

**FOREIGN DIRECT INVESTMENT AND HOST COUNTRY REGIONAL EXPORT  
PERFORMANCE: EVIDENCE FROM POLAND**

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## **ABSTRACT**

A prominent benefit attributed to the flow of foreign direct investment to developing countries is its effect on international market access. Through a variety of channels the presence of foreign firms is expected to reduce the costs faced by domestic firms in breaking into international markets and in turn boost their export prospects. To examine the validity of this claim we use panel data from Poland's manufacturing sector to investigate whether variation in the export volume of domestic firms is related to the concentration of foreign firm export activity. Our results are consistent with the notion of spillovers from foreign firms and suggest that domestic firms operating in regions-industries with a higher concentration of foreign firm export activity enjoy higher export volumes.

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## 1. INTRODUCTION

The growing worldwide trend towards liberalization of economic activity has increased the importance of multinational enterprises in the development process. Foreign direct investment (FDI) is an important source of external finance and accounts for more than half of all capital inflows to developing countries (UNCTAD, 1999). A recent World Development Report (1999) points out that multinational firms are also important sources of innovation and the spread of their productive activities constitutes an important means of knowledge dissemination. In a similar vein, Romer (1993) argues that one of the best ways for developing countries to acquire ideas and knowledge is to create an economic environment conducive to the flow of foreign direct investment.

Several benefits associated with the flow of foreign direct investment to developing countries have been proposed (see Helleiner (1989); Hatzinichronoglou (1996)). One of these is the potential role that may be played by multinational firms in promoting access to world markets.<sup>1</sup> Several factors may make it difficult for developing country firms to compete internationally. In such an environment multinational firms are a natural conduit for a variety of inputs. Depending on the country and the firm in question the role of multinational enterprises (MNEs) may include the provision of technical, marketing, managerial and informational inputs. The impact of MNEs in promoting exports stems not simply from the provision of these inputs to a particular firm but the subsequent diffusion and spread of this know-how to other companies and other entrepreneurs. Through imitation, labor market turnover or through more formal channels (for example, outsourcing and distribution links) interaction with multinational firms may reduce the costs associated with entering international markets and enable host country firms to target export markets more effectively.

This kind of learning mechanism is supported by a considerable amount of anecdotal evidence and case studies. One of the most frequently cited and spectacular examples is the development of Bangladesh's garment exporting industry. In the 1980s, hundreds of garment exporting firms were created by entrepreneurs who had previously been employed by one

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<sup>1</sup> While the role of multinational enterprises (MNEs) in promoting host country exports has received limited attention, the link between FDI and home country exports has been examined by several authors (for e.g. Pearce, 1990; Meredith and Maki, 1992; Buigues and Jacquemin, 1994; Svensson, 1996). The main findings are summarized in Graham (1996). In general, these papers find support for a positive relationship between outward FDI and home country exports.

joint venture with a Korean firm. Consequently, garment exports became and still are the largest source of foreign exchange earnings for Bangladesh. Rhee and Belot (1989) provide further discussion on the channels through which this knowledge diffusion may take place and additional case studies which suggest that the export activities of multinational firms generate externalities that enhance the international competitiveness of domestic firms.<sup>2</sup>

Despite these studies, formal economy wide empirical evidence on the effect that multinational firms may have on the export activities of domestic firms is limited. A notable exception is a study by Aitken et al. (1997). Their paper uses data on Mexican manufacturing firms to examine whether the export propensity of a domestic firm is influenced by the local concentration of foreign firm export activity. The results suggest that domestic firms in areas with a greater concentration of foreign export activity are more likely to export. These results support the notion of positive export spillovers from multinational firms.

The aim of our paper is to examine whether the presence and activities of foreign firms enhances the export performance of domestic firms.<sup>3</sup> Our analysis is based on data from Poland's manufacturing sector. Although aggregated at the level of region-industry our data includes information from all manufacturing firms in Poland and covers a recent period, 1992-1997. The use of these comprehensive data makes our work one of the few attempts to formally examine the role of foreign firms in promoting exports. Another attractive feature is the use of data from a transition country such as Poland. Before radical economic and political reforms were initiated in the late 1980s, Polish firms had limited knowledge of foreign markets and there was virtually no foreign direct investment. The post-reform period has been marked by substantial flows of foreign direct investment to Poland. These pre and post reform characteristics make Poland a natural testing ground for examining whether there are any export spillovers associated with the activities of foreign firms.

In some more detail, our strategy to assess the presence of export spillovers builds on

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<sup>2</sup> Through out the paper we refer to foreign-owned firms as foreign firms and domestically-owned firms as domestic firms.

<sup>3</sup> Our work is restricted to the impact that foreign firms have on the export activities of domestic firms and is not concerned with the trade balance. Briefly, there appear to be three different perspectives on the link between inward FDI and host country trade flows. The first considers the direct impact of multinational enterprises and argues that FDI tends to worsen the trade balance. The second takes into account indirect effects of FDI and claims exactly the opposite. The third argues that macroeconomic considerations rather than activities of individual firms play a more important role in determining the trade balance.

the notion that if there are benefits to be derived from interacting with and locating close to foreign firms then we may expect these (benefits) to be pronounced in areas with a greater concentration of foreign export activity. If geographical proximity facilitates the transmission of knowledge then it should certainly be easier for domestic firms to access this resource when there is a greater concentration of foreign firm activity. By empirically testing whether the exports of domestic firm are associated with the geographic concentration of foreign firm export activity we can learn whether such spillovers exist and whether they are important for promoting exports.<sup>4</sup>

The structure of the paper is as follows. The following section describes the analytical framework used to motivate our empirical specifications. Section III discusses foreign direct investment and trade patterns in Poland and provides a description of the data. Section IV presents results and section V concludes.

## 2. ANALYTICAL FRAMEWORK

Our aim is to examine whether foreign firm export activity enhances the export activities of domestic firms. The potential for such spillovers from foreign to domestic firms may be expected due to the global presence of foreign firms and their knowledge of foreign markets and foreign consumers. By interacting with and locating close to foreign firms it may be possible for domestic firms to reduce the costs associated with entering export markets and thereby enhance their export prospects.

To formalize these notions, consider a representative *domestic* firm operating in a particular industry and region. This firm faces the decision of supplying output to the domestic market, to international markets or to both. We assume that the firm's cost function consists of two components. A component that is common to the domestic and foreign market,

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<sup>4</sup> Although not in the context of exports, there are several papers which provide evidence that is consistent with the idea of localized spillovers. For instance, Carlton (1983) finds that the geographic concentration of employment in an industry exerts a positive influence on firm location decisions. Similarly, Wheeler and Mody (1992) and Head et al. (1995) find that the existing local concentration of foreign investment exerts a positive influence on the location decisions of new multinational investments. Nakamura (1985) and Henderson (1986) report that local concentration of economic activity is positively correlated with total factor productivity.



and a cost component that is pertinent only to international markets.<sup>5</sup> Using this characterization the production decision of the firm may be specified as follows:

$$\max_{(q_d, q_f)} \Pi = P_d q_d + P_f q_f - \{c_1(q_d + q_f) + c_2(q_f)\}, \quad (1)$$

$$\text{s.t. } q_d, q_f \geq 0,$$

where  $d$  and  $f$  index the domestic and foreign markets respectively,  $q$  represents output,  $P$  represents output prices,  $c_1(\bullet)$  is the cost component common to both markets while  $c_2(\bullet)$  is the cost component relevant only to the international market. Following Aitken et al. (1997) we assume quadratic cost functions for the two cost components,

$$c_1(q_d + q_f) = \frac{a}{2}(q_d + q_f)^2 + b(q_d + q_f), \quad c_2(q_f) = \frac{g_f}{2} q_f^2 + k_f q_f.$$

Substituting these costs function into (1) and using the first order conditions to (1) we obtain the following system of equations<sup>6</sup>,

$$q_d = \frac{1}{a}(P_d - a q_f - b) \quad (2)$$

$$q_f = \frac{1}{a + g_f}(P_f - a q_d - b - k_f). \quad (3)$$

To proceed we assume that the parameters  $b$  and  $k_f$  are functions of cost variables, i.e.,

$$b = b(X) \text{ and } k_f = k_f(Z, CONC_{MNE}), \quad (4)$$

where  $X$  represents variables that influence costs in both markets, while  $Z$  and  $CONC_{MNE}$ , represent variables that influence the costs of operating in foreign markets. The latter variable,  $CONC_{MNE}$  or the concentration of foreign firm export activity, is the key variable in our analysis. The spillover notion that we explore is based on the idea that domestic firms benefit from locating close to foreign exporters. Accordingly, higher levels of this variable may be

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<sup>5</sup> For instance distribution costs may be considerably different across the two markets, while production costs may be quite similar. Of course, it is possible that production costs are also market specific. Allowing for this feature would not have much of a bearing on the derivation of our empirical specification.

<sup>6</sup> We can only derive equations (2) and (3) if the optimal level of output supplied to the domestic and foreign markets is positive. While all firms do supply positive quantities to the domestic market, all firms may not be exporting. However, our data are aggregated at the level of all firms in a particular region-industry and we deal only with export supply at the level of region-industry. Accordingly, we assume that there is an interior solution for both  $q_d$  and  $q_f$ .

expected to lower the costs of entering foreign markets and which in turn should manifest itself in higher export volumes.

Substituting (4) into (2) and (3) and aggregating output to the level of the region-industry, estimable versions of (2) and (3) may be written as,

$$Q_{dij} = \alpha_1 P_d + \alpha_2 Q_{fij} + \alpha_3' X_{ij} + u_{dij} \quad (5)$$

$$Q_{fij} = \beta_1 P_f + \beta_2 Q_{dij} + \beta_3' X_{ij} + \beta_4' Z_{fij} + \beta_5 CONC_{MNEij} + u_{fij} \quad (6)$$

where  $Q_{dij}$  and  $Q_{fij}$  represent the total output supplied to the domestic and foreign markets by all domestic firms in region  $i$  and industry  $j$ .<sup>7</sup> The  $\alpha$ 's and  $\beta$ 's are coefficients to be estimated and the error terms ( $u_{dij}$ ,  $u_{fij}$ ) are assumed to be normally distributed with mean zero and positive variances. These two equations represent a simultaneous-equation model. Since we are interested in the export activity of domestic firms we focus on (6). Substituting (5) into (6), and rewriting we obtain,

$$Q_{fij} = \gamma_1 P_f + \gamma_2 P_d + \gamma_3' W_{ij} + \gamma_4 CONC_{MNEij} + v_{ij} \quad (7)$$

where the  $\gamma$ 's are coefficients to be estimated,  $W_{ij} = [X_{ij} \ Z_{ij}]$  and  $v_{ij}$  is a composite error term.<sup>8</sup> According to this equation, export volumes of domestic firms depend on domestic and foreign output prices, a vector of cost variables, and the concentration of foreign firm export activity. Estimation of this equation will allow us to explore whether the export activity of domestic firms in a region-industry is influenced by the concentration of foreign firm export activity in that region-industry. A positive and statistically significant coefficient on the concentration measure would suggest the presence of externalities that increase domestic firms' exports.

## 2.1 Estimation Issues

Before we proceed, there are number of estimation issues that need to be discussed. The first issue is whether it is possible to identify a spillover effect that is distinct from other

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<sup>7</sup> These relationships should not be interpreted as supply functions. Output sold is an outcome of supply and demand considerations and these functions should be viewed as reduced form relationships.

<sup>8</sup> Our data covers the time period 1992 to 1997 and (7) is estimated using pooled data. For brevity the time sub-script has been suppressed.

site-specific characteristics that may lead to higher domestic and foreign firms exports from a particular region-industry. For instance, if a region is a particularly attractive industrial location then it may have a concentration of overall economic activity. As is quite likely, the overall concentration of economic activity may be positively correlated with the concentration of foreign export activity, and estimates that do not control for the former will lead to exaggerated estimates of the export spillover effect. To control for this possibility our specification of (7) includes a measure of the concentration of overall economic activity in a region-industry.<sup>9</sup> Inclusion of this concentration measure allows us to control for site-specific characteristics that may attract industry and to distinguish between general and export spillovers.

Despite this control there may still be a number of omitted variables and unobserved characteristics that influence exports of both domestic and foreign firms from a particular region-industry. The presence of such variables raises the possibility that  $CONC_{MNE}$  and domestic firm export volumes may be simultaneously determined. Estimates that do not allow for such behavior may lead to a positive correlation between the two variables which may have nothing to do with spillovers but may simply be a result of unobserved variables that influence exports of both domestic and foreign firms. To address the simultaneity issue we treat  $CONC_{MNE}$  as an endogenous variable and estimate several versions of (7) using instrumental variables.

A third issue that needs to be tackled is the effect of changes in firm ownership. During the time period covered by our data there has been a rapid increase in the level of foreign participation in the economy (see Table 1). If a substantial proportion of this expansion has been achieved by foreign firms buying up existing domestic firms then these changes in ownership will lead to a pattern where a higher concentration of foreign activity in a region-industry is associated with lower domestic firm activity. It is likely that a higher concentration of foreign ownership in a region-industry will be positively correlated with the concentration of foreign firm export activity. In such a situation, estimating (7) without accounting for changes in firm ownership may lead to a negative relationship between the concentration

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<sup>9</sup> A related problem is that the source of the spillovers may lie not in the export activity of foreign firms but may stem from the local concentration of foreign activity regardless of the market served. To probe the source of the spillovers we also estimate versions of (7) that include concentration measures of foreign firm domestic economic activity.

of foreign firm export activity and exports of domestic firms and to the incorrect conclusion that there is a negative spillover effect. To identify export spillovers which are purged of the effect of changes in firm ownership, our estimates include two variables that attempt to control for changes in the level and concentration of foreign ownership respectively.<sup>10</sup>

### **3. DESCRIPTIVE STATISTICS AND THE DATA**

#### **3.1. Foreign trade and investment patterns in Poland**

For almost 45 years following the end of the second World War, Poland, like several other Central and East European countries, remained isolated from the world economy in terms of both foreign direct investment and trade. Till the late 1980s, central planning and an inward looking development strategy were typical of Poland's economy. Foreign direct investment, which essentially meant Western investment, was negligible and undesirable due to political, ideological and economic reasons. The foreign trade sector was managed and monopolized by the State. Manufacturing firms were allowed to export their products only through a limited number of specialized foreign trade companies which acted as intermediaries in international transactions. This led to a situation where Polish producers of exported goods did not have direct contacts with their foreign counterparts nor relevant information about foreign markets. They were isolated and passive participants in export sector development (Wziątek-Kubiak, 1998). As a result, trade volume was low both in per capita terms and as a share of GDP.<sup>11</sup> Eastern Europe and the former Soviet Union accounted for the majority of both exports and imports.<sup>12</sup>

Sparked by the radical political and economic reforms enacted in the late '80s and early '90s there have been substantial changes in foreign direct investment and trade patterns

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<sup>10</sup> The proportion of foreign firms in a region weighted by output is used to control for the level of ownership and a concentration measure based on this variable is used to control for the concentration of foreign ownership. The specification of the concentration measures is discussed in detail later on in the text.

<sup>11</sup> For example, in 1987 per capita imports were \$298 and exports \$324, while in 1997 these per capita figures were \$1094 and \$666, respectively (current prices). In 1987 total imports were \$10844 million and exports \$12205 million, while in 1997 total imports were \$42307,5 million and exports \$25751,3 million (current prices) (CSO, Yearbook of foreign trade statistics 1999).

<sup>12</sup> During the 1980s, Central and East European Countries accounted for as much as 50 percent of Polish exports and imports. During the 1990s, their share dropped below 20 percent (CSO, Yearbook of foreign trade statistics 1999).

in Poland. Since 1991 there has been a fifteen fold increase in the flow of foreign direct investment to Poland. Currently, Poland ranks as the largest recipient of foreign direct investment in Central and Eastern Europe, and fifth within the group of “emerging economies”.<sup>13</sup> At the end of December 1997, the most prominent investor countries were, the Netherlands (accounting for 21 percent of total foreign capital invested in Poland), Germany (20.6 percent) and the United States (14.4 percent). A substantial fraction of the stock of foreign capital is invested in the manufacturing sector (54.5 percent of total stock in 1997).

As far as trade patterns are concerned, the reforms allowed for substantial decentralization of export activity. Since, early 1990 all economic agents have enjoyed virtually unrestricted access to foreign trade activities. The dominant position of the state trading monopolies has been eroded and the private sector now accounts for almost eighty percent of all foreign trade transactions. There has also been a remarkable re-orientation of Polish trade. The importance of Central and European countries as a market for Polish products has declined while the share of the European Union has increased sharply.<sup>14</sup>

The pre-reform backdrop of negligible foreign direct investment and limited knowledge of foreign markets, and the substantial and sudden post-reform entry of foreign firms suggests that Poland may present one of most apt economic environments to examine whether the flow of foreign direct investment does indeed provide a boost to host country exports.

### **3.2. Data Sources and Description**

Our paper is based on annual data covering the Polish manufacturing sector during the period 1992 to 1997. These data have been obtained from the Polish Central Statistical Office (*Główny Urząd Statystyczny*) and are largely drawn from financial statements (F-02 forms). Every year, *all* Polish manufacturing firms employing more than five workers are required to fill and submit these forms to the Statistical Office. In addition to financial data,

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<sup>13</sup> In 1991 foreign direct investment in Poland amounted to \$291 million. By the end of 1997 this figure had reached \$4908 million (OECD, International Direct Investment Database 1999).

<sup>14</sup> In 1987, Central and Eastern European (CEE) countries accounted for 42.3 percent of Polish exports while the share of the European Union (EU) was 25.9 percent. In 1997, the share of CEE countries declined to 24.4 per cent while the share of the EU rose to 64 percent (CSO, Yearbook of foreign trade statistics 1999).

these forms contain detailed information on several aspects of a firm's operations including firm turnover, domestic and foreign sales, employment and ownership.<sup>15</sup>

Although the data are collected at the firm level, to retain confidentiality, Polish law prohibits the dissemination of these firm level data. Therefore, our study is based on data at the region-industry level and is composed of information from 13 two digit manufacturing industries from Poland's 8 macro-regions (see Figure 1). Given the span of six years this gives us a total number of 624 observations (13 x 8 x 6). The sample is restricted to the duration 1992-1997 as this time period provides a consistent set of data. Before 1992 information from firms with foreign participation was not gathered regularly, and in 1998 there was a change in the administrative division of Poland which makes it difficult to compare pre and post 1997 data.

### *3.2.1. Data Description*

We begin our analysis by examining patterns of foreign participation, and regional concentration of economic and export activity. As Table 1 displays, in 1992, the share of foreign firms in employment and output was quite low (7-9 per cent of total employment and output in manufacturing).<sup>16</sup> Their contribution to total exports was slightly higher at around 12 per cent. The period 1992-1997 witnessed substantial increases in foreign participation and in 1997 foreign firms accounted for around 21 percent of employment, 34 percent of output and 43 percent of exports. In absolute terms the number of employees in foreign firms more than trebled, while output and exports rose around six times. Absolute employment in domestic firms fell and output and exports rose, albeit at a much lower rate as compared to foreign firms (see Table A1).

With respect to export intensity, it is not surprising that foreign firms export a higher percentage of their output (around 25 percent) as compared to domestic firms (around 17 per-

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<sup>15</sup> The data that we use are comprehensive (covering all manufacturing firms) and may be considered to be of high quality. Polish data gathering procedures and cross-checks to ensure data consistency are comparable to methods used in other OECD countries.

<sup>16</sup> A firm is defined as foreign owned if ownership of any equity in the enterprise is in foreign hands. In most joint venture firms the share of foreign equity is more than 25 percent. For instance, in 1996 only 5.1 percent of all foreign firms had a foreign equity participation of less than 25 percent.

cent). While exports of foreign and domestic firms do increase (in real terms), there are no substantial changes in export intensity.<sup>17</sup>

### 3.2.2 *Concentration of economic activity and exports*

If there are localized externalities and benefits to be derived from clustering then we might expect a geographical concentration of overall economic activity as well as of export activity. If there are no such benefits then one may expect a more equal regional distribution. Figure 2 presents the regional distribution of overall economic activity (employment) while Figure 3 displays the regional distribution of export activity. With regard to overall economic activity we see that considerable employment is concentrated in the southern and the middle regions of the country. These two regions together account for 37-39 percent of total manufacturing employment. In terms of exports the northern and the southern regions of the country account for 38-42 percent of the total.

In addition to spillovers that may arise due to the concentration of overall economic activity, if there are benefits to be derived from the clustering of export activity then we may expect the concentration of export activity to be even more pronounced than that for overall economic activity. This appears to be the case in our data. Based on a formal measure of concentration, we find that concentration of export activity is 1.3 to 1.6 times higher (depending on the year) than the concentration of overall economic activity.<sup>18</sup> Of course, evidence of such concentrations does not constitute evidence in favor of spillovers. Certain regions may account for a larger share of exports as compared to their share in economic activity due to lower transportation costs or differences in the composition of their industrial base. For instance, in 1997 the northern region accounted for 9.6 percent of employment while its export share was 19.5 percent. This might well be due to its proximity to the German and Scandinavian borders.

The upshot of this discussion is that although there does appear to be evidence of concentration of export and economic activity, it is not possible to argue the case for export

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<sup>17</sup> As shown in Table A1 increases in output and exports are quite evenly matched and consequently export intensity remains stable.

<sup>18</sup> The measure of concentration we use here is the sum of the squared deviation of the expected share of employment (exports) from the actual share divided by the number of regions.

spillovers unless several other factors that may influence exports are accounted for and controlled.

#### 4. SPECIFICATION AND RESULTS

This section presents our empirical evidence on the question of whether the concentration of foreign firm export activity in a region-industry exerts an influence on the export performance of domestically owned firms. To examine this issue we estimate several versions of equation (7). Equation (7) displays that the value of exports of domestically owned firms (our dependent variable) in region  $i$  industry  $j$  are a function of output prices, input prices and measures of geographic concentration. Accordingly, the independent variables included in (7) are prices,  $P_d$ , measured by two-digit producer prices indices, a vector of cost variables which includes labor costs captured by average wages in the region-industry, input price indices for construction, transportation and raw materials, as well as measures of road density and telephone density to control for differences in transportation and communication links. The independent variables also include sets of indicator variables to control for region, industry and year.<sup>19</sup>

To measure the geographic concentration of overall economic activity or export activity in a certain region-industry we rely on a measure that has been used in recent empirical work (Glaeser et al., 1992; Henderson et al., 1995). To capture concentration one may craft a measure based on the region-industry's share of national industry activity. However, this ignores the possibility that a region-industry may have a higher concentration of economic or export activity simply because the region is large. We would like to measure the concentration of economic (export) activity having controlled for the size of the region. In order to achieve this objective we divide the region's share of national industry activity by the region's share of national manufacturing activity. The resulting variable measures the concentration of industrial activity in a region relative to the share of the region in total manufacturing activity. Specifically, our measure of the concentration of overall economic activity is de-

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<sup>19</sup> Equation (7) includes a measure of output prices in foreign markets ( $P_f$ ). However, we do not have information on this variable and are forced to treat it as an omitted variable. Also, our information on input prices does not vary by region-industry and including the full set of input price indices in our estimates would force us to drop year effects. We estimate versions of (7) which include year effects and versions which exclude these and include the full set of input price indices. The results are largely similar.



defined as the region-industry's share of national industry employment divided by the region's share of national manufacturing employment. This measure controls for site-specific characteristics which may make a particular region attractive for locating industrial activity and also controls for general spillovers that may be associated with the overall concentration of economic activity.

The concentration of multinational export activity, the key variable in our work, is measured in a similar manner and is defined as the region-industry's foreign firm exports as a share of national industry exports divided by the region's share in national manufacturing exports. The export contribution of domestic firms in the particular region-industry to which the measure pertains is obviously excluded.

#### **4.1. Empirical Results**

Estimates of several versions of (7) are presented in Table 2. Estimates in column (1) examine the relationship between foreign concentration and domestic firm export activity without including controls for the concentration of economic activity in a region or for changes in the level and concentration of firm ownership. The coefficient on the concentration of foreign firm export activity is positive and statistically significant.

While this is suggestive of a spillover effect, as argued earlier, estimates that do not include controls for the overall concentration of economic activity may lead to exaggerated effects of the role of foreign firm export activity. On the other hand, estimates that do not control for changes in the level and concentration of foreign firm ownership may lead to an underestimate of the effect of foreign firm export activity. To control for these divergent effects, column 2 presents a specification that includes the overall concentration of economic activity, and two variables that control for the level and concentration of foreign ownership. The inclusion of these variables leads to a sharp fall in the magnitude of the coefficient on  $CONC_{MNE}$ . Despite the mitigation of the foreign firm effect, the coefficient is still statistically significant. The change in the magnitude of the coefficient highlights the importance of controlling for site-specific characteristics that may make a region an attractive industrial location.

As may be expected, the overall concentration of economic activity is highly correlated with the export activities of domestic firms. The magnitude of this coefficient is much

larger than the effect of foreign firm export activity. Despite the smaller size of the latter, the distinct effect of these two concentration variables suggests that in addition to the benefits that emanate from the agglomeration of overall economic activity there appears to be a payoff associated with location in a region-industry with high foreign firm export activity.

The effect of the foreign ownership variables is negative. How should these negative effects be interpreted? A portion of the increase in foreign participation during this period may have occurred due to the purchase of domestically owned firms by foreign firms. Given that the concentration of foreign ownership and foreign firm export activity are likely to be highly correlated, examining the effect of foreign firm export concentration without controlling for changes in foreign ownership is likely to lead to a negative correlation between the export activities of foreign and domestic firms. However, this would be misleading. The two ownership variables have been included so that we may examine the effect of foreign export activity on domestic firms keeping foreign firm ownership constant.<sup>20</sup> Accordingly, the negative effects indicate that region-industries which have experienced the highest increases in foreign ownership and concentration have at the same time witnessed the largest declines in the concentration of domestic economic activity.

As for the other variables, domestic prices do not appear to have a bearing on export performance. Similarly, our measures of telecommunications and transportation links record statistically insignificant effects. For all specifications wages are positively related to the export performance of firms. This is consistent with other papers that have found a positive correlation between the export intensity of an industry and wages (e.g. Gaston and Trefler, 1994). This positive link probably indicates that export oriented production is more skill-intensive.

The remaining estimates presented in Table 2 are designed to examine the robustness of the results. Estimates in Column 3 and column 4 are based on alternative measures of the concentration of overall economic activity. Rather than using employment to capture overall economic activity, the specification in column 3 uses a measure based on output, while col-

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<sup>20</sup> Furthermore, if a domestic firm is sold to foreign investors it is no longer the focus of our study, as we are interested in the effect of foreign owned firms on the export activity of domestic firms. In other words, we are interested in those firms which remain domestically owned through out the time period covered by our data.

umn 4 estimates are based on a measure that uses the number of firms in a region to capture the concentration of overall economic activity. The latter measure allows for the possibility that it is the number of firms that is important in terms of measuring concentration rather than the number of employees or the level of output. Finally, estimates in column 5 include a measure of the concentration of foreign firm domestic activity.<sup>21</sup> The idea is to examine whether export volumes of domestic firms are related to foreign firm activity in general or whether they are specific to the export activities of foreign firms.

Although there is considerable variation in the magnitude of the effect, the use of these alternative measures of overall economic concentration and the additional measure of foreign economic activity leave the basic result unchanged. Across all specifications there is a positive and statistically significant link between the concentration of foreign firm export activity and the export performance of domestically owned firms. The range of estimates indicates that at the mean, an increase in the concentration ratio by 10 percent is associated with a 2-3.4 percent increase in domestic exports.

#### *4.1.1. Instrumental Variable Estimates*

A potential problem with our analysis is that the exports of foreign and domestic firms may be simultaneously determined. This endogeneity problem may be due to unobserved shocks which influence exports or may also arise if there are important variables that influence exports and have been omitted from our estimates. To tackle this issue we treat  $CONC_{MNE}$  as an endogenous variable and resort to instrumental variable estimation.

To instrument  $CONC_{MNE}$  we require variables that are correlated with the concentration of foreign firm export activity but are uncorrelated with unobserved effects which may influence the export activities of domestic firms. Although it is difficult to find convincing instruments that meet these criteria we consider two variables - the number of foreign firm employees in a region-industry and the amount of foreign capital in a region-industry. These two variables capture overall foreign participation in a region-industry and are likely to be

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<sup>21</sup> The measure used in column 3 is defined as the region-industry's share of national industry output relative to the region's share of total manufacturing output. The measure used in column 4 is defined as the region-industry's share of national industry firms relative to the region's share of national manufacturing firms. Concentration of foreign firm domestic activity is defined as the share of region-industry foreign firm domestic output in national industry domestic output relative to the region's share of total domestic output.

correlated with the concentration of foreign firm export activity in a region-industry. In the first step  $CONC_{MNE}$  is regressed on these two instruments and other independent variables.<sup>22</sup> On the basis of this regression we obtain predicted values of foreign firm export concentration. A new set of equation (7) estimates based on the instrumented variable are presented in Table 3. These estimates parallel those in Table 2.

Similar to the earlier results there is a positive and statistically significant relationship between  $CONC_{MNE}$  and the export activities of domestic firms. The effect of overall economic concentration is also similar to the earlier estimates as are the effects of the firm ownership variables.<sup>23</sup> The main difference between the two sets of estimates is that the coefficient on  $CONC_{MNE}$  is now somewhat higher. The estimates suggest that at the mean, a ten percent increase in the concentration of foreign firm export activity is associated with a 3.2-4.3 percent increase in the exports of domestic firms.

#### 4.1.2. *Additional Specifications*

In order to control for site-specific characteristics that may influence industrial location and export volumes we have included a measure of the concentration of overall economic activity. However, if this measure is not adequate then the positive correlation between  $CONC_{MNE}$  and domestic firm exports may simply be a consequence of some characteristics (natural or otherwise) which make a particular region-industry a more attractive location for promoting exports. This possibility may be especially true for industries which are natural-resource intensive. For instance, in our case 65-70 percent of exports of basic metals and fabricated metal products come from the south of Poland. Similarly, albeit not as concentrated, 45-50 percent of the exports of mineral products are from the south and south-west of Poland.

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<sup>22</sup> A Hausman test (p-value 0.0236) rejects the null hypothesis that the least squares estimates are consistent. However, the IV estimates and this test are valid provided the matrix of instruments are highly correlated with  $CONC_{MNE}$  and uncorrelated with exports of domestic firms. The correlation between  $CONC_{MNE}$  (domestic firm exports) and the number of foreign employees and foreign capital is 0.46 (0.18) and 0.22 (0.06) respectively. The first step regression of  $CONC_{MNE}$  on the instruments yields an  $R^2$  of 0.465.  $F$ -tests (p-value 0.0001) reject the exclusion of the two instruments from the first stage regression. A test of overidentifying restrictions supports the validity of the instruments (p-value 0.1161). These statistics provide some support for the quality and validity of the instruments (see Bound et al., 1995; Davidson and MacKinnon, 1993 pp 232-242).

<sup>23</sup> We also examined the effect of using alternative employment weighted measures of ownership rather than output weighted. This check was carried out on the specification reported in Table 3, column 1. The coefficient on  $CONC_{MNE}$  was 5.708 with a t-statistic of 2.322.

If our results are driven by the particular nature of these industries then excluding them from our sample should lead to a dissipation of the effect of  $CONC_{MNE}$ . We re-estimate the specification presented in Table 3, column 1 (our baseline specification) excluding observations from these two industries. The effect of the concentration measure remains stable and it retains its statistical significance (coefficient estimate 6.234 with a  $t$ -statistic of 2.176).

Besides natural endowments, policy related variables may be important in determining the export performance of different region-industry's. If variation in policies across regions and industries are important in determining exports then the positive correlation between  $CONC_{MNE}$  and domestic firm exports may be a consequence of these variations rather than any spillover effects. If such policies are important and are driving our results then excluding a region which has particularly export oriented policies from our sample should result in a diminution of the effect of  $CONC_{MNE}$ . To gauge such effects we exclude, in turn, each of the 8 regions from our sample. The coefficient on  $CONC_{MNE}$  spans a wide range (coefficient estimates (t-statistics) range from 4.198 (2.115) to 9.494 (3.620)) suggesting that differences in policy environment may be playing a role in determining exports. However, regardless of the excluded region the concentration effect remains statistically significant and its magnitude lies in the same range as estimated earlier.

Rather than being region-specific, variation in policies may be industry specific. During the period covered by our data there have been several policy changes with regard to tariffs and quotas on Polish products entering the European Union (EU). These changes have led to an easing of restrictions especially for the textile and basic metals/fabricated metal products industry. In December 1991, Poland signed an agreement of association with the European Union under which several trade concessions pertaining to these two industries was granted. Voluntary export restraints (VER) on fabricated metal products (steel) were eliminated in 1992 and quotas for Polish textiles and clothing were increased. In 1996 custom duties on fabricated metal products were eliminated and in 1998 VER on textiles were eliminated.<sup>24</sup>

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<sup>24</sup> Although there were tariff reductions for products of other industries the most substantial variation in trade policies during the time-period that we consider occurred in the two industries mentioned above. During the period 1992-1994 tariffs on manufactured products of other industries ranged from 0 to 1.8 percent. After 1994 these were eliminated.

To examine the extent to which our results may be driven by favorable industry specific policies we exclude, in turn, the textile and basic metals/fabricated metal products industries from our sample. Exclusion of either of these industries does not alter the basic pattern of our results (exclusion of textile industry - estimated coefficient (t-statistic) 7.630 (2.866), exclusion of basic metals/fabricated metal product - estimated coefficient - 5.573 (2.050)). These informal checks suggest that our results are not driven by unduly favorable circumstances in any particular region or industry.

Finally, we run two more specifications to assess the robustness of our estimates. Aitken et al. (1997) argue that access to factors such as capital, technology and skilled labor may be important determinants of a region's export competitiveness. If these attributes are particularly influential then excluding them from our specifications will result in biased estimates. To control for capital and technology access we include the capital-labor ratio and a measure of total factor productivity (TFP).<sup>25</sup> To control for the level of skilled labor we use three measures: the percentage of workers with post secondary education, secondary general education and secondary vocational education. The set of education variables is available only for 1994, 1995 and 1996. Accordingly we run two specifications – the first controls for access to capital and technology and is estimated using the entire sample, while the second includes controls for capital, technology and skilled labor and is estimated over the smaller sample. Despite the smaller sample, the inclusion of these measures does not result in any substantial changes in the magnitude or the statistical significance of the effect of foreign firm export concentration.<sup>26</sup>

## 5. CONCLUDING REMARKS

Several benefits associated with the flow of foreign direct investment to developing countries have been proposed. One of these is the role that may be played by foreign firms in boosting host country access to world markets. In order to permeate international markets developing country firms require information and knowledge that may be costly to obtain. For-

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<sup>25</sup> The measure of total factor productivity used here is the (Solow) residual from a regression of domestic firm's output on labor and capital.

<sup>26</sup> Inclusion of the capital/labor ratio and TFP leads to a coefficient (t-statistic) of 7.329 (2.755) on  $CONC_{MNE}$ . The second specification, which is estimated on the restricted sample and includes capital/labor ratio, TFP and the education variables yields a  $CONC_{MNE}$  coefficient (t-statistic) of 7.315 (1.908).

eign firms are an obvious source of such information. Through imitation, labor market turnover, or through more formal channels, interaction with foreign firms may reduce the costs associated with targeting export markets and enable domestically owned firms to compete more effectively.

To examine the validity of this idea, this paper used data from Poland's manufacturing sector to examine whether the concentration of foreign firm export activity had a bearing on the export performance of domestically owned firms. The limited knowledge of foreign markets prior to reforms in the late 1980s and the rapid entry of foreign firms after the first wave of reforms provides an appropriate environment to examine the link between foreign firm presence and export performance of domestic firms.

Across a variety of specifications we found a positive and statistically significant link between the concentration of foreign firm export activity and the export performance of domestically owned firms. This positive correlation was robust to controls for the overall concentration of economic activity as well as to region and industry specific characteristics that may have a bearing on exports. Although available data does not allow us to identify the exact channel through which this positive link manifests itself, it does seem that the presence of foreign firms is associated with enhanced export performance of domestically owned firms.

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## TABLES

**Table 1**  
**Employment, Output and Export Shares**

Statistic	1992	1993	1994	1995	1996	1997
Share of foreign firms in:						
1. Employment	6.7	9.4	11.7	15.3	18.6	20.5
2. Output	8.6	12.8	17.1	21.8	29.7	33.7
3. Exports	12.3	16.9	22.1	29.9	38.1	43.1
Export intensity <sup>a</sup> :						
4. Foreign firms	26.0	23.7	25.0	27.9	24.4	25.5
5. Domestic firms	17.5	17.0	18.2	18.4	16.8	17.1

*Notes:* All figures are in percentages. <sup>a</sup> Export intensity – exports as a percentage of output.

**Table 2**  
**Exports of Domestic Firms – OLS estimates**  
(t-statistics)

Variable	1	2	3	4	5
Foreign firm export concentration ( $CONC_{MNE}$ )	8.273 (3.927)	4.514 (2.080)	4.139 (2.100)	7.353 (3.648)	4.573 (2.161)
Overall economic concentration	.	18.420 (6.098)	15.908 (6.281)	20.291 (7.551)	19.301 (6.141)
Prices	-0.206 (-0.155)	-0.778 (-0.667)	-0.743 (-0.645)	-0.748 (-0.641)	-0.742 (-0.539)
Wages	0.693 (2.927)	0.428 (2.379)	0.341 (2.031)	0.478 (2.426)	0.435 (2.984)
Level of foreign ownership	.	-8.044 (-2.240)	-8.474 (-2.455)	-8.567 (-2.577)	-3.643 (-1.241)
Concentration of foreign ownership	.	-1.951 (-3.414)	-2.429 (-4.094)	-1.491 (-0.100)	-1.292 (-2.199)
$R^2$	0.340	0.566	0.587	0.501	0.548

*Notes:* N = 624. Dependent variable-exports of domestically owned firms (in real terms, base = 1992). All specifications include indicator variables for region, industry and year. T-statistics are heteroscedasticity consistent. Estimates in columns 2-4 are based on different measures of overall economic concentration. Column 5 estimates include a measure of the concentration of domestic economic activity of foreign firms.

**Table 3**  
**Exports of Domestic Firms – IV estimates**  
(t-statistics)

Variable	1	2	3	4
Foreign firm export concentration ( $CONC_{MNE}$ )	6.942 (2.714)	6.750 (2.542)	9.348 (3.493)	8.495 (3.457)
Overall economic concentration	19.211 (6.483)	16.451 (6.661)	22.345 (7.113)	20.148 (6.578)
Prices	-0.510 (-0.425)	-0.476 (-0.405)	-0.410 (-0.325)	-0.386 (-0.327)
Wages	0.219 (1.145)	0.131 (0.768)	0.227 (1.104)	0.164 (0.856)
Level of foreign ownership	-9.093 (-2.321)	-9.635 (-2.433)	-9.291 (-2.561)	-3.956 (-1.037)
Concentration of foreign ownership	-1.259 (-2.161)	-1.812 (-2.816)	-0.269 (-0.624)	-0.394 (-0.774)
$R^2$	0.566	0.588	0.493	0.574

*Notes:* N = 624. Dependent variable-exports of domestically owned firms (in real terms, base = 1992). All specifications include indicator variables for region, industry and year. T-statistics are heteroscedasticity consistent. Estimates in columns 2-3 are based on different measures of overall economic concentration. Column 4 estimates include a measure of the concentration of domestic economic activity of foreign firms.

**Table A1**  
**Employment, output and exports**

Statistic	1992	1997
1. Employment:		
Foreign	151,562	459,881
Domestic	2,088,552	1,783,279
2. Output:		
Foreign	4,716	29,084
Domestic	49,740	57,273
3. Exports		
Foreign	1,227	7,416
Domestic	8,726	9,802

*Notes:* Output and exports are in millions of real zloties (base year 1992).

**Table A2**  
**Industrial Distribution**

Industry	Employment Share		Export Share	
	1992	1997	1992	1997
Food, Beverages, Tobacco	0.167	0.184	0.105	0.100
Textiles and apparel	0.143	0.123	0.096	0.070
Leather, leather products	0.031	0.023	0.018	0.011
Wood, wood products	0.028	0.036	0.035	0.042
Pulp, paper products	0.032	0.039	0.017	0.034
Chemicals, chemical products	0.055	0.054	0.102	0.097
Rubber, plastic products	0.024	0.035	0.016	0.027
Mineral products	0.062	0.060	0.044	0.040
Basic metals, fabricated metal	0.123	0.121	0.216	0.162
Machinery and equipment	0.129	0.114	0.098	0.076
Electrical and optical machinery	0.077	0.073	0.073	0.115
Transportation equipment	0.078	0.076	0.116	0.132
Other manufactures	0.043	0.057	0.059	0.088

# GRAPHS

Figure 2: Distribution of Employment

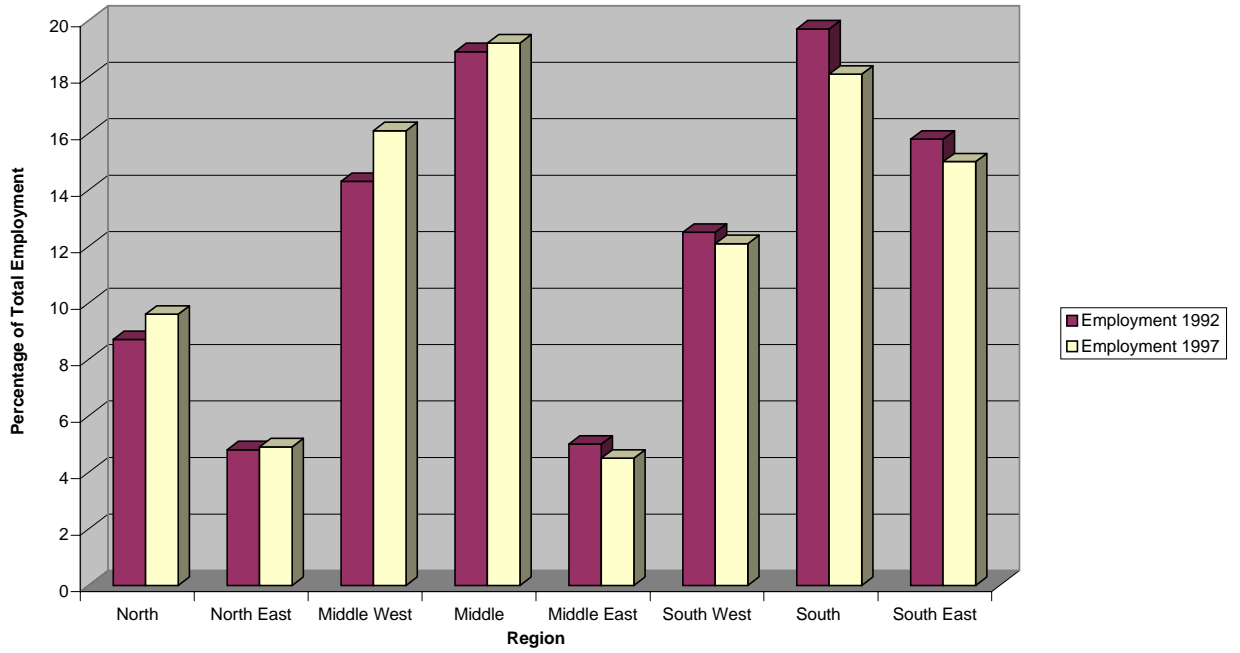


Figure 3: Distribution of Exports

