



# research paper series

**Globalisation, Productivity and Technology**

Research Paper 2001/11

***Do Domestic Firms Learn to Export from  
Multinationals?***

*By D. Greenaway, N. Sousa and K. Wakelin*



**The Authors**

David Greenaway is a Professor in the Leverhulme Centre for Research on Globalisation and Economic Policy in the School of Economics, University of Nottingham. Nuno Sousa has recently been awarded a PhD at the University of Nottingham and is now at the University of Minho. Katharine Wakelin is a former Research Fellow in the Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

---

**Acknowledgements**

Financial support from the European Commission Fifth Framework Programme (Contract No. HPSE-CT-1999-00017) and the Leverhulme Trust (Programme Grant F114/BF) is gratefully acknowledged. The authors wish to thank Richard Upward for the provision of the NES data.

# **Do Domestic Firms learn to Export from Multinationals?**

by

**David Greenaway, Nuno Sousa and Katharine Wakelin.**

## **Abstract**

Is it possible for a domestic firm to become more export oriented in response to the activities of MNEs' subsidiaries in the host country? We identify three channels through which this may occur, namely export information externalities, increased competition in the domestic market and demonstration effects. We then investigate this empirically for the United Kingdom, using a large firm-level panel of 3,662 firms from 1992 to 1996. Our results confirm positive spillover effects from MNEs on the decision to export of UK-owned firms as well as on their export propensity. It is also clear from our results that the main channel for this phenomenon is increased competition.

## **Outline**

1. Introduction
2. Multinationals and export performance
3. A model of export spillovers
4. Empirical model
5. Econometric results
6. Conclusion

## **Non-Technical Summary**

Governments the world over invest substantial public funds to attract inward investment, using a range of instruments such as tax allowances, duty drawbacks, investment allowances, grant in aid and so on. The investment is motivated by a belief that multinational enterprises (MNEs) can affect productivity levels and growth rates in the industries they enter as well as promoting skill upgrading and increased innovation. In addition, however, it is widely believed that many of the benefits of MNEs spill over to indigenous firms raising their productivity or export activity. But does this actually happen in practice?

This paper focuses on an under-explored spillover, the impact of MNEs on the export behaviour of domestic firms. In principle, there are several possible transmission channels via which MNEs can affect the trade performance of domestic firms. One is through information externalities, i.e. domestic firms learn tricks from MNEs that lower the fixed costs of entering export markets. Another is via domestic firms imitating and adopting new technology and business practices and a third is the efficiency gains stimulated by the greater competition that MNEs bring.

We model the choices facing a domestic firm in deciding whether to produce for the domestic market or export, and which allows for potential spillover effects. We then transform this into a probit model which can be estimated and which models export behaviour as involving both the decision to export and the proportion of output exported. We use an econometric technique that allows us to model these as independent decisions. We estimate our models using panel techniques for a sample of over 3,500 firms and data covering the period 1992 to 1996.

Our results suggest that the probability of domestic firms exporting is positively influenced by the relative importance of MNEs' production and MNEs' export activities in the UK. Where export intensity is concerned, we also found evidence of a positive impact from MNE presence, in terms of their domestic production. The key transmission channel appears to be through pro-competition effects.

## **I. Introduction**

There is significant competition among governments to attract inward investment, using incentives such as tax allowances, duty drawbacks, investment allowances, grant in aid and so on. This signals a belief on their part in the existence of external benefits. More specifically it has been argued that multinational enterprises (MNEs) can affect productivity levels and growth rates in the industries they enter, as well as promoting skill upgrading and increased innovation<sup>1</sup>.

This paper focuses on an under-explored spillover, namely the impact of MNEs on the export behaviour of domestic firms. The role of FDI in aggregate exports of host countries has been investigated by, among others, Blake and Pain (1994) for the United Kingdom, O'Sullivan (1993) and Barry and Bradley (1997) for Ireland, and Cabral (1995) for Portugal. However, this literature typically focuses on the export performance of foreign affiliates themselves, rather than the possibility that domestic firms become more export oriented as a result of their presence. It is that link which is the focus of this paper, where we search for export spillovers in a large sample of 3,662 manufacturing firms in the UK.

The paper is organised as follows. Section II reviews potential transmission channels whereby MNEs may influence the export activities of locally-owned firms and provides a brief review of the empirical evidence available so far. Section III sets out the model to be estimated, Section IV explains our modelling strategy whilst Section V describes the data set used and discusses our econometric results. Section VI concludes.

## **2. Multinationals and Export Performance**

Multinational firms are widely acknowledged as having firm-specific advantages that allow them to overcome a potentially disadvantageous position with respect to domestic counterparts in foreign markets<sup>2</sup>. Such advantages typically take the form of

---

<sup>1</sup> For surveys of the evidence on productivity spillovers see Blomström, Kokko and Zejan (2000), Görg and Strobl (2001) and Görg and Greenaway (2002).

<sup>2</sup> MNEs face extra costs of expanding activity into foreign markets such as control related expenses associated with managing and co-ordinating internationally decentralised organisations, costs of stationing personnel abroad, communication, transport, packaging, shipping, financial transactions,

knowledge-based assets such as proprietary information relating to product or process technology, managerial know-how, quality of the workforce, company culture, marketing, branding and so on. The firm's decision to invest instead of pursuing other forms of internationalisation such as exporting or licensing results from internalisation being the most efficient strategy for exploiting their firm-specific assets. It has been widely acknowledged that such inward investment offers potential indirect benefits to domestic firms, via enhanced productivity levels and/or productivity growth (see, for example, Blomström and Persson, 1983; Blomström, 1986; Haddad and Harrison, 1993). It has also been recognised that MNEs can directly affect the trade performance of the host economy through their own exporting activity (Blake and Pain (1994), Barry and Bradley (1997), Cabral (1995)). What has not been explored, until recently however, is the possibility that MNEs can affect trade performance *indirectly* through their impact on domestic firms.

One immediate channel for export spillovers is by domestic firms learning from the export activities of foreign subsidiaries in the host country through information externalities (see Aitken *et al*, 1997). Subsidiaries may have easier access to information on foreign markets because they form part of a multinational enterprise. Exporting involves fixed costs, such as the establishment of distribution networks, the creation of transport infrastructures, investment in advertising to gain public exposure, research about the foreign market to gain intelligence on consumers' tastes, market structure, competitors, regulations and so on. These may be lower for MNEs as they already have knowledge and experience of operating in foreign markets and can benefit from network economies and know-how of managing the international marketing, distribution and servicing of their products. This information could spill over to domestic firms.

MNEs can also be a source of another sort of information not directly related to exporting, namely new technologies and management techniques, from which domestic firms could benefit through processes of demonstration and imitation (e.g. via contact with local clients and suppliers and training of personnel and management

staff). The presence of MNEs would thus complement the indigenous firms' innovation activities, and contribute to the emergence of a more competitive pool of local firms geared to exporting<sup>3</sup>.

Entry of foreign companies will, at least in the first stage, lead to increased competition. This is particularly the case where MNEs invest in sectors with higher barriers to entry and therefore with more oligopolistic market structures. Cantwell (1989) shows that the entry of US firms led to decreasing market shares of EU firms in some sectors. Increased competition in the domestic market may also be responsible for reinforcing the imitation effect, as it constitutes an incentive to engage in more efficient and leaner production techniques which in turn facilitates entry into foreign markets (see Wong and Blomström (1992) and Cantwell (1989)).

Evidence on export spillovers is very limited. There are a few case studies which provide some support for export externalities in developing countries, for instance Rhee and Bélot (1990). But Aitken *et al* (1997) is the first study to test the hypothesis that MNEs act as export catalysts in the host. Using panel data on 4,104 Mexican manufacturing plants for the period 1986-1990, they analyse a firm's decision of whether to serve the domestic market or export, taking into account fixed costs of supplying foreign markets. They argue that the latter decrease due to information externalities resulting from the local concentration of export activity in general and MNEs' export performance in particular. They use a probit model to test the impact of MNEs on the domestic firm's decision to export, controlling for the local concentration of MNEs' export activity, sectoral concentration of export activity in general, and the overall geographic concentration of economic activity<sup>4</sup>. Their results support the hypothesis that spillovers from both MNE export activity, and export

---

<sup>3</sup> It has been argued elsewhere in the literature that technological innovation plays an important role in promoting export performance. Empirical evidence supports this view, particularly for developed economies, see Hirsch and Bijaoui (1985) and Wakelin (1998).

<sup>4</sup> The estimating model includes a range of other variables thought to affect the export decision. These include domestic final-goods prices, cost variables, employment in the plant relative to industry average, value-added tax payments as a share of sales, royalty payments as a share of sales and a set of dummy variables to control for the foreign-ownership status, the industry of the firm, the region where it is located and the year of the observation. In addition they include variables related to the country's trade policies like average tariffs and import-licence requirements.



activity in general, are important. However, they are not robust to changes in the sample. When natural resource-intensive industries and those facing high transport costs are excluded, local concentration of export activity becomes insignificant. Nonetheless, export spillovers due to MNEs remain significant. In further tests of robustness, the authors replace MNE export activities by a measure of general MNE production and obtain the same positive and statistically significant relationship using the production measure as with the export variable. This raises the question of whether the impact of MNEs on export behaviour of domestic firms is associated with their export performance, or whether it occurs because of their presence in the domestic market.

Kokko *et al* (1997) also investigate export spillovers using a cross-section of 1,243 manufacturing firms in Uruguay in 1988. A probit model was estimated using firm-level as well as sector-level variables as regressors, including a measure of the impact of foreign MNEs at the sector-level. Their results suggest that the likelihood of exporting increases with the presence of foreign MNEs established since 1973, the more outward-oriented period in Uruguay. For foreign firms established before 1972 (Uruguay's inward oriented period) there is no sign of spillovers. They also explore whether the geographical destination of exports matters. They find most evidence of export spillovers outside of neighbouring markets (Brazil and Argentina). Their explanation for this is that exports to these countries are driven mainly by low transaction cost and preferential institutional arrangements.

### 3. A Model of Export Spillovers

Like Aitken, Hanson and Harrison (1997), we begin with the choice facing a representative domestically-owned firm between serving the domestic market, exporting, or both, to maximise its profit:

$$\begin{aligned} \max_{q_d, q_f} P_d q_d + P_f q_f - h(q_d + q_f) - m_d(q_d) - m_f(q_f) \\ \text{s.t. } q_d, q_f \geq 0 \end{aligned} \tag{1}$$

Where, subscripts  $f$  and  $d$  refer to the foreign and domestic markets, respectively.

---

This is a standard profit function dependent on prices, quantities sold in each market and costs.  $q$  refers to quantity of output and  $P$  to price.  $h(\bullet)$  refers to production costs,  $m_d(\bullet)$  and  $m_f(\bullet)$  to distribution costs for domestic and foreign markets, respectively. Externalities are modelled as MNEs having a cost reducing effect on domestically-owned firms. The cost function is composed of two parts defined as<sup>5</sup>:

$$\begin{aligned} h(q_d + q_f) &= \frac{a}{2}(q_d + q_f)^2 + g(q_d + q_f) \\ m_i(q_i) &= \frac{1}{2}b_i q_i^2 + c_i q_i \\ i &= f, d \end{aligned} \tag{2}$$

where,

$$\begin{aligned} g &= g(X, \Omega, \Psi) \\ c_d &= c_d(X, Z_d), c_f = c_f(X, Z_f, \Gamma_{EX}, \Gamma_{MNE}) \end{aligned} \tag{3}$$

The firm's costs are divided into production costs,  $h(\bullet)$  and distribution costs,  $m(\bullet)$ . Part is common to both markets,  $X$ , while the remainder is market specific. These are given by  $Z_i$  ( $i=f,d$ ).  $\Gamma_{EX}$ , and  $\Gamma_{MNE}$  are, respectively, total export activity and total MNE export activity.  $\Omega$ , represents the relative importance of MNEs in the domestic market and  $\Psi$  the total innovation activities carried out by MNEs. Finally,  $a$ ,  $g$ ,  $b_i$  and  $c_i$  ( $i=f,d$ ) are scalar parameters.

We set up the cost function so that production costs,  $h(\bullet)$  are invariant to destination of output. Distribution costs,  $m(\bullet)$  vary by destination, capturing the idea of export specific costs. Specifically, we assume that distribution costs associated with exporting -  $Z_f$ - exceed the costs of distribution in the domestic market. Information spillovers from export activities of multinationals and exports in general are shown as:

$$\begin{aligned} \frac{\partial m_f(q_f)}{\partial \Gamma_{EX}} &\leq 0 \\ \frac{\partial m_f(q_f)}{\partial \Gamma_{MNE}} &\leq 0 \end{aligned}$$

---

<sup>5</sup> We use the same functional form as Aitken et al (1997), with  $m(\cdot)$  and  $h(\cdot)$  increasing and convex in

Thus the higher the concentration of MNE export activities and export activity in general, the more domestic firms can benefit in terms of information externalities which in turn reduce the distribution costs of selling abroad.

In addition we also introduce a competition effect and an imitation/demonstration effect captured by variables  $\Omega$  and  $\Psi$  respectively. These are:

$$\frac{\partial g(q_f + q_d)}{\partial \Omega} \leq 0$$

$$\frac{\partial g(q_f + q_d)}{\partial \Psi} \leq 0$$

The greater the importance of foreign firms in the domestic market the stronger the competitive pressure leading domestic firms to reduce production costs. Also the more technologically-intensive the MNE's activities in the host country, the larger the imitation potential for domestic firms to increase their efficiency in production.

Returning to the profit function, we derive the first order conditions for profit maximisation for a representative domestic firm, as follows<sup>6</sup>,

$$q_d = \frac{1}{a + b_d} [P_d - a q_f^* - g(X, \Omega, \Psi) - c_d(X, Z_d)] \quad (4)$$

$$q_f^* = \frac{1}{a + b_f} [P_f - a q_d - g(X, \Omega, \Psi) - c_f(X, Z_f, \Gamma_{EX}, \Gamma_{MNE})] \quad (5)$$

To estimate the model we re-write these as:

$$q_{dj} = \alpha_1 P_d + \alpha_2 q_{ff}^* + \alpha_3' Z_{dj} + \alpha_4' X_j + \alpha_5 \Omega + \alpha_6 \Psi + u_{dj} \quad (6)$$

$$q_{ff}^* = \beta_1 P_f + \beta_2 q_{dj} + \beta_3' Z_{ff} + \beta_4' X_j + \beta_5 \Omega + \beta_6 \Psi + \beta_7 \Gamma_{EXj} + \beta_8 \Gamma_{MNEj} + u_{ff} \quad (7)$$

Where  $j$  is the index for the firm.  $Z_{ij}$  is a  $(I \times K)$  vector of cost variables specific to market  $i$ ,  $X_{ji}$  a  $(I \times J)$  vector of cost variables common to both markets,  $\alpha_3$  and  $\beta_3$  are

---

their arguments.

<sup>6</sup> The model is set so that at least  $q_d$  must always be positive. It is possible however that the firm decides not to export. It is then defined as a latent variable  $q_f^*$  such as,  $q_f^* = q_f$  if  $q_{ff} > 0$  and  $q_f^* = 0$  otherwise.

( $I \times K$ ) vector of coefficients.  $\alpha_4$  and  $\beta_4$  are ( $I \times J$ ) vector of coefficients, and  $u_{ij}$  is a normally distributed error term for market  $i$  and firm  $j$ , which has zero mean and variance  $\sigma_u^2$ .

These equations can be transformed to reveal the determinants of the optimal quantity of output to be sold in the foreign market:

$$q_{fj} = \beta_1 P_f + \beta_2 (\alpha_1 P_d + \alpha_3' Z_{dj}) + \beta_3' Z_{fj} + (\beta_2 \alpha_4' + \beta_4') X_j + (\beta_5 + \beta_2 \alpha_5) \Omega + (\beta_6 + \beta_2 \alpha_6) \Psi + \beta_7 \Gamma_{EXj} + \beta_8 \Gamma_{MNEj} + v_j \quad (8)$$

where

$$v_j = \beta_2 u_{dj} + u_{fj}$$

The firm's optimal exported output thus depends on the price of the goods, firm-specific production costs, distribution costs in the foreign and domestic markets, exporting activity in the country and several aspects of the presence of MNEs such as their exporting activities, technological innovation activities and competitive pressure their activities entail.

We transform this into a probit model of the probability that a firm exports:

$$\Pr(y_j = 1) = \Pr \left[ \begin{array}{l} \beta_1 P_f + \beta_2 (\alpha_1 P_d + \alpha_3' Z_{dj}) + \beta_3' Z_{fj} + (\beta_2 \alpha_4' + \beta_4') X_j + (\beta_5 + \beta_2 \alpha_5) \Omega + \\ (\beta_6 + \beta_2 \alpha_6) \Psi + \beta_7 \Gamma_{EXj} + \beta_8 \Gamma_{MNEj} + v_j \geq 0 \end{array} \right] \quad (9)$$

where

$$v_j = \beta_2 u_{dj} + u_{fj}$$

#### 4. Empirical Model

Building on the framework above we develop an empirical model to analyse the effects of foreign MNEs on export behaviour of domestic firms. We use a panel of UK domestically-owned firms over a 5-year period, taking into account the three

potential spillover channels discussed. We consider export behaviour as involving both the decision to export and the proportion of production exported. Our econometric analysis accounts for both decisions and the fact that they are interdependent. This specification avoids selectivity biases associated with focusing exclusively on export propensity of exporting firms, which would cast doubt on the econometric results, (see Heckman, 1979). This is particularly important since we investigate how the presence of MNEs affects the export behaviour of all domestic manufacturing firms, not only exporting firms.

The export decision equation is:

$$EXP_i = \alpha + \beta_1 FRD_s + \beta_2 MNEM_s + \beta_3 MNEX_s + \beta_4 DRD_s + \beta_5 SEI_s + \beta_6 II_s + \beta_7 PP_s + \beta_8 PC_s + \beta_9 WAGE_i + \beta_{10} ASSETS_i + \beta_{11} TURN_i + \beta_{12} FUNDS_i + v_i \quad (10)$$

The export propensity equation is:

$$EXPROP_i = \alpha + \beta_1 FRD_s + \beta_2 MNEM_s + \beta_3 MNEX_s + \beta_4 DRD_s + \beta_5 SEI_s + \beta_6 II_s + \beta_7 PP_s + \beta_8 PC_s + \beta_9 WAGE_i + \beta_{10} ASSETS_i + \beta_{11} TURN_i + u_i \quad (11)$$

where

$$v_i \sim N(0,1)$$

$$u_i \sim N(0,\delta)$$

$$corr(v_i, u_i) = \rho$$

$$(v_i, u_i) \sim \text{bivariate normal} [0, 0, 1, \delta, \rho]$$

and the subscripts  $i$  and  $s$  refer to the firms and sectors respectively.

The first equation is estimated for the full sample.  $EXP$  is a dichotomous dependent variable, which takes the value 1 or 0 depending on whether the domestic firm decides to export or not<sup>7</sup>. This equation also performs the sample selection for the second model that focuses exclusively on the export propensity of those firms that decide to export. The dependent variable for the second estimating equation is then  $EXPROP$ .

Following the analysis in Section III, we include a number of spillovers and control variables. First, we include three regressors to test for export spillover channels. *FRD* is the expenditure on R&D carried out by foreign MNEs in the UK. This captures the contribution of MNEs to the available stock of technological knowledge, on the assumption that the more innovation activities carried out by MNEs, the larger the potential for imitation from which domestic firms can benefit. *MNEM* is the relative weight of MNEs in total employment in a sector. It accounts for the relative importance of MNEs at the sector level in the domestic market. The greater their relative importance, the stronger the competitive pressure on domestic firms. Finally *MNEX* is the relative importance of MNEs' export activities in a sector scaled by the relative importance of MNEs' exports in total exports. Following Aitken *et al* (1997), we assume that the greater the importance of MNEs in the exports of a given sector the higher the scope for domestic firms to benefit from information externalities. We expect to obtain positive coefficients for *FRD*, *MNEM* and *MNEX*.

We also control for spillovers from export activity in general, by including *SEI*, which is the relative importance of sector *i* in domestic exports. This captures the export structure of the host country and controls for factors that affect a sector's overall export profile. The variable *II* is included to control for industry size at the national level (in terms of employment), which allows for possible general spillovers not directly associated with export activity. In terms of sector and firm-specific variables we include *PP*, domestic producer price indices; *PC*, average production costs; *WAGE*, average wages; and *ASSETS*, fixed assets per employee. We also include *DRD* to capture the domestic contribution to the total innovation activities carried out in the UK, to control for the UK's comparative advantage in technology, technology-related activities. Since there is a well-established link between firm size and exports, firm turnover (*TURN*) is included<sup>8</sup>. Finally, in the export decision equation we control for shareholders' funds per unit of output available to the domestic firm (*FUNDS*). This captures the domestic firms' financial capacity to meet the extra costs associated with setting up export operations and is only included in the first estimating equation, since the firm's ability to overcome liquidity constraints influence the decision to export but

---

<sup>7</sup> A more detailed description of the variables and data sources is presented in Appendix A.

not export propensity (as it relates to fixed rather than variable costs).

Most of our data were taken from *OneSource*, a database containing the latest available accounts and related information for 100,000 firms in the UK, covering a wide range of firm characteristics<sup>9</sup>. We selected domestically-owned firms in UK manufacturing, defined between sectors 15000 and 37000 of the Standard Industrial Classification (1992). We then eliminated all holding companies, due to the specific character of these firms. We also kept only firms with 10 or more employees on average over the last ten years in order to eliminate the very smallest of firms. A total of 10,402 firms matched these criteria. However, inevitably there were missing observations for many firms and we kept only those that had data available for at least three consecutive years. Our final sample is made up of 3,662 firms with at least three years of data between 1992 and 1996 (see Appendix B), yielding a final sample of over 11,000 observations.

## 5. Econometric Results

We use an econometric technique based on the Heckman selection model, (see Heckman, 1979). This takes into account the truncated nature of the sub-sample of firms used in the export propensity model and incorporates a sample selection mechanism given by the export decision equation. We pooled the five years of firm-level data, clustering it by firm, which allows the use of robust standard errors and unspecified serial correlation within firms while assuming independence between them. Finally, since it proved impossible to test simultaneously for the existence of competition effects and spillover information due to the strong correlation between *MNEM* and *MNEX* (see Appendix C) we report results for the two effects separately<sup>10</sup>.

Maximum likelihood estimates for our two estimating equations are shown in Tables 1 and 2. The reported *Wald* test for overall significance indicates that taken jointly the coefficients of the regressors are significant. Also the correlation coefficient -  $\rho$  - between the error terms of the export decision and export propensity equations is

---

<sup>8</sup> See for example Hirsch and Adlar (1974), Glejser *et al* (1980) and Lall and Kumar (1981).

<sup>9</sup> *OneSource* aims to cover the population of economically active firms in the UK.

significantly different from zero. This is also confirmed by the likelihood-ratio test, which validates our choice of the Heckman selection model.<sup>11</sup>

### *The Export Decision*

Table 1 reports coefficient estimates for the export decision. Our model is able to correctly predict 71% of firms' decisions of whether to export or not. The presence of MNEs in the domestic market appears to increase the probability of an indigenous firm becoming an exporter. More specifically, we find a positive and significant coefficient on *FRD*, confirming a demonstration effect. The positive and significant coefficient on *MNEX* suggests that local firms benefit from contact with the MNEs' exporting strategies and techniques. With respect to the competition effect we found that the relative importance of MNEs in the domestic markets, (*MNEM*) is positively and significantly associated with a higher probability that the domestic firm is exporting.

The results for *SEI* confirm that belonging to an export-oriented sector helps domestic firms establish their own export activities. With respect to *II* we found a significant and negative relationship between this and the probability of a firm exporting, suggesting that firms in large domestic sectors tend to focus more on serving the home market. The coefficients on the variables, *TURN*, *PP*, *PC* and *DRD* all had the expected sign but turned out to be insignificant. We found, however, a positive and significant relationship between average labour remuneration (*WAGE*) and the probability of a firm being an exporter. This may be capturing the importance of labour skills for the competitiveness of British firms' production in world markets.

In conclusion, there is evidence to support the hypothesis that the presence of foreign MNEs affiliates in the United Kingdom influences the export orientation of domestic firms. Our results point to the existence of spillovers. Though we cannot discriminate clearly between competition and information externalities effects, the results suggest that increased competition may be the main spillover channel.

---

<sup>10</sup> Appendix C reports the correlation coefficients for the variables used in the model.

<sup>11</sup> Estimating these equations separately using OLS without correcting for the sample selection (given by parameter  $\lambda$ - inverse Mills ratio) would lead to omitted-variable bias.



**Table 1 – The Export Decision***Dependent variable: EXP*

<b>Regressor</b>	<b>Coeff.</b>	<b>t-stats</b>	<b>Coeff.</b>	<b>t-stats</b>
<b>FRD</b>	0.0001	5.79***	0.0001	3.53***
<b>DRD</b>	0.11	0.69	0.23	1.51
<b>MNEX</b>	0.1	1.83*	-	-
<b>MNEM</b>	-	-	1.42	6.16***
<b>SEI</b>	8.94	4.65***	8.74	4.87***
<b>II</b>	-32.29	-11.43***	-29.83	-10.46***
<b>PP</b>	-0.01	-1.23	-0.004	-0.84
<b>PC</b>	-0.0001	-0.03	-0.0002	-1.12
<b>WAGE</b>	1.89	4.19***	1.65	3.64***
<b>ASSETS</b>	-0.26	-3.69***	-0.26	-3.83***
<b>TURN</b>	0.0001	0.9	0.0001	0.96
<b>FUNDS</b>	0.07	1.91**	0.07	1.84**
<b>Year93</b>	0.004	0.13	-0.002	0.96
<b>Year94</b>	-0.12	-3.09***	-0.12	-3.07***
<b>Year95</b>	-0.04	-0.63	-0.02	-0.37
<b>Year96</b>	0.03	0.45	0.03	0.4
<b>Const.</b>	0.82	1.89*	0.42	0.96
<b>Number of obs.</b>	11372		11372	
<b>Log Likelihood</b>	-5875.66		-5780.15	
<b>Wald chi<sup>2</sup>(14)</b>	309.93		312.06	

\*\*\* significant at 1%

\*\* significant at 5%

\* significant at 10%

***Export Propensity***

Table 2 reports the estimated coefficients for the export propensity equation. Again we include *MNEX* and *MNEM* separately. We find no evidence of export information spillovers from MNEs. The exporting experience of foreign firms seems to contribute little to export propensity. There is nonetheless, evidence that information externalities from export activities in general play an important role, with *SEI*, confirming that sector-specific factors are important determinants of export propensity.

Table 2 – Export Propensity

*Dependent variable: EXPROP*

Regressor	Coeff.	t-stats	Coeff.	t-stats
<b>FRD</b>	0.0001	3.03***	0.0001	1.62*
<b>DRD</b>	0.04	1.49	0.06	2.02**
<b>MNEX</b>	0.02	1.41	-	-
<b>MNEM</b>	-	-	0.16	3.82***
<b>SEI</b>	0.85	4.61***	0.86	4.69***
<b>II</b>	-2.77	-4.38***	-2.51	-3.95***
<b>PP</b>	0.003	3.79***	0.003	3.92***
<b>PC</b>	0.0002	9.41***	0.0002	8.032***
<b>WAGE</b>	0.63	6.38***	0.62	6.21***
<b>ASSETS</b>	0.02	1.08	0.02	1.04
<b>TURN</b>	0.0001	2.21**	0.0001	2.19**
<b>Year93</b>	-0.014	-2.76***	-0.01	-2.68***
<b>Year94</b>	0.01	0.848	0.01	1.01
<b>Year95</b>	0.003	0.3	0.01	0.66
<b>Year96</b>	0.01	0.72	0.01	0.85
<b>Const.</b>	-0.20	-2.45**	-0.25	-2.93**
<b>Number of obs.</b>	11372		11372	
<b>Censored obs.</b>	7948		7948	
<b>Uncensored Obs</b>	3424		3424	
<b>Log Likelihood</b>	-5875.65		-5780.15	
<b>Wald chi<sup>2</sup>(14)</b>	309.9		312.1	
$\lambda$	-0.05		-0.05	
$\rho$	-0.22		-0.22	
<b>Wald test of independence of equations, (<math>\rho=0</math>)</b>	Chi <sup>2</sup> (1)=32.81 Prob>chi <sup>2</sup> = 0.0		Chi <sup>2</sup> (1)=34.14 Prob>chi <sup>2</sup> =0.00	

\*\*\* significant at 1%

\*\* significant at 5%

\* significant at 10%

With respect to other spillover channels, there is significant evidence of demonstration/imitation effects as well as competition effects, since the coefficients for *FRD* and *MNEM* are both positive and significant. It seems therefore that foreign MNEs not only affect the decision of domestic firms to export but also their export

propensity. We also find a positive and significant coefficient for *DRD* suggesting that domestic technological innovation is important to the competitiveness of domestic firms' export activities in the United Kingdom, despite not being crucial to the decision to export.

As far as the firm-specific variables are concerned, size, cost and average wages all positively and significantly influence export propensity. It is interesting to note that costs did not play a significant role in the decision to export. It thus seems that production costs may be more important when increasing export propensity than the initial decision to export. To conclude, the results for the export propensity equation confirm a role for export spillovers from MNEs. The size of the estimated coefficients suggests that the competition effect is again the most important channel.

## **6. Conclusion**

This paper has investigated, for the first time to our knowledge, export spillover effects from MNEs to domestic firms in an industrialised economy. We began by outlining the reasons why we expect spillovers to exist, focusing particularly on information externalities, demonstration effects and competition effects. Our model provided the theoretical underpinning for the empirical analysis, which followed a two-stage strategy, modelling both the decision of whether or not to export and export propensity. With regard to the former we found that the probability of domestic firms exporting was positively influenced by the intensity of foreign R&D expenditure, the relative importance of MNEs' production and MNEs' export activities in the host market. However, by far the most important of these is the level of foreign production in the sector.

When we focused on export propensity we again found evidence of a positive impact associated with MNEs. The variables controlling for the intensity of R&D expenditure and the relative importance of MNE production in the domestic market are found to be positively and significantly correlated with the export propensity of domestic firms. There is however no significant evidence of export information externalities. Again the most important channel for this export-enhancing effect is increased competition resulting from foreign MNEs.

Our results are consistent with the predictions of our model and provide a robust analysis of links between MNEs and the export performance of indigenous firms. We present evidence that the export enhancing effect of FDI for the host country is not limited to the export performance of the foreign affiliates themselves, but also associated with higher export orientation of domestic firms. Our answer to the question posed at the start of the paper, “Do Domestic Firms Learn to Export from Multinationals?” is yes, this appears to be the case in the UK.

*Appendix A- Variables definitions and data sources*

<b>VARIABLES</b>	<b>DESCRIPTION</b>	<b>SOURCE</b>
<i>EXP</i>	- dichotomous variable taking the value 1 if the domestically-owned firm exports and 0 otherwise	OneSource
<i>EXPROP</i>	- export propensity of domestically-owned exporting firms computed as the ratio, exports/turnover	OneSource
<i>PP</i>	- 5 -digit level SIC(92) sectors producer price index numbers of products manufactured in the UK	National Statistics
<i>TURN</i>	- firm level data for domestically-owned firms	OneSource
<i>WAGE</i>	- total remuneration/ number of employees	OneSource
<i>ASSETS</i>	- fixed assets/ number of employees	OneSource
<i>PC</i>	- average producer costs computed using 3-digit SIC(92) sector data and the number of firms in the respective sector	National Statistics
<i>FRD</i>	- expenditure on R&D performed in UK by foreign businesses at the 2- digit level SIC(92)	National Statistics
<i>DRD</i>	-expenditure on R&D performed by domestic businesses/ Total expenditure in R&D - 2-digit SIC(92) level	National Statistics
<i>FUNDS</i>	- shareholders' funds / Turnover  shareholders' funds include: -issued ordinary and preferences share capital; -revenue and capital reserves -Profit & Loss account balances and government grants	OneSource
<i>SEI</i>	- total domestic exports in industry i/ total domestic exports in country Computed by aggregating firm level data at 5-digit level	OneSource

**Cont'd/.....**

VARIABLES	DESCRIPTION	SOURCE
<i>MNEM</i>	- employment share of MNE in each sector using data at 5-digit level	OneSource
<i>II</i>	- share of industry i employment in total employment in the country, computed at 5-digit level	OneSource
<i>MNEX</i>	- computed by aggregating firm level data to 5-digit level sectors:  $\frac{\text{(MNE exports in industry i / total exports in industry i)}}{\text{(total MNE exports / total exports)}}$	OneSource
<i>YEAR 93-96</i>	- year dummies	

***Appendix B: Number of firms per year in the sample***

<i>Year</i>	<i>Number of firms</i>
1992	3501
1993	3564
1994	3636
1995	3662
1996	3662



## References

- Aitken, B., G.H. Hanson and A.E. Harrison, 1997, "Spillovers, foreign investment and export behaviour", *Journal of International Economics*, vol.43, p.103-132
- Balasubramanyam, V.N., M. Salisu and D. Sapsford, 1996, "Foreign direct investment and growth in EP and IS countries", *Economic Journal*, vol.106, p.92-105
- Barry, F. and J. Bradley, 1997, "FDI and the trade: the Irish host-country experience", *Economic Journal*, vol.107, p.1798-1811
- Blake, A.P. and N. Pain, 1994, "Investigating structural change in UK export performance: the role of innovation and direct investment", *NIESR Discussion paper n.71*
- Blomström, M., A. Kokko and M. Zejan, 2000, *Foreign Direct Investment: Firm and Host Country Strategies* (London, Macmillan)
- Blomström, M. and H. Persson, 1983, "Foreign investment and spillover efficiency in an underdeveloped economy: evidence from Mexican manufacturing industry", *World Development*, vol.11, p.493-501
- Blomström, M., 1986, "Foreign investment and productive efficiency: the case of Mexico", *Journal of Industrial Economics*, vol.35, p.97-110
- Cabral, S., 1995, "Comparative export behaviour of foreign and domestic firms in Portugal", *Banco de Portugal Economic Bulletin*, March, p.69-78
- Cantwell, J., 1989, *Technological innovation and multinational corporations*, Oxford, Basil Blackwell
- Görg, H. and D. Greenaway, 2002 "Foreign Direct Investment and Intra-Industry Spillovers", *GEP Research Paper 2002/01*, Leverhulme Centre for Research in Globalisation and Economic Policy, University of Nottingham.
- Görg, H. and E. Strobl, 2001 "Multinational Companies and Productivity Spillovers: A Meta Analysis", *Economic Journal*, vol. 111, pp. F723-F739.
- Haddad, M. and A. Harrison, 1992, "Are there positive spillovers from direct foreign investment? Evidence from Panel data for Morocco", *Journal of Development Economics*, vol.42, p.51-74
- Heckman, J. J., 1979, "Sample selection bias as a specification error", *Econometrica*, vol.47, p.153-161
- Hirsch, S. and I. Bijaoui, 1985, "R&D intensity and export performance: a micro view", *Weltwirtschaftliches Archiv*, vol.121, p.138-251



- Kokko, A., R. Tansini and M. Zejan, 1997, "Trade Regimes and Spillover Effects of FDI: Evidence from Uruguay" (mimeo, Stockholm School of Economics)
- O'Sullivan, P.J., 1993, "An assessment of Ireland's export-led growth strategy via foreign direct investment: 1960-1980", *Weltwirtschaftliches Archiv*, vol.129, p.139-158
- Rhee, Y.W. and T. Bélot, 1990, "Export catalysts in low-income countries", *World Bank Discussion Papers*, no72
- United Nations Conference on Trade and Development (UNCTAD), 1997, *World Investment Report 1998. Trends and determinants*, United Nations, Geneva
- Wakelin, K., 1998, "Innovation and export behaviour at the firm level" *Research Policy*, vol.26, p.829-841
- Wang, J-Y and Blomström, M., 1992, "Foreign investment and technological transfer: a simple model", *European Economic Review*, vol.36, p.137-155