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**CENTRE FOR RESEARCH ON GLOBALISATION AND LABOUR MARKETS**



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# **Multinationals and Export Spillovers**

**by**

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and Katharine Wakelin**

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## **Abstract**

This paper focuses on the under-explored area of export spillovers from MNEs to domestic firms. It is 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 dataset of 3662 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. Empirical Evidence
4. A Model of Export Spillovers for the United Kingdom
5. Empirical Model
6. Construction of Data Set
7. Results
8. Conclusion

## **Non-Technical Summary**

There is significant competition among governments to attract inward investment. Typically a range of incentives are provided – tax allowances, duty drawbacks, investment allowances, grant in aid and so on. This signals a belief on the part of many governments in the existence of external benefits from multinationals. This paper contributes to the study of the indirect effects of foreign direct investment (FDI) focusing on one under-explored spillover, namely the impact of multinational enterprises (MNEs) on the export behaviour of domestic firms.

The importance of the export-enhancing role of FDI in host countries has been analysed before. This literature typically focuses on the export performance of foreign affiliates themselves. However, this export promotion effect need not be limited to the foreign affiliates. It is possible that domestic firms become more export oriented in response to the presence of multinationals, i.e. there is a spillover to domestic firms. The mechanisms for this can include information spillovers, demonstration effects and stronger product market competition.

This paper analyses for the first time potential export spillover effects from MNEs in the United Kingdom. We test the impact of MNEs on domestic export behaviour for a large sample of manufacturing firms in the UK for the first half of the 1990s. We examine domestic firms' export behaviour taking into account the three potential channels for export spillovers mentioned above.

Our results provide a comprehensive and 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' activities. This in effect means a structural change in the economy, which can have long lasting effects. Since we expect this export promotion effect to be the product of improved international competitiveness as a result of technological transfer, information externalities and reduced inefficiency due to increased competition, we can then argue that it is an important contribution for the long-term economic growth of the host country.

## 1. Introduction

There is significant competition among governments to attract inward investment. Typically a range of incentives are provided – tax allowances, duty drawbacks, investment allowances, grant in aid and so on. This signals a belief on the part of many governments in the existence of external benefits from multinationals. More specifically it has been argued they can affect productivity levels and growth rates in the industries they enter, as well as promoting skill upgrading and increased innovation.

This paper contributes to the study of the indirect effects of foreign direct investment (FDI) focusing on one under-explored spillover, namely the impact of multinational enterprises (MNEs) on the export behaviour of domestic firms. The importance of the export enhancing role of FDI in host countries has been recognised by for example, Blake and Pain (1994) for the United Kingdom, O’Sullivan (1993) and Barry and Bradley (1997) for Ireland, and Cabral (1995) for Portugal. This literature typically focuses on the export performance of foreign affiliates themselves. However, this export promotion effect need not be limited to the foreign affiliates. It is possible that domestic firms become more export oriented in response to the presence of multinationals, i.e. there is a spillover to domestic firms. The mechanisms for this can include information spillovers, demonstration effects and stronger product market competition.

Export spillovers may thus be associated with structural change resulting from FDI. Being a channel for the introduction of new technology, diffusion of information, as well as an important competitive stimulus, MNEs may promote efficiency in domestic firms, economies of scale and increasing international specialisation. This in turn provides a stimulus to long-run economic growth in the host country (see Balasubramanyam *et al* (1996) and Borensztein *et al* (1998)). Moreover, this weakens potential instability resulting from over-dependence on foreign direct investment. It is often argued that MNEs’ strategies are more volatile than domestic firms in reacting to changes in external conditions, see Ruane and Görg (1997) and Jones (1980).

We test the impact of MNEs on domestic export behaviour for a large sample of 3662 manufacturing firms in the UK for the first half of the 1990s. The United Kingdom is a particularly interesting case to take, being one of the most important hosts countries for FDI with an 11 per cent share of the global inward FDI stock, United Nations (1997).

The layout of the paper is as follow. Section II reviews potential indirect effects of multinationals on host countries, and focuses specifically on the impact of MNEs on the export activities of locally-owned firms. Section III provides a description of the empirical evidence available so far. Section IV sets out the model to be estimated, Section V explains our modelling strategy whilst Section VI describes the data set used. Section VII discusses our results and Section VIII concludes.

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

It has long been recognised that multinational firms are characterised by firm-specific advantages, that allow them to overcome their disadvantageous position with respect to domestic counterparts in foreign markets<sup>1</sup> (Kindleberger, 1969; Caves, 1971; Buckley and Casson, 1976; Hymer, 1976; Hirsch, 1976; Dunning, 1977). Firm-specific advantages typically take the form of knowledge-based assets such as proprietorial information relating to product or process technology, managerial know-how, the quality of the workforce, company culture, marketing, branding and so on. The firms' decision to invest instead of pursuing other forms of internationalisation such as exporting or licensing is related to the nature of their firm-specific assets. Being intangible, their exploitation is driven by market imperfections. The internalisation of activities thus emerges as the most efficient way for these firms to exploit fully their advantage in domestic and international markets, Buckley and Casson (1976). Dunning (1979) links these explanations and presents necessary conditions for the emergence of MNEs combining ownership and internalisation factors with elements of location theory. The localisation aspect refers to the idea of country-specific characteristics, in the trade theory tradition. It relates the existence of FDI flows to host location's characteristics such as factor endowments (natural or created) that can enhance the MNEs' ownership advantages.

This concept of MNEs as firms endowed with specific advantages leads to the belief that their presence brings indirect benefits to domestic firms, via influencing productivity levels and/or productivity growth of domestic firms, which in turn affects productivity growth in the economy as a whole. These spillovers have generated a large literature (see for example Caves (1972), Globerman (1979), Blomström and Persson (1983), Blomström (1986), Haddad and Harrison (1993)). It has also been recognised that MNEs can affect the trade performance of the host economy through their own exporting activity, see Blake and Pain (1994), Barry and Bradley (1997), Cabral (1995). What has not been explored, until

recently, is the possibility that MNEs can affect trade performance *indirectly* through their impact on domestic firms.

### ***Export Information Externalities***

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, Hanson and Harrison (1997)). It is assumed that subsidiaries have easier access to information on foreign markets because they form part of a multinational enterprise. Exporting implies 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 privileged information could spill over to domestic firms.

### ***Demonstration/Imitation Effects***

MNEs can also be a source of another sort of information not directly related to exporting, namely new technologies and management techniques. MNEs are generally assumed to be competitive and this is reflected in technological leadership, efficient management methods and marketing know-how. Given this, domestic firms could benefit through processes of demonstration and imitation, due for instance to 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>ii</sup>.

### ***Competition Effects***

Entry of foreign companies will, at least in the first stage, lead to increased competition. This is particularly the case given that MNEs tend to 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, leaner production

techniques. This in turn can also facilitate entry into foreign markets. One may expect this to be particularly important in developed economies where indigenous firms have accumulated sufficient know-how to survive the increased competition and are more able to adapt their production methods and absorb new technology, see Wang and Blomström (1992) and Cantwell (1989).

### **3. Empirical Evidence**

Evidence on export spillovers is very limited. There are case studies which provide some support for export externalities in developing countries, see for instance Rhee and Belot (1990). But Aitken, Hanson and Harrison (1997) is the only study to date to test specifically the role of MNEs as export catalysts in the host country. Using panel data on 4104 Mexican manufacturing plants for the period 1986-1990, the authors start by analysing a firm's decision to serve the domestic market or to export, taking into account fixed costs of supplying foreign markets, such as advertising, adaptation to local consumers' tastes and transportation. They argue that these decrease due to information externalities resulting from the local concentration of export activity in general and MNEs' export performance in particular. They then use a probit model to test empirically 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>iii</sup>. The idea is that geographic concentration of export activity need not be directly related to spillovers, but may be the result of external factors, possibly location-specific factors affecting all firms, such as transportation costs advantages.

The results from the full sample provide support for the hypothesis that spillovers from both MNE export activity, and export activity in general, are important. However, the results are not robust to a change in 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 the presence of MNEs remain significant. In further tests of robustness, the authors replace MNE export activities by a measure of general MNE production. This is particularly interesting as they 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. It may not be due exclusively to information externalities, an issue that we investigate in the following sections.

#### 4. A Model of Export Spillovers for the United Kingdom

In this section we present a simple theoretical framework to motivate the empirical analysis which follows. The objective is to investigate how the presence of MNEs can affect domestic firms' export behaviour, by explicitly considering three different channels. In addition to the information spillovers explored in Aitken *et al* (1997) we introduce the imitation/demonstration effect and competition effect discussed in Section II.

Using a framework building on Aitken, Hanson and Harrison (1997), we analyse the decision of a representative domestically-owned firm choosing between serving the domestic market, exporting, or both, to maximise its profit:

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

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 (domestic or foreign), and costs.  $q_i$  is quantity of output and  $P_i$  is price.  $h(\bullet)$  refers to production costs.  $m_d(\bullet)$  and  $m_f(\bullet)$  are distribution costs for domestic and foreign markets, respectively. Externalities are defined as the possibility that the presence of MNEs has a cost reducing effect on domestically-owned firms. The cost function is composed of two parts defined as follows<sup>iv</sup>:

$$h(q_d + q_f) = \frac{a}{2}(q_d + q_f)^2 + g(q_d + q_f)$$

$$m_i(q_i) = \frac{1}{2}b_i q_i^2 + c_i q_i$$

$$i = f, d$$

where,

$$g = g(X, \Omega, \Psi)$$

$$c_d = c_d(X, Z_d), c_f = c_f(X, Z_f, \Gamma_{EX}, \Gamma_{MNE})$$

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

We set up the cost function so that the production costs,  $h(\bullet)$  are invariant to the destination of output. Distribution costs,  $m(\bullet)$  vary by destination, capturing the idea of specific costs linked with exporting. We assume that distribution costs associated with exporting -  $Z_f$  - exceed the costs of distribution in the domestic market. In order to export the firms have to invest in the creation of wider distribution networks, in the accumulation of international managerial skills, in understanding foreign markets, and so on.

The presence of other exporting firms and MNEs in particular may be an important source of information for domestic firms considering selling in foreign markets, which may contribute to reducing the costs associated with exporting. Information spillovers from export activities of multinationals and exports in general are shown as:

$$\frac{\partial m_f(q_f)}{\partial \Gamma_{EX}} \leq 0$$

$$\frac{\partial m_f(q_f)}{\partial \Gamma_{MNE}} \leq 0$$

These expressions show that 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 to this spillover effect we also introduce a competition effect and an imitation/demonstration effect captured by variables  $W$  and  $Y$  respectively. These are shown as:

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

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

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 activities MNEs carry out 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>v</sup>,

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

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

To estimate the model we re-write these as:

$$q_{dj} = a_1 P_d + a_2 q_{fj}^* + a_3' Z_{dj} + a_4' X_j + a_5 \Omega + a_6 \Psi + u_{dj}$$

$$q_{fj}^* = b_1 P_f + b_2 q_{dj} + b_3' Z_{fj} + b_4' X_j + b_5 \Omega + b_6 \Psi + b_7 \Gamma_{EXj} + b_8 \Gamma_{MNEj} + u_{fj}$$

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  $(I \times K)$  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:

$$q_{fj} = b_1 P_f + b_2 (a_1 P_d + a_3' Z_{dj}) + b_3' Z_{fj} + (b_2 a_4' + b_4') X_j + (b_5 + b_2 a_5) \Omega + (b_6 + b_2 a_6) \Psi + b_7 \Gamma_{EXj} + b_8 \Gamma_{MNEj} + v_j$$

where,

$$v_j = b_2 u_{dj} + u_{fj}$$

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 finally on several aspects of the presence of MNEs such as their exporting activities, their technological innovation activities, and the competitive pressure their activities entail.

We extend this framework to examine the export behaviour of domestic firms given the presence of foreign firms. To do that we transform the above equation using a dummy variable such as  $y_j=1$  if  $q_{fj}>0$  and  $y_j=0$  otherwise. The former equation is thus transformed into a model of the probability that a firm exports:

$$\Pr(y_j = 1) = \Pr \left[ \begin{array}{l} b_1 P_f + b_2 (a_1 P_d + a_3' Z_{dj}) + b_3' Z_{fj} + (b_2 a_4' + b_4) X_j + (b_5 + b_2 a_5) \Omega + \\ (b_6 + b_2 a_6) \Psi + B_7 \Gamma_{EXj} + b_8 \Gamma_{MNEj} + v_j \geq 0 \end{array} \right]$$

where,

$$v_j = b_2 u_{dj} + u_{fj}$$

## 5. 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 sample of UK domestically-owned firms over a 5-year period, taking into account the three potential channels for export spillovers discussed. We consider export behaviour as involving both the decision to export and the proportion of production exported. Our econometric representation takes into account both decisions and the fact that they are inter-dependent. This specification avoids selectivity biases associated with the option of focusing exclusively on export propensity of exporting firms, which would cast doubts on the econometric results, see Heckman (1979), Greene (1997). This is particularly important since we investigate how the presence of MNEs affects the export behaviour of all domestic manufacturing firms, and not only exporting firms.

The export decision equation is:

$$B \text{ exports}_i = a + b_1 \text{ForeignR \& D}_s + b_2 \text{MNEmks}_s + b_3 \text{MNE exports}_s + b_4 \text{DomesticR \& D}_s + b_5 \text{SEI}_s + b_6 \text{II}_s + b_7 \text{Dprice}_s + b_8 \text{ProdCost}_s + b_9 \text{Avgremuneration}_i + b_{10} \text{Avgassets}_i + b_{11} \text{Turnover}_i + b_{12} \text{Funds}_i + v_i$$

The export propensity equation is:

$$\text{Exp propensity}_i = a + b_1 \text{ForeignR \& D}_s + b_2 \text{MNEmks}_s + b_3 \text{MNE exports}_s + b_4 \text{DomesticR \& D}_s + b_5 \text{SEI}_s + b_6 \text{II}_s + b_7 \text{Dprice}_s + b_8 \text{ProdCost}_s + b_9 \text{Avgremuneration}_i + b_{10} \text{Avgassets}_i + b_{11} \text{Turnover}_i + u_i$$

where,

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

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

$$\text{corr}(v_i, u_i) = r$$

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

The first equation is estimated for the full sample. We use a dichotomous variable, *Bexports* as the dependent variable that takes the value 1 or 0 depending on whether the domestic firm decides to export or not<sup>vi</sup>. This equation also performs the sample selection for the second model that focuses exclusively on the export propensity of the firms that decide to export, i.e. when  $B \text{ exports}_i = 1$ . The dependent variable for this equation is then, *Exp propensity*.

Following the analysis in Section IV, we choose the following regressors to explain the export behaviour of a representative UK-owned firm. First, we include three regressors to test for the channels through which export spillovers may arise. *ForeignR&D*, the expenditure on R&D carried out by foreign MNEs in the UK, is included to control for the demonstration effect. This captures the contribution of MNEs to the available stock of technological knowledge. The more innovation activities carried out by MNEs, the larger the potential for imitation from which domestic firms can benefit. *MNEmks*, the relative weight of MNEs in total employment in a given sector, accounts for the relative importance of MNEs at the sector level in the domestic market and tests for competition effects. The greater the relative importance of MNEs, the stronger the competitive pressure on domestic firms. One possible response to increased competition is exploitation of market opportunities abroad. Finally *MNEexports*, the relative importance of MNEs' export activities in a given sector scaled by the relative importance of MNEs' exports in total exports tests spillovers affecting the export behaviour of domestic firms linked with the

MNEs' export activities. Inclusion of this variable follows from Aitken *et al* (1997). 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 each of these three variables.

We also control for the existence of spillovers from export activity in general, by including *Sectoral Exports Index (SEI)*, 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 export profile. Finally the variable *Industry Index (II)*, showing the size of industries at national level in terms of employment, to control for possible general spillovers not directly associated with export activity.

Following our discussion in Section IV we include other sector and firm-specific variables such as *Dprice*, the domestic producer price indices, and average production costs, *ProdCost*. We also include the variables *Avgremuneration* (average wages) and *Avgassets* (fixed assets per employee) to control for labour skills and physical capital. These are thought to be important determinants of exports in a developed economy such as the United Kingdom. We also take into account that the United Kingdom has a clear comparative advantage in technology factors. Thus technology-related activities developed by UK-owned firms are expected to play an important role in determining the country's exports. We control for this by including variable *Domestic R&D* that captures the domestic contribution to the total innovation activities carried out in the UK. *Turnover*, is included as a proxy for the size of the firm. This is also thought to be an important determinant of a firm's export performance, see for example Hirsch and Adlar (1974), Glejser *et al* (1980) and Lall and Kumar (1981). The larger the firm, the more oriented towards foreign markets it will be as larger firms can more easily overcome the additional fixed costs associated with exporting and the more likely they are to exploit economies of scale.

Finally, in the export decision equation *Funds*, defines shareholders' funds per unit of output available to the domestic firm. This is included to capture the domestic firms' financial capacity to meet the extra costs associated with setting up export operations in foreign countries. This variable is only expected to be important for the domestic firm's decision of whether to export or not. We do not expect it to influence the export propensity of firms already exporting as it relates to fixed rather than variable costs of exporting.

## 6. Construction of Data Set

Our sample comprises 3662 UK-owned manufacturing firms covering a 5-year period from 1992 to 1996. Most of the 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>vii</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 10 years in order to eliminate very small firms, likely to be exclusively oriented towards domestic or even local markets. A total of 10,402 firms matched all these criteria. However, given missing observations for many firms we decided to keep only those that had data available for at least three consecutive years. Our final sample is made up of 3662 firms which we believe to be representative of the population of domestically-owned firms in the UK<sup>viii</sup>.

Using firm-level data is crucial since it allows us to complement the investigation of potential export promotion effects of the presence of foreign MNEs, by identifying the specific role of export spillovers to domestic firms. It is also important to note that the data set will allow this issue to be investigated for the first time in the context of a developed country, the United Kingdom. *A priori*, we expect the demonstration/imitation effect, and particularly the competition effect to be especially important for firms in developed countries as they have the “absorptive capacity” to face increased competition and assimilate innovation more efficiently, see Cohen and Levinthal (1989).

## 7. Results

To estimate the two equations we use an econometric technique based on the Heckman selection model, see Heckman (1979) and Greene (1997). This takes into account the truncated nature of the sub-sample of exporting firms used for 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 the data by firm, which allows the use of robust standard errors and unspecified serial correlation within firms while assuming independence between them, i.e. we take the observations as being independent across but not necessarily independent within firms. Finally, it proved impossible to test simultaneously for the existence of competition effects and spillover information due to the

strong correlation between the two variables, *MNEmkts* and *MNEexports*<sup>ix</sup>. We therefore report results for the two effects separately. The maximum likelihood estimates of the two 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 estimated correlation coefficient (*rho*) between the error terms of the export decision and export propensity equations is significantly different from zero. This is also confirmed by the likelihood-ratio test. Thus, the evidence validates our choice of the Heckman selection model for these data.

### ***The Export Decision***

Table 1 reports coefficient estimates for the export decision. Our model is able to correctly predict 71% of the firms' decisions of whether to export or not<sup>x</sup>. With respect to each regressor, there is significant evidence to support the hypothesis of the existence of export spillovers. It appears that the presence of MNEs in the domestic market increases the probability of an indigenous firm becoming an exporter. More specifically, we find a positive and significant coefficient for the variable *Foreign R&D*, confirming a demonstration effect. We also find significant evidence of information spillovers (*MNEexports*) affecting the domestic firms' decision to sell in foreign markets. This confirms the hypothesis 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, *MNEmkts*, is positively and significantly associated with a higher probability that the domestic firm is exporting.

The results for the *Sector Export Index (SEI)* confirm that belonging to an export-oriented sector helps the domestic firm establish its own export activities. With respect to variable *II (Industry Index)* we found a significant and negative relationship between this variable and the probability of a firm exporting showing that firms in large domestic sectors tend to focus their activity in serving the home market. The coefficients on the variables, *Turnover*, *Dprice* (domestic price), and *ProdCost* (production costs) all had the expected sign but turned out to be insignificant. We found, however, a positive and significant relationship between labour remuneration costs, *Avgremuneration*, 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. We would also expect this to complement an



important role by domestic innovation activities. We found however the variable *Domestic R&D* to be statistically insignificant.

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 between the competition and the information externalities effect. The results suggest that increased competition seems to be the main spillover channel. A marginal increase in MNE export activity increases the probability that a firm exports by 0.033 while a marginal increase in the relative importance of foreign firms in terms of employment is associated with an increase in the probability of exporting of 0.4792. The imitation effect is also considerably smaller. A marginal increase in the R&D expenditure of foreign firms in the United Kingdom increases the probability of a domestic firm exporting by 0.00003. Statistical significance apart we found, as expected, a much larger effect (marginal effect of 0.032) associated with domestic R&D investment.

### ***Export Propensity***

Table 2 reports the estimated coefficients for the export propensity equation. Again we estimate the model taking into consideration the export information externality effect, *MNEexports*, and the competition effect, *MNEmkts*, 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, captured by the variable *SEI*, confirming that sector-specific factors are crucial determinants of the export performance of domestic firms.

With respect to other spillover channels, there is significant evidence of demonstration/imitation effects as well as competition effects, since coefficients for *ForeignR&D* and *MNEmkts* are both positive and significant. We can thus argue that foreign MNEs not only affect the decision of domestic firms of whether to enter foreign markets, but also their export propensity. We also find a positive and significant coefficient for the variable *Domestic R&D* that suggests that the United Kingdom's expertise in technological activities plays a significant role. Domestic technological innovation seems to be an important factor determining the competitiveness of domestic firms' export activities in the United Kingdom, although not a major determinant of the decision to export. The

demonstration effect seems to be complementing the domestic efforts in terms of technological innovation. As expected, we find a much higher marginal effect associated with domestic R&D efforts than with the innovation activities carried out by MNEs. With the competition effect, we again find positive evidence.

As far as the firm-specific variables are concerned size, cost and average wage 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 achieving low production costs is more important to the increase in export propensity than the decision to export.

To conclude, the results obtained for the export propensity equation confirm the existence of export spillovers from MNEs. The size of the estimated coefficients indicates that the competition effect is again clearly the most important. The imitation effect does not seem to be a major factor, due perhaps to the difficulty in absorbing technology inflow or to the MNEs' efforts to internalise and protect its technological advantage.

## **8. Conclusion**

This paper analysed for the first time potential export spillover effects from MNEs in the United Kingdom. We began by outlining the reasons why we expect spillovers to exist, focusing particularly on information externalities, demonstration effects and competition effects. Our model, which is an extension to the Aitken, Hanson and Harrison (1997) model, provided the theoretical underpinning for the empirical analysis. This 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 the export propensity of domestic firms 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. According to our results the presence of MNEs in the

domestic market plays a much greater role than the specific activities that they carry out in the host country in providing incentives to the domestic firms to export.

Our results are consistent with the predictions of our model and provide a comprehensive and 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' activities. This in effect means a structural change in the economy, which can have long lasting effects. Since we expect this export promotion effect to be the product of improved international competitiveness as a result of technological transfer, information externalities and reduced inefficiency due to increased competition, we can then argue that it is an important contribution for the long-term economic growth of the host country.

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<sup>i</sup> MNEs face extra cost of expanding activity into foreign markets such as the control related expenses associated with managing and co-ordinating internationally decentralised organisations, the higher costs of stationing personnel abroad, communication, transport, packaging, shipping, financial transactions, insurance. They also have to face costs associated with their unfamiliarity of the business, legal and economic environment of the host country.

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

<sup>iii</sup> The estimating model includes a range of other variables thought to affect the firm's export decision. These include domestic final-goods prices, cost variables, dummy variables for whether the plant subcontracts from other plants, employment in the plant relative to industry average employment, 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.

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

<sup>v</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  $q_f > 0$  and  $q_f^* = 0$  otherwise.

<sup>vi</sup> A more detailed description of the variables is presented in Appendix 2.

<sup>vii</sup> Onesouce aims to cover the population of economically active firms in the UK.

9

<sup>ix</sup> Table 2 in Appendix provides the the correlation coefficients for the variables used in the model.

<sup>x</sup> The proportion of correct predictions of the export decision using probit model.

**Table 1***Dependent variable: Bexports- Export decision*

<b>Regressor</b>	<b>Coeff.</b>	<b>t-stats</b>	<b>Coeff.</b>	<b>t-stats</b>
<b>Foreign R&amp;D</b>	0.0001***	5.787	0.0001***	3.527
<b>Domestic R&amp;D</b>	0.1055	0.695	0.229	1.508
<b>MNEexports</b>	0.0987*	1.832	-	-
<b>MNEmkts</b>	-	-	1.4151***	6.158
<b>SEI</b>	8.9422***	4.65	8.741***	4.867
<b>II</b>	-32.2887***	-11.432	-29.8267***	-10.463
<b>Dprices</b>	-0.0055	-1.23	-0.0038	-0.839
<b>ProdCost</b>	-0.0001	-0.031	-0.0002	-1.122
<b>Avgremuneration</b>	1.8918***	4.185	1.6477***	3.638
<b>Avgassets</b>	-0.2568***	-3.695	-0.2596***	-3.831
<b>Turnover</b>	0.0001	0.903	0.0001	0.956
<b>Funds</b>	0.0679**	1.909	0.0671**	1.835
<b>Year93</b>	0.0039	0.131	-0.0015	0.960
<b>Year94</b>	-0.1241***	-3.091	-0.1236***	-3.066
<b>Year95</b>	-0.0363	-0.628	-0.0214	-0.367
<b>Year96</b>	0.0312	0.45	0.0281	0.402
<b>Const.</b>	0.8152*	1.889	0.4179	0.962
<b>Number of obs.</b>	11372		11372	
<b>Log Likelihood</b>	-5875.654		-5780.149	
<b>Wald chi<sup>2</sup>(14)</b>	309.93		312.06	

\*\*\*-significant at 1%

\*\*- significant at 5%

\*- significant at 10%

**Table 2**

*Dependent variable: Expropen- Propensity to export*

<b>Regressor</b>	<b>Coeff.</b>	<b>t-stats</b>	<b>Coeff.</b>	<b>t-stats</b>
<b>Foreign R&amp;D</b>	0.0001***	3.034	0.0001*	1.623
<b>Domestic R&amp;D</b>	0.0444	1.492	0.0607**	2.018
<b>MNEexports</b>	0.0145	1.409	-	-
<b>MNEmkts</b>	-	-	0.1635***	3.820
<b>SEI</b>	0.8533***	4.612	0.8561***	4.692
<b>II</b>	-2.7719***	-4.376	-2.5096***	-3.951
<b>Dprices</b>	0.0032***	3.795	0.0033***	3.920
<b>ProdCost</b>	0.0002***	9.41	0.0002***	8.032
<b>Avgremuneration</b>	0.6325***	6.375	0.6158***	6.208
<b>Avgassets</b>	0.0182	1.078	0.0176	1.041
<b>Turnover</b>	0.0001**	2.21	0.0001**	2.195
<b>Year93</b>	-0.0135***	-2.763	-0.013***	-2.675
<b>Year94</b>	0.0062	0.848	0.0074	1.001
<b>Year95</b>	0.0031	0.3	0.0069	0.655
<b>Year96</b>	0.0092	0.717	0.0109	0.851
<b>Const.</b>	-0.2044**	-2.45	-0.2461**	-2.929
<b>Number of obs.</b>	11372		11372	
<b>Censored obs.</b>	7948		7948	
<b>Uncensor. Obs</b>	3424		3424	
<b>Log Likelihood</b>	-5875.654		-5780.149	
<b>Wald chi<sup>2</sup>(14)</b>	309.93		312.06	
<b>Rho</b>	-0.2236		-0.2281	
<b>Wald test of independence of equations, (rho=0)</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%

**Appendix Table A - Variable definitions and data sources**

<b>VARIABLES</b>	<b>DESCRIPTION</b>	<b>SOURCE</b>
<i>BEXPORTS</i> - Export decision	- dichotomous variable taking the value 1 if the domestically-owned firm exports and 0 otherwise.	Onesource
<i>EXPROPEN</i> - Export propensity	- export propensity of domestically-owned exporting firms computed as the ratio, exports/turnover.	Onesource
<i>DPRICES</i> - Domestic prices	- 5 -digit level SIC(92) sectors producer price index numbers of products manufactured in the UK	Office for National Statistics
<i>TURNOVER</i>	- firm level data for domestically-owned firms	Onesource
<i>Avgremuneration</i> - Average wage	- total remuneration/ number of employees.	Onesource
<i>Avgassets</i> – Average assets	- fixed assets/ number of employees	Onesource
<i>ProdCost</i> - Production Costs	- average producer costs ( <i>Purchases<sup>11</sup></i> ) computed using 3-digit SIC(92) sector data. and the number of firms in the respective sector.	Office for National Statistics
<i>FOREIGN R&amp;D</i>	- expenditure on R&D performed in UK by foreign businesses at the 2- digit level SIC(92).	Office for National Statistics
<i>DOMESTIC R&amp;D</i> - Relative Domestic R&D	-expenditure on R&D performed by domestic businesses/ Total expenditure in R&D - 2-digit SIC(92) level	Office for National Statistics
<i>FUNDS</i> - Shareholders' funds	- shareholders' funds / Turnover  where, Shareholders' funds are defined as: -issued ordinary and preferences share capital; -revenue and capital reserves -Profit and Loss account balances and government grants	Onesource
<i>SEI</i> - Sectoral Domestic Export Index	- total domestic exports in industry i/ total domestic exports in country Computed by aggregating firm level data at 5-digit level	Onesource

**Table A (cont.)**

<b>VARIABLES</b>	<b>DESCRIPTION</b>	<b>SOURCE</b>
<i>MNEmkts</i> - MNE Relative Importance in Domestic Market ()	- employment share of MNE in each sector using data at 5-digit level	Onesource
II - Industry Index	- share of industry i employment in total employment in the country, computed at 5-digit level	Onesource
<i>MNEexports</i> - MNEs' Export Activity Index	- computed by aggregating firm level data to 5-digit level sectors:  $\frac{(\text{MNE exports in industry } i / \text{total exports in industry } i)}{(\text{total MNE exports} / \text{total exports})}$	Onesource
<i>YEAR 93-96</i>	- year dummies	

**Appendix table 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



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