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Firm Export Participation: Entry, Spillovers and Tradability

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Abstract

This paper analyses the choices made by individual firms to enter the export market. It uses data on a sample of Irish firms over seventeen years to test whether sunk costs influence the decision to export. A probit specification tests the probability of exporting in the current period given past exporting experience, controlling for the firm's initial export status. Methodologically, the contribution of this paper is the use of a two-step estimation procedure suggested by Orme (1997), which controls for the influence of initial conditions. In addition, this paper tests for the existence of spillover effects in exporting, in particular if the levels of export activity in a sector increase the probability of a firm participating in the export market. Significant evidence of sunk costs was found, based on the observed persistence of export activity and the explanatory power of previous exporting experience on current export status. A measure of sector tradability was also used, and as expected firms in more easily traded sectors were most likely to be exporters. However, little evidence of spillovers was found in determining export market participation.

1. Introduction

Firm involvement in the export market is typically characterised by a high degree of persistence, which has been assumed to be due to the existence of a sunk cost of entry (Krugman, 1989). The increasing availability of firm level data has led to a number of papers testing the presence and extent of these sunk costs and firm decisions to export (Roberts and Tybout, 1997; Bernard and Wagner, 1998; Bernard and Jensen, 2001). Recent literature in this area has also suggested that the sunk costs identified in entering the export market may be reduced if there are other domestic or multinational firms actively exporting in the same sector (e.g. Aitken, Hanson and Harrison, 1997). Such positive spillovers to firms entering the export market could arise from a variety of sources, such as knowledge spillovers relating to the structure and conditions of the foreign markets, or possibly even more directly through improved transport infrastructure and increasing access to distribution networks.

This paper adds to the literature in a number of ways. Methodologically, we use a two-step estimation procedure suggested by Orme (1997) to control for the influence of initial conditions. This adjustment allows us to control for the fact that many firms in the survey were already exporters before our first sample period and the unobservable pre-sample characteristics and decisions of the firm may be important in explaining their decisions during the observed sample period. The method used therefore models the first sample period separately and uses the residuals as a variable in the panel estimations that follow. This two-step Orme correction for initial conditions has not previously been

applied to the question of export participation, although it is a variant of the Heckman (1982) one-stage estimation used by Roberts and Tybout (1997).

We apply this new method to an unusually long time-series of firm data, with a consistent survey available from 1983 to 1999. Another novelty of this paper is the introduction of a 'sector tradability' index, based on Swan and Zeitsch (1992) in order to separate the sunk costs interpretation of exporting experience from sector characteristics that might influence entry into exporting. This index has a positive and significant impact on export market participation, but the coefficient on past exporting remains large and significant in the specification including the tradability index.

This paper uses data on a sample of Irish firms over seventeen years to test the hypothesis that sunk costs influence the decision to enter or exit the export market. A probit specification tests the probability of exporting in the current period given past exporting experience, controlling for the firm's initial export status. We find significant inertia in firm movements in and out of exporting, with previous export activity a strong explanatory factor for current export market participation.

In addition, this paper tests for the existence of spillover effects in exporting, in particular if the levels of export activity in a sector increase the probability of a firm participating in the export market. It also looks at how these spillovers may differ depending on whether their source is export activity of Irish domestic firms or of multinationals exporting from a base in Ireland. Research on other countries has found mixed results when testing the

presence and extent of influence of aggregate exporting on individual firm decisions. We find no significant impact of spillovers, either from sector exports or multinational presence, once the firm's own export history is controlled for.

The paper proceeds as follows: section 2 reviews the recent literature on sunk costs and spillovers in firm entry to the export market. Section 3 outlines the theoretical model and section 4 details the empirical model to be tested, as well as discussing some relevant econometric issues. Section 5 describes the data and section 6 presents the empirical results. Section 7 concludes.

2. Literature Review

2.1 Sunk Costs

Firm-level export decisions and performance are relatively recent and growing areas of interest in the economic literature. Roberts and Tybout (1997) tested for the existence of hysteresis in export activity for a sample of 650 Columbian firms throughout the 1980s and found a significant impact of sunk costs. The presence of sunk costs can be detected by testing if the previous export activity of the firm can be used to explain its current status, controlling for other firm-level characteristics that may influence export activity. In their paper, previous participation in exporting was found to increase the probability of current export activity by up to sixty percent.

The importance of the existence of sunk costs in the export market is that it results in transitory changes, perhaps in the exchange rate or in trade policy, having permanent

effects on the export activity of firms. Examples of sunk costs in exporting are thought to be mainly those of information gathering on the new market, setting up new distribution networks, marketing and possibly repackaging of the product to appeal to new consumers etc. A further interesting finding of the Roberts and Tybout analysis is the speed at which the benefit of experience in the foreign market can evaporate if the firm ceases to export. Firms which had previously exported, but exited the export market two years previously, were found to have the same probability of re-entering the export market as a firm which had never exported before, implying that the full amount of sunk costs were incurred at re-entry.

In addition to the positive and significant influence of a history of exporting (indicating the presence of sunk costs), a number of other plant characteristics were found to impact the probability of being an exporter. Factors such as plant size, age and ownership by a corporation were found to increase the probability of exporting. Location, particularly in terms of distance to a port, was also found to be significant. However, no impact was found either for wages or for a measure of relative export to domestic prices (although the inclusion of time dummies would have already controlled for much of the impact of price changes).

Broadly similar results were found for German firms, with export history increasing the probability of current inclusion in the export market by up to 50 percent, depending on the specification (Bernard and Wagner, 2001). In addition to the other firm characteristics looked at by Roberts and Tybout (1997), higher levels of productivity

were also found to positively affect the probability of exporting. The direction of the relationship between exporting and productivity has been the subject of a number of inquiries, for example Bernard and Jensen (2001). Due to data constraints, this relationship is not explicitly examined in this paper.

Bernard and Jensen (2004) take both sunk costs and spillovers into account in their analysis of the export decision of US firms. They find similar effects of plant characteristics, with larger, high-wage, more productive plants being more likely to export. They also find significant sunk costs exist in entering the export market, with exporting in the previous period increasing the probability of current exporting by approximately 36 percent. However, neither geographic nor industry spillovers were detected.

Spillovers

Extending the idea that sunk costs play a role in firm export activity, Aitken, Hanson and Harrison (1997) look at whether these sunk costs can be affected by spillovers from other firms. For example, a firm in an export intensive sector may find its cost of entering the foreign market reduced by the export activity of other firms. Aitken *et al.* hypothesise that such spillovers would be even larger from multinational companies as these might operate as a "natural conduit for information about foreign markets, foreign consumers, and foreign technology" to domestic firms. Testing this empirically on a sample of Mexican firms from 1986-1990, the main result that emerges is that multinational firms do have a positive spillover effect on the probability of domestic firms exporting.

However, no such spillover effect is found for sector-level exporting activity. Looking at plant characteristics, they find larger plants are more likely to export, but unlike Roberts and Tybout (1997) they find higher wages (as a proxy for skill levels perhaps) also increases the likelihood of being an exporter.

3. Model

The theoretical basis of sunk cost models was developed by Dixit (1989) and Krugman (1989), and applied empirically to the decision to enter the export market by Roberts and Tybout (1997) and Bernard and Jensen (2004). This section outlines the model used by Bernard and Wagner (2001) and Bernard and Jensen (2004). They in turn follow the structure of Roberts and Tybout (1997) whereby the decision to export is made in a similar way to a rational firm's decision to begin producing a new product. The profit-maximising firm makes its export entry decision based on expected profits from exporting, now and in the future, taking into account the fixed costs of entering the new market. The foreign market is treated here as a single unit.

We maintain the assumption of Bernard and Wagner (2001) that exporting experience does not impact the cost function of the firm. The costs we want to analyse are any costs that may be involved in entering the export market, for example in marketing, setting up distribution networks etc. These costs are assumed to be sunk and are incurred in full if the firm has left the export market for any period of time. It is assumed that the profit-

maximising level of exports, q^*_{it} can always be produced by the firm, once it is in the foreign market. Including entry costs of N results in firm profits given by

$$\tilde{\pi}_{it}\left(X_t, Z_{it}, Y_{i,t-1}\right) = p_t q^*_{it} - c_{it}\left(X_t, Z_{it} / q^*_{it}\right) - N\left(1 - Y_{i,t-1}\right) \qquad (1)$$

Where p_t is the price of the exported goods, and $c_{it}(.)$ is the variable cost of producing the goods for the export market. Exogenous factors affecting profitability are given by X_t (e.g. macroeconomic conditions), and firm specific factors by Z_{it}. Variables that may be included in this firm specific term could include size, skill composition of labour force, productivity, product characteristics and ownership structure. If the expected profits are positive, then the firm will become an exporter. The export status of the firm i in period t is denoted by Y_{it}, where

$$Y_{it} = 1 \text{ if } \pi_{it} \geq 0 \qquad (2)$$

$$= 0 \text{ if } \pi_{it} < 0 \qquad (3)$$

If the firm exported in the previous period, $Y_{i,t-1} = 1$, then the firm does not have to pay any sunk cost. The firm will export if its expected profits, this time net of the sunk cost, are greater than zero, $Y_{it}=1$ if $\tilde{\pi}_{it} > 0$.

4. Empirical Specification

From the multi-period model above, the firm will enter the export market if its expected current and future profits from doing so are greater than the costs involved,

$$Y_{it} = 1 \quad \text{if } \tilde{\pi}_{it} > c_{it} + N\left(1 - Y_{i,t-1}\right) \qquad (4)$$

$$= 0 \quad \text{otherwise} \qquad (5)$$

Rather than attempt to parameterise the cost function, we follow Bernard and Wagner (2001) in focusing on identifying the factors that increase the probability that a firm will be an exporter. This is estimated using a binary choice non-structural approach given by

$$Y_{it} = 1 \quad \text{if } \beta Z_{it} - N(1-Y_{i,t-1}) + \varepsilon_{it} > 0 \qquad (6)$$

$$= 0 \quad \text{otherwise} \qquad (7)$$

With the vector Z_{it} denoting plant characteristics, while the residual term ε_{it} captures any other effects (such as terms of trade shocks, which would have formed part of X above). The plant characteristics that will be included in the vector Z_{it} follow those that have been found to have an impact in previous studies. They include measures of plant success, namely size (numbers employed) and productivity (output per worker), as the literature has consistently found that better firms are more likely to be exporters. Wages will also be included as a proxy for the skill level of the workforce, which would be expected to have a positive effect on exporting probability. A dummy for foreign ownership will be included as it is frequently assumed that the presence of foreign firms in Ireland relates to a desire to use it as an export base for the EU market. Foreign ownership should therefore have a strong positive effect on export status.

Following Aitken et al. (1997), spillover effects are included in the model by allowing the distribution costs in the foreign market for a firm to be a function of the total exporting activity in the sector to which the firm belongs, and also a function of the MNE export activity in the sector. This enables testing of different spillover effects from exporters in general and more specifically from multinationals' exports. Total export activity in the sector is denoted as Γ_{EX}, and multinational export activity as Γ_{MNE}.

Econometric Issues 1: Lagged Endogenous Variable

Bernard and Jensen (2004), and Bernard and Wagner (2001) discuss the main potential problem in this estimation as being the identification of the parameter on the lagged endogenous variable. As it is possible that there are permanent and serially correlated unobserved characteristics of the firm that could be influencing its decision to export, the error term ε_{it} will be made up of two components, one of which is a permanent firm specific effect, κ_i and another transitory effect to pick up exogenous shocks, η_{it}. Given the (0, 1) nature of the dependent variable, the estimation methods that can be used for this model include probit with random effects, and linear probability models with fixed or random effects. The random effects probit is given by

$$Y_{it} = 1 \quad \text{if} \quad \beta Z_{i,t-1} + \theta Y_{i,t-1} + \kappa_i + \eta_{it} > 0 \qquad (8)$$

$$= 0 \quad \text{otherwise} \qquad (9)$$

If there are sunk costs in entering the export market, the coefficient on the previous period's export activity should have a significant and positive effect on current exporting activity. To test how quickly this effect diminishes, export status of the two previous periods will also be included.

Econometric issues 2: Initial Conditions Problem

There is an additional issue to be addressed in the estimation of this type of model. The 'initial conditions' problem arises when the start of the sample period is not the same as the start of the process that generates firm export decisions. The sample period begins in 1983, but many of the firms covered may have been in operation and/or exporting before

this period. Whether or not a firm exports in 1983 may therefore be the result of earlier experiences or due to other observable or unobservable characteristics. The initial conditions problem is dealt with by following Heckman (1981) and specifying a reduced form equation for the initial observation:

$$Y_{i1}^{*} = \lambda' X_i + u_i \qquad (10)$$

where $var(u_i) = \alpha^2_u$, with $corr(\kappa_i, u_i) = \rho$ and X_i is a vector of exogenous instruments which includes variables relevant in period 1 and other pre-sample information. To account for a non-zero ρ, a linear relationship is assumed between error components:

$$u_i = \varphi\kappa_i + \eta_{i1} \qquad (11)$$

With κ_i and η_{i1} orthogonal to one another, $\varphi = \rho\sigma_u/\sigma_\kappa$ and $var(ui1) = \sigma^2_u(1- \rho^2)$. We assume that the initial observation y_{i1} is uncorrelated with u_{it} and that u_{i1} is uncorrelated with the firm characteristics Z_{it}. The 'initial conditions' equation now becomes:

$$Y_{i1}^{*} = \lambda' X_i + \varphi\kappa_i + \eta_{i1} \qquad i = 1,\ldots N \text{ and } t=1 \qquad (12)$$

Together with equation (13) this now represents a complete model for the export decision process. It is possible to estimate this system of equations by programming the maximum likelihood estimation, as is done by Roberts and Tybout (1997). However, a more practical two-step estimation procedure has been suggested by Orme (1997). This procedure has been implemented by Arulampalam, Booth and Taylor (2000) and Arulampalam (2002) to test state dependence in unemployment and by Henley (2004) for persistence in self-employment, but has not previously been applied to the export decision.

This two-step procedure involves first estimating the initial conditions probit equation (for the first year of the sample period) and then using the generalised residuals from this as a correction to the random effects probit model for the rest of the sample. The form of the random effects model under this procedure is shown by transforming equation (11), which becomes:

$$\kappa_i = \delta u_i + e_i \qquad (13)$$

Where $\delta=\rho\sigma_\kappa/\sigma_e$ and $var(e_i)= \sigma_\kappa^2(1-\rho^2)$. Substitution for κ_i in the random effects probit equation gives:

$$Y_{it} = \beta Z_{i,t-1} + \theta Y_{i,t-1} + \delta u_i + e_i + \eta_{it} \qquad i = 1,\ldots N \text{ and } t = 2,\ldots T_i \qquad (14)$$

Orme's method involves first estimating the reduced equation for the initial time period[1] (equation 12). The probit error from this estimation is then used to replace u_i in a random effects probit estimation of (14). The importance of the initial conditions correction can be estimated from a standard t-test on the significance of δ.

5. Data

The data are taken from the annual Forfás Irish Economy Expenditures Survey covering Irish firms over the period 1983 to 1999, which is sent to all firms of over 30 employees. The survey contains information on sales, exports, employment, expenditures and ownership, amongst other things. The available data is an unbalanced panel with

[1] It is important to note that when using this system including the 'initial conditions' correction, we must have all plants entering the panel at the same start time.

approximately half of the sample being exporters. For the initial conditions correction model, firms have to have a common entry date to the sample and this results in the number of observations being just over 4500.

Table 1 presents some summary statistics for three years of the sample (1983, 1990 and 1998), comparing characteristics of exporting and non-exporting firms. Exporters are generally larger, both in terms of sales and employment and pay higher wages (except in 1983). These differences remain fairly constant throughout the sample period. Table 2 shows the level of persistence in firm export activity. The number of firms entering or exiting the export market is low over the entire seventeen-year period. This is not unusual; Bernard and Wagner (2001) find similar percentages of entry and exit in their German study. Firms exporting in any period *t* are overwhelmingly likely to have exported in the previous period. This implies that exporting firms are significantly different from non-exporters in some way that allows them to compete internationally, or that there are sunk costs to entering the export market, generating hysteresis in firm export status.

6. Results

Introducing the initial conditions correction, Table 3 presents the results for export status in 1983. The residual from these regressions are then used to adjust for initial conditions, the results of which are shown in Table 4. Previous exporting experience, included as export status lagged one and two periods, shows a highly significant effect of past

exporting activity on current exporting. The initial conditions variable is significant, and firm characteristics are found to be important determinants of whether or not the firm is an exporter. Employment is positive and significant, showing that larger firms are more likely to export, which can be interpreted as an indicator of economies of scale for the firm. Wages per employee are somewhat surprisingly found to have a negative coefficient, although this could be due to the technology and value-added variables picking up skill levels, leaving wages to proxy cost structures. Foreign ownership is positively related to export market involvement, as is presence in a high technology sector. The technology dummy is 0 for a high technology firm and 1 for a traditional or low technology firm[2]. The negative coefficient implies that low technology firms are less likely to export.

Spillovers are introduced in Table 5, with two measures used as proxies. First, the exports from Irish and Foreign firms in the firm's sector are used to test for spillovers from exporting and if these spillovers are different from foreign owned firms. The second measure is sector size, measured by employment, for Irish and Foreign owned firms. This is to test if there are direct spillovers to export activity from foreign presence in a sector, irrespective of the level of actual exports from the foreign firms. No evidence of spillovers are found in this specification.

The interpretation of the variables used to proxy sunk costs and spillovers (i.e. lagged exporting, multinational and domestic exports and employment) have so far followed

[2] The sectoral technology dummy is based on the Davies and Lyons (1996) classification. I would like to thank Ciara Whelan of University College Dublin for providing the command files for the technology classification and converting of industry codes.

those of the literature in this area, particularly Roberts and Tybout (1997) and Aitken et al. (1997). However, it is possible that these proxies are in fact picking up information on the 'tradability' of sectors. A highly tradable sector would have low trading costs, both fixed and variable, and it may not be possible to separate this empirically from low sunk costs of market entry. The same is true of our proxy for spillovers; sectors with high levels of exports and high probability of entry to exporting could be those with easily tradable products, without any necessity for the existence of informational or competitive spillovers. These explanations are not necessarily mutually exclusive – the existence and level of sunk costs would be a factor in determining how tradable a sector is – however it would widen our interpretation of the exporting experience variable to include a wider range of influences on the exporting decision.

An attempt is made in the final empirical specification to separate this issue of sector tradability from the influence of the firm's past exporting record. To do this a new variable is introduced; an index of sectors designed to capture the ease with which they can be traded internationally. This is based on Swan and Zeitsch (1992), although the sector coverage of their study was much wider. The index values used in this paper are presented in Table 6. The index is constructed as a ratio of trade to production, using data from Japan and the US. The index ranges from zero (non-tradable goods) such as retail trade and government to 62 (the most tradable sector) for water transport. The most tradable sector to which firms in our sample belong is precision instruments with a tradability index of 46; the least tradable is printing with a value of 4. The lowest tradability sectors are mainly services, which are not represented in the firm survey.

The index of tradability is included in Table 7 and is found to have a positive and significant effect on the probability of exporting. Spillover effects, from sector exports or size, are not present in this specification. However, past export status remains a significant determinant of current exporting. The coefficient on export status in the previous period has fallen slightly however; in this specification it is 2.71 compared to 2.89 in Table 5 (which uses the same specification apart from the inclusion of the tradability variable). This indicates that some information on sector tradability could have been picked up by the lagged export status variable in the earlier specifications.

7. Conclusions

The importance of exporting for the health of the economy necessitates an understanding of what factors determine the export decisions of firms. In particular, the issue of whether entry to the export market is characterised by sunk costs would have significant implications for understanding entry and exit patterns to exporting and for the success of government policies designed to encourage firms to export. Likewise, if the existence of spillovers from currently exporting firms could reduce the sunk costs of entry to the export market, additional positive externalities could accrue to export promotion strategies.

In order to address the issue that pre-sample decisions may have effected firms' exporting in the period covered by the current data, a procedure to control for initial conditions is

also used. This two-step estimation developed by Orme (1997) has been applied to questions of state dependence in the labour market, but has not previously been used to estimate persistence in export activity. The data uses annual firm level data to examine the issues of sunk costs and spillovers in the export decision. The data is from the Forfás Irish Economy Expenditures Survey, a yearly firm-level survey. The time period covered is 1983 to 1999. This paper demonstrates that there is a high level of persistence in firms' export status, even when controlling for firm characteristics and unobserved heterogeneity. Past exporting experience influences current export status, and this result is robust in all specifications.

Other factors that increase the probability of a firms' participation in the export market include foreign ownership and being in a high technology sector. Value-added is another significant variable, indicating that higher productivity firms and exporting are positively linked. However, the direction of causation between productivity and exporting activity is not clear. Firm size, measured by employment, showed that larger firms are more likely to be exporters. The inclusion of initial conditions in the export decision specification was significant, demonstrating the importance of this control variable to pick up unobservable firm characteristics that influence the export decision. When sunk costs and spillovers were tested together and initial conditions were controlled for, the effect of spillovers was not significant.

The final section of the paper examines the robustness of the sunk costs and spillovers specification to the inclusion of a variable measuring the tradability of the sector. Using

an index developed by Swan and Zeitsch (1992), being in a sector with a higher degree of tradability is found to positively effect the probability of a firm being an exporter. Lagged export status remains a significant variable, albeit with a rather smaller coefficient. Once again, no evidence of spillover effects is found.

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Table 1: Mean Values of Firm Characteristics for Exporters and Non-Exporters, 1983, 1990 and 1998

	1983		1990		1998	
	Exporters	Non-Exporters	Exporters	Non-Exporters	Exporters	Non-Exporters
Employment	170	106	144	89	141	55
Employment Growth*	0.03	-0.06	0.05	0.04	0.05	0.02
Sales	15189	7380	19153	9486	30055	7382
Wage per Employee	11.9	12.5	15.7	13.9	20.4	18.2
Exports	10188		14360		24197	

*1983/84, 1989/90, 1997/98
All variables except employment and employment growth are in thousands of 1985 ECU

Table 2: Persistence of Exporting Status

	No. Exporters	% Exitors	% Entrants	% Stayers
1984	471	1.1	2.1	96.8
1985	544	0.7	2.2	97.1
1986	573	0.3	1.2	98.4
1987	601	1.2	1.3	97.5
1988	662	1.7	1.8	96.5
1989	697	2.6	2.0	95.4
1990	773	0.6	3.0	96.4
1991	847	0.9	2.1	96.9
1992	1154	1.0	2.4	96.5
1993	1118	1.9	2.1	96.0
1994	1021	1.0	2.0	97.1
1995	1058	0.6	1.3	98.1
1996	1188	1.0	1.9	97.1
1997	1204	0.8	1.0	98.2
1998	1371	0.5	0.7	98.8
1999	1215	0.6	1.3	98.1

Table 3: Initial Conditions Equation
Export Status in 1983

	(I)	(II)	(III)
Firm Age	-0.00729** (0.0037)	-0.0103*** (0.00389)	-0.00869** (0.0041)
Ownership	0.8912*** (0.1426)	0.8498*** (0.1476)	0.7697*** (0.158)
Low Technology Dummy	-0.5869*** (0.1634)	-0.6179*** (0.1657)	-0.098 (0.1857)
Sales		0.0000174** (0.0000007)	0.000034*** (0.000012)
Employment		0.003** (-0.00118)	0.0026** (0.0013)
Wages		-0.00019*** (0.000059)	-0.0002*** (0.00007)
Sector Exports			0.000016*** (0.00000024)
Sector Sales			-0.0000094*** (0.0000015)
Sector Employment			0.000084 (0.000091)
Location Controls	Yes	Yes	Yes
Sector Controls	Yes	Yes	Yes
N	647	647	647

Standard Errors in parentheses
*** Significant at 1% level, ** at 5% level and * at 10% level

Table 4: Decision to Export

	(I)	(II)	(III)
Export Status t-1	2.897***	2.904***	2.886***
	(0.157)	(0.1572)	(0.158)
Export Status t-2	0.7052***	0.7147***	0.6724***
	(0.1608)	(0.161)	(0.1627)
Employment (t-1)	0.00088*	0.000854*	0.00085*
	(0.00047)	(0.000477)	(0.00048)
Employment Squared (t-1)	-0.00000026	-0.000000278	-0.00000028
	(0.000000299)	(0.00000031)	(0.00000032)
Wage per Employee (t-1)	-0.01227**	-0.0106*	-0.0088
	(0.00649)	(0.00634)	(0.006)
VA per Employee (t-1)	0.00324	0.00328	0.00325
	(0.00204)	(0.00205)	(0.002)
Probit Residual (I)	1.031***		
	(0.376)		
Probit Residual (II)		0.7173**	
		(0.318)	
Probit Residual (III)			0.8325***
			(0.2396)
N	4529	4529	4529

Standard Errors in parentheses
*** Significant at 1% level, ** at 5% level and * at 10% level

Table 5: Decision to Export – Sunk Costs and Spillovers

	(I)	(II)
Export Status t-1	2.89*** (0.157)	2.89*** (0.1574)
Export Status t-2	0.696*** (0.161)	0.693*** (0.162)
Sector Exports (Irish)	-0.000000064 (0.00000017)	
Sector Exports (Foreign)	0.000000176 (0.000000155)	
Sector Size (Irish)		-0.0000116 (0.00002)
Sector Size (Foreign)		0.00005 (0.000039)
Employment (t-1)	0.00067** (0.00028)	0.00065** (0.0029)
Wage per Employee (t-1)	-0.00847 (0.00539)	-0.0075 (0.0055)
VA per Employee (t-1)	0.0011 (0.002)	0.00114 (0.0021)
Probit Residual (I)	0.8445** (0.396)	0.71318** (0.421)
Year	Yes	Yes
N	4529	4528

Standard Errors in parentheses
*** Significant at 1% level, ** at 5% level and * at 10% level

Table 6: Sector Tradability Index

Sector Description	Nace-Clio Code	Tradability
Precision instruments	371	46
Telecommunications equipment	344	39
Jewellery	491	33
Office machinery	330	26
Optical instruments	373	25
Pharmaceutical products	257	24
Electric motors	342	24
Electrical equipment for industry	343	21
Synthetic fibres	260	20
Woven materials	432	19
Secondary processing metal	313	18
Machinery & mechanical equipment	328	16
Medico-surgical equipment	372	15
Pens & other products	495	14
Electric household appliances	346	12
Household linen	455	12
Footwear	451	10
Soaps, perfumes etc	258	9
Clothing	453	8
Rubber products	481	8
Plastic products	483	8
Spare parts - motor vehicles	353	7
Machinery for building & mining	325	6
Concrete, cement	243	5
Printing	473	4

Based on Swan and Zeitsch (1992)

Table 7: Decision to Export – Sector Tradability

	(I)	(II)
Export Status t-1	2.71***	2.71***
	(0.136)	(0.136)
Export Status t-2	0.826***	0.823***
	(0.14)	(0.14)
Sector Exports (Irish)	0.0000004	
	(0.0000012)	
Sector Exports (Foreign)	0.00000002	
	(0.00000004)	
Sector Size (Irish)		-0.00001
		(0.00003)
Sector Size (Foreign)		0.00002
		(0.00002)
Tradability Index	0.014**	0.011*
	(0.006)	(0.006)
Employment (t-1)	0.0005	0.0005
	(0.0004)	(0.0004)
Wage per Employee (t-1)	-0.009*	-0.009*
	(0.005)	(0.005)
VA per Employee (t-1)	0.0019	0.002
	(0.001)	(0.001)
Probit Residual (I)	1.34***	1.27***
	(0.377)	(0.392)
Year	Yes	Yes
N	5769	5769

Standard Errors in parentheses

*** Significant at 1% level, ** at 5% level and * at 10% level