56)***		2.888 (93.18)***
Wald chi2			1885.63	11095.08

Notes: **Firms: 5876** **Observations: 44215**

(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 12: Heckman selection model (MLE)

	(1) Heckman Selection Without REER		(2) Heckman Selection with REER		(3) Heckman Selection (interact with productivity)		(4) Heckman Selection (interact with productivity)	
	Export Dummy	Export Share	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) ***		3.04 (39.93) ***	
Lag Industry REER			0.00214 (0.33)	-0.0039 (-2.02) **	-0.00206 (-0.23)	-0.0024 (-0.77)	0.00068 (0.10)	-0.0035 (-1.72)*
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)	0.0436 (2.32) ***	0.00204 (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) ***	0.0358 (0.72)	0.0919 (3.07) ***
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) **	-0.0245 (-1.56)	-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) ***	0.1315 (4.25) ***	0.0584 (6.82) ***
InREER* Labor prod					0.00093 (0.71)	-0.00033 (-0.64)	0.00033 (1.23)	-0.00009 (-1.12)
Lambda (standard error)	-0.034 (0.006) ***		-0.0341 (0.0057) ***		-0.0341 (0.0057) ***		-0.0341 (0.0057) ***	
Rho (standard error)	-0.133 (0.02) ***		-0.1331 (0.0210) ***		-0.1331 (0.0210) ***		-0.1332 (0.0211) ***	

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

(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 13: Marginal effects of the Heckman selection model (clustered) from Table 12

	(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)*** **

(i) *significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: Heckman selection model: foreign vs. domestic firms

	(1) Heckman Selection (interact with home and foreign dummy)		(2) Heckman Selection (foreign owner dummy=1)		(3) Heckman Selection (foreign owner dummy=0)	
	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	

(i) Notes for Table 14 – Table 20 (except Table 17), see notes for Table 12.

Table 15: Heckman selection model: big vs. small firms

	(1) Heckman Selection		(2) Heckman Selection (interact with #emp dummy)	
	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	3.04 (39.94)***		3.26 (40.57)***	
Lag Industry REER	0.00214 (0.33)	-0.0039 (-2.02)**		
Lag log of employment	0.0435 (2.32)**	0.00207 (0.44)	0.0176 (0.97)	0.0037 (0.53)
Lag log of wage	0.0362 (0.73)	0.0916 (3.09)***	0.0325 (0.77)	0.0991 (3.33) ***
Lag log of labor productivity	0.0375 (1.20)	-0.0102 (-1.09)	0.0432 (1.40)	-0.0106 (-1.06)
Lag log of age	-0.0244 (-1.56)	-0.0096 (-2.53)**	0.0153 (0.95)	-0.0094 (-2.07)**
Foreign owner dummy	0.1316 (4.26)***	0.058 (6.80)***	0.09 (2.79)***	0.057 (6.28)***
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)	-0.0341 (0.0057)***		-0.0574 (0.006)***	
Rho (standard error)	-0.1331 (0.0210)***		-0.2247 (0.0217)***	

Table 16: Heckman selection model: size (separated)

		(1) Big size firm	(2) Big size & dometic	(3) Big size & foreign	(4) Small size
Export share	LagIndustry REER	-0.0045 (-1.88)*	-0.0057 (-2.14)**	-0.00315 (-1.28)	-0.0031 (-1.35)
	Lag log of employment	0.0185 (2.49)**	0.0074 (0.86)	0.0258 (2.66)***	-0.0229 (-2.17)**
	Lag log of wage	0.091 (1.84)*	0.078 (0.93)	0.121 (3.42)***	0.121 (4.57)***
	Lag log of labor prod.	-0.0244 (-1.78)*	-0.0319 (-1.50)	-0.0202 (-1.09)	-0.0182 (-1.49)
	Lag log of age	-0.0049 (-0.86)	0.0032 (0.46)	-0.0102 (-1.28)	-0.0149 (-2.47)**
	Foreign dummy	0.0451 (3.78)***			0.0653 (5.75)***
Export dummy	LagIndustry REER	0.0123 (1.60)	0.0108 (0.81)	0.012 (0.82)	0.011 (1.38)
	Lag log of employment	-0.017 (-0.76)***	-0.021 (-0.70)***	-0.004 (-0.14)	0.0873 (2.88)***
	Lag log of wage	0.0958 (1.25)	0.126 (1.37)	0.057 (0.56)	-0.0032 (-0.06)
	Lag log of labor prod.	0.0141 (0.29)	-0.0267 (-0.44)	0.058 (0.89)	0.081 (2.49)
	Lag log of age	-0.0058 (-0.26)*	-0.0133 (-0.43)	-0.0037 (-0.15)	0.042 (1.90)*
	Foreign dummy	0.1045 (2.48)**			0.092 (2.19)**
	Lag Export dummy	3.28 (37.20)***	3.35 (34.01)***	3.23 (30.60)***	3.24 (38.45)***
	Lambda (std. error)	-0.0423 (0.006)***	-0.0383 (0.007)***	-0.049 (0.013)***	-0.0719 (0.008)***
	Rho (std. error)	-0.172 (0.024)***	-0.165 (0.035)***	-0.193 (0.048)***	-0.273 (0.027)***
	Observations	19488	9706	9782	18887

Table 17: Statistics of firm size: foreign vs. domestic firms

	Foreign owner firms		Domestic firms	
	mean	median	mean	median
# employees	418.41	146	374.4277	116
Real sales	55339.79	14448.09	36685.51	8222.491

Table 18: Heckman selection model: uncertainty

	(1) Heckman Selection with uncertainty (average)		(2) Heckman Selection with uncertainty (avg. abs. value)	
	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	3.04 (39.94)***		3.04 (39.95)***	
LagIndustry REER	0.00201 (0.32)	-0.0037 (-1.98)**	0.00215 (0.34)	-0.00393 (-2.02)**
Lag log of employment	0.0435 (2.31)**	0.00212 (0.45)	0.0435 (2.31)**	0.00206 (0.44)
Lag log of wage	0.0366 (0.74)	0.091 (3.07)***	0.0363 (0.73)	0.0915 (3.09)***
Lag log of labor prod.	0.0374 (1.19)	-0.010 (-1.07)	0.0374 (1.19)	-0.0101 (-1.09)
Lag log of age	-0.0244 (-1.56)	-0.0097 (-2.53)**	-0.0244 (-1.56)	-0.0096 (-2.53)**
Foreign dummy	0.1316 (4.26)***	0.058 (6.81)***	0.13176 (4.26)***	0.058 (6.80)***
Uncertainty (average)	3.23 (0.34)	-5.144 (-2.18)**		
Uncertainty (avg absol)			-0.42 (-0.03)	-0.623 (-0.27)
Lambda (std. error)	-0.0339 (0.0056)***		-0.034 (0.0057)***	
Rho (std. error)	-0.1323 (0.0210)***		-0.1331 (0.0210)***	

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

Table 19: Heckman selection model: uncertainty (nonlinearity)

	(1) Heckman Selection with uncertainty (average)		(2) Heckman Selection with uncertainty (avg. abs. value)	
	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	3.04 (39.90)***		3.04 (40.00)***	
LagIndustry REER	0.00203 (0.32)	-0.00379 (-2.04)**	0.00218 (0.34)	-0.0039 (-2.02)**
Lag log of employment	0.0435 (2.31)**	0.00215 (0.46)	0.0435 (2.31)**	0.00206 (0.44)
Lag log of wage	0.0361 (0.73)	0.0905 (3.06)***	0.0363 (0.73)	0.0915 (3.09)***
Lag log of labor prod.	0.0374 (1.20)	-0.0099 (-1.07)	0.0374 (1.19)	-0.0101 (-1.09)
Lag log of age	-0.0243 (-1.56)	-0.0096 (-2.52)**	-0.0244 (-1.56)	-0.0096 (-2.53)**
Foreign dummy	0.1317 (4.27)***	0.058 (6.81)***	0.13176 (4.26)***	0.058 (6.80)***
Uncertainty (average)	6.64 (0.74)	-3.99 (-2.04)**		
Sqr. Uncert. (average)	-490.97 (-1.17)	-163.27 (-1.80)*		
Uncertainty (avg absol)			-3.67 (-0.10)	-0.435 (-0.08)
Sqr. Uncert. (avg absol)			92.34 (0.10)	-5.137 (-0.04)
Lambda (std. error)	-0.0340 (0.0057)***		-0.0341 (0.0057)***	
Rho (std. error)	-0.1329 (0.0210)***		-0.1331 (0.0210)***	

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

Table 20: Heckman selection model (uncertty.): foreign vs. domestic firms (separated)

	(1) Heckman Selection With uncertainty (foreign owner dummy=1)		(2) Heckman Selection with uncertainty (foreign owner dummy=0)	
	Export Dummy	Export Share	Export Dummy	Export Share
Lag Export dummy	3.03 (39.30)***		3.05 (34.56)***	
Lag Industry REER	0.0018 (0.22)	-0.0029 (-1.40)	0.0022 (0.30)	-0.0046 (-2.38)**
Lag log of employment	0.047 (2.26)**	0.0046 (0.80)	0.0456 (1.95)*	-0.00125 (-0.24)
Lag log of wage	0.0103 (0.12)	0.1134 (4.74)***	0.0523 (1.12)	0.073 (1.53)
Lag log of labor productivity	0.06 (1.54)	-0.015 (-1.46)	0.0236 (0.61)	-0.00413 (-0.33)
Lag log of age	-0.030 (-1.68)*	-0.0109 (-2.38)**	-0.0216 (-0.94)	-0.0067 (-1.12)**
Uncertainty (average)	-7.48 (-0.52)	-2.26 (-0.85)	8.33 (0.60)	-7.33 (-2.98)***
Lambda (standard error)	-0.0248 (0.01057)***		-0.0399 (0.0059)***	
Rho (standard error)	-0.092 (0.0387)***		-0.167 (0.0246)***	
Observations	20572		23679	