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CENTRE FOR RESEARCH ON GLOBALISATION AND LABOUR MARKETS

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Multinational Companies and Indigenous Development: An Empirical Analysis

by

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Multinational Companies and Indigenous Development: An Empirical Analysis

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H. Görg and E. Strobl

Abstract

This paper presents an empirical study of the effect of foreign multinational companies on the development of indigenous firms in the host country, using data for the Irish manufacturing sector. Our starting point is a recent paper by Markusen and Venables (1999) that shows formally that multinationals, through the creation of linkages with indigenous suppliers, can exert positive effects on the development of indigenous firms. Based on the literature on entry in industrial organisation theory, we estimate empirically a model describing the entry of indigenous firms in Irish manufacturing. Our results indicate that there is a positive effect of multinational companies on the entry of indigenous firms in the Irish economy for a variety of alternative specifications.

Outline

1. Introduction
2. Competition Effect and Linkages
3. The Entry Model
4. Econometric Results
5. Conclusions

Non-Technical Summary

This paper presents an empirical study of the effect of the presence of foreign multinational companies on the entry of domestic firms in the host country. In a recent paper, Markusen and Venables (1999) analyse the effects of multinational companies on the development of domestic firms in the host economy. They argue that multinationals may foster the development of domestic intermediate good producing firms, which in turn may have positive effects on the development of domestic final good producing firms.

According to the model the presence of multinationals has three effects on the host economy. First, there is a competition effect as multinationals compete with domestic final good producers. The increase in total output due to multinationals decreases the market price, which leads to the exit of some domestic firms. This, thus, leads to multinationals crowding out domestic firms. Second, multinationals create additional demand for domestically produced intermediate goods through linkages with indigenous suppliers. This entry causes the third effect, namely, a fall in the price of intermediates which favours customer firms through lower input prices. Through these effects multinationals may induce the entry of domestic intermediate good producers as well as domestic final good producing firms.

In the context of the model developed by Markusen and Venables we estimate the factors that affect the entry of domestic firms into the Irish manufacturing sector. In particular, we use a simple entry model familiar from industrial organisation theory to investigate whether the presence of multinational companies in a sector helps to explain the entry of domestic firms. Our findings suggest that there is a positive effect of the presence of multinational companies on domestic entry, i.e., multinational firms have a positive impact on the development of domestic firms in the host country.

1 Introduction

In a recent paper, Markusen and Venables (1999) analyse the effects of multinational companies on the development of domestic firms in the host economy. They argue that multinationals may foster the development of domestic intermediate good producing firms, which in turn may have positive effects on the development of domestic final good producing firms. In this paper we utilise their ideas to investigate whether there is any evidence that these effects have taken place in the Republic of Ireland. The Irish economy provides a model example for such an analysis as its industrial structure is heavily dependent on multinational companies. This is evident from figures from the Central Statistics Office (1997), which show that foreign multinationals located in Ireland accounted for roughly 47 per cent of employment, 77 per cent of net output produced and 83 per cent of total exports in the Irish manufacturing sector in 1995.

The presence of foreign multinationals has arguably had profound effects on sectoral adjustment in the Irish manufacturing sector. While indigenous manufacturing industry tended to be concentrated on traditional and food-sector activities, MNCs have invested primarily in modern high-tech sectors, leading to a rapid increase in the significance of the high-tech sectors for the Irish economy (Barry and Bradley, 1997; Ruane and Görg, 1997). Barry and Bradley (1997) argue that "spin-off benefits of FDI [in Ireland] might also include a role as 'incubators' for new entrepreneurs" (p. 1803), and this claim has been echoed in other studies (for example, Ruane and Görg, 1997), as well as in Irish academic and policy debate. However, a rigorous investigation of such a positive effect of multinational companies has yet to be conducted. In this paper we provide evidence on the existence of such an effect.

The starting point for our analysis is the model developed by Markusen and Venables (1999) which shows that multinationals can change the structure of imperfectly competitive industries in the host country by fostering the development of domestic industry.[1] The model features two types of industries, intermediate and final consumer good producing, and three types of firms: domestic firms producing intermediate goods, domestic firms producing

[1] The structure of the model is similar to other models in the so-called "new economic geography" literature, such as the models by Krugman and Venables (1995, 1996) and Puga (1999) which deal with the issue of industrial agglomerations. See, for example, Ottaviano and Puga (1998) for a survey of the "new economic geography" literature.

final consumer goods, and multinational firms producing final consumer goods. Both industries are assumed to be imperfectly competitive with increasing returns to scale of production. This assumption allows the possibility of external effects which drive the positive effects described in the model.

According to the model the presence of multinationals has three effects on the host economy. First, there is a competition effect as multinationals compete with domestic final good producers. The increase in total output due to output produced by multinationals decreases the market price, which leads to the exit of some domestic firms. This, thus, leads to multinationals crowding out domestic firms. Second, multinationals create additional demand for domestically produced intermediate goods through linkages with indigenous suppliers. In an imperfectly competitive domestic supplier industry, this leads to decreasing average costs leading to increases in profits for intermediate good producers, which, in turn, may induce entry into the intermediate good producing sector. This entry causes the third effect, namely a fall in the price of intermediates which favours customer firms through lower input prices. Customer firms can be both domestic or multinational final good producing firms. Through these effects multinationals may induce the entry of domestic intermediate good producers as well as domestic final good producing firms.[2]

In the context of the model developed by Markusen and Venables (1999) we estimate the factors that affect the entry of indigenous firms into the Irish manufacturing sector. In particular, we use a simple entry model familiar from industrial organisation theory to investigate whether the presence of multinational companies in a sector helps to explain the entry of domestic firms.[3] Our findings suggest that there is a positive effect of the presence of multinational companies on indigenous entry, which is consistent with the predictions of the Markusen-Venables model.

The paper is structured as follows. Section 2 provides a brief analysis of the competition effect and linkages in Irish manufacturing. In Section 3 we discuss the empirical model of firm entry used in the analysis, while Section 4 presents the results of our econometric

[2] The latter two effects resemble the backward and forward linkage effects as discussed by Hirschman (1958). Rodríguez-Clare (1996) examines a similar mechanism in a more aggregate two-country model with countries specialising in the production of different goods. Multinationals can help develop domestic supplier industries which in turn leads to the development of indigenous final-good producers.

[3] See Caves (1998) and Geroski (1995) for recent surveys of the literature on firm entry.

analysis of the entry of indigenous firms in Irish manufacturing for a number of alternative specifications. Section 5 presents a summary and concluding remarks.

2 Competition Effect and Linkages

The first effect of the presence of multinationals on indigenous development identified by Markusen and Venables is a competition effect, whereby multinationals crowd out indigenous firms. To investigate whether such crowding out seems likely to have happened in the Irish case we examine data available from the *Employment Survey*, an annual survey of all existing indigenous and foreign manufacturing firms in Ireland.[4]

It is of course difficult to directly disentangle the extent of the competition effect with simple employment data. Our approach is based on the insight that a decrease in the share of manufacturing employment in indigenous firms relative to foreign firms must be due to two reasons: Either due to losses of share of indigenous-intensive sectors in overall manufacturing (i.e., between sectors) and/or due to losses of employment shares of indigenous firms relative to foreign firms within the same sectors. It is the latter part that can be thought of as an indicator of the extent to which multinational companies located in Ireland have eroded existing or potential employment of indigenous firms or potential entrants in the same product market through the competition effect.

To isolate the importance of the loss of share within sectors we employ the following composition of a change in aggregate share of indigenous employment for $j = 1, \ldots, J$ industries:[5]

$$\Delta S_i = \sum_j \Delta S_j \, \bar{S}_{ij} + \sum_j \Delta S_{ij} \, \bar{S}_j \qquad (1)$$

where S_{ij} is the share of indigenous employment in industry j, S_j is the proportion of industry j in aggregate employment and a bar over a term denotes a mean over time. The first term on the right hand side of (1) represents the change in the aggregate proportion of indigenous employment due to shifts in the shares of employment between industries, whereas the

[4] Data for the *Employment Survey* are collected by Forfás, the policy and advisory board for industrial development in Ireland. The response rate to the survey is estimated by Forfás to be generally well over 90 percent, i.e., our data can be seen as including virtually the whole population of manufacturing firms in Ireland. Forfás (1996) defines foreign firms as firms which are majority-owned by foreign shareholders, i.e., where 50 per cent or more of the shares are owned by foreign shareholders.

[5] See Berman *et al.* (1994) for a use of this decomposition to examine the change in the demand for skilled labour.

second term is the change in the aggregate share attributable to changes in the share of indigenous employment within industries.

The results of employing (1) to our employment survey data set for the standard CSO sectoral breakdown, distinguishing 68 manufacturing sectors for the period 1974 to 1995, are reported in Table 1. Accordingly, over our sample period the indigenous sector lost 11.4 percentage points of its share of manufacturing employment. As our decomposition shows, over 76 per cent of this is attributable to shifts away from indigenous employment intensive sectors. Even if we break down our sample period into two sub-periods, 1974-85 and 1985-95, also shown in Table 1, a similar picture emerges. For both sub-periods, the loss due to between sector shifts in shares of aggregate employment is substantially larger, particularly for the latter period.

Our results thus show that most of the loss of the share of the indigenous sector in manufacturing employment was not due to an erosion of share of employment by multinational companies operating in the same sectors, but because of the decline in importance of indigenous employment intensive sectors. They thus suggest that the competition effect, *a la* Markusen and Venables (1999), is unlikely to have been important for Irish manufacturing. This result may not be surprising, as multinational companies mainly located in Ireland in sectors which did not exist before the entry of multinationals, i.e., predominantly high-tech sectors such as electronics and pharmaceuticals (see also Barry and Bradley, 1997).

[Table 1 here]

The Markusen-Venables model predicts that, if linkages between multinationals and indigenous firms exist, indigenous intermediate and final good producing firms will benefit and the number of indigenous firms will increase. To investigate whether there may have been positive effects we, therefore, examine linkages between multinationals and indigenous firms in Ireland as a first step. There have been a number of studies of linkages in Ireland which show that multinationals have backward linkages with indigenous firms and that they are likely to increase these linkages over time (McAleese and McDonald, 1978, Kennedy, 1991, Görg and Ruane, 2000).

Table 2 provides some aggregate statistics on the extent of linkages, defined as the percentage of intermediate inputs and raw materials purchased in the Irish economy, between foreign multinationals and Irish suppliers in manufacturing industries.[6] The table shows that foreign firms have increased their linkages between 1986 and 1995 by almost 4 percentage points. The data on linkages may be taken to indicate that the conduit for the positive development effect, as described by Markusen and Venables (1999), exists which, in turn, suggests that this effect may have taken place in Ireland.

[Table 2 here]

3 The Entry Model

To investigate further the impact of multinationals on the development of indigenous firms we model the entry of indigenous firms as dependent on, amongst other factors, the presence of multinationals, and estimate this model using data for Ireland. To this end, we calculate two measures of entry: First, the net entry rate defined as the number of indigenous plant entries minus exits over the period *t* to *t+1* divided by the total number of plants at time *t* in industry *j*, and, second, the gross entry rate which is calculated as only the number of indigenous plant entries over the total number of plants. While the Markusen-Venables model seems to be concerned solely with (changes in) firm numbers, which would point to analysing net entry, it may be of interest to study the effects of multinationals on gross entry as well since most studies of firm entry employ this latter measure (for example, Acs and Audretsch, 1989; Mata, 1993).[7]

Table 3 provides some aggregate data pertaining to the net and gross entry rates of indigenous firms and one measure of the presence of foreign multinationals in Irish manufacturing, namely the share of employment in foreign multinationals as a percentage of total manufacturing employment. The data are calculated for the period 1974 to 1995 using data from the *Employment Survey*.

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[6] The figures are derived from the *Irish Economy Expenditure Survey*, which is undertaken annually by Forfás. The survey includes output and employment data as well as detailed information on each firm's expenditure on labour, material and services inputs. It is sent out to firms with thirty or more employees. It is not compulsory for firms to take part in the survey, but response rates are normally around 60-80 per cent (O'Malley, 1995).

[7] In the context of the model, one could arguably also expect effects of MNCs on other measures of domestic industrial activity, such as expansions of output or employment. An analysis of such effects would be beyond the scope of the present paper. Also, the main results of the Markusen - Venables model relate to firm numbers, and it therefore appears reasonable to focus on entry of indigenous firms.

[Table 3 here]

The gross entry rate of indigenous firms has fluctuated considerably over the years, as shown in the table. It reached a high of almost 14 percent in 1983, while it has fluctuated around roughly 6-7 percent in the late 1980s and early 1990s. The net entry rate has followed a similar pattern, reaching a high of 6.6 percent in the late 1970s and fluctuating between 0.0 and –2.6 per cent in the 1990s. The share of employment in foreign multinationals in Ireland has constantly increased over the same period. Foreign multinationals accounted for some 34 percent of manufacturing employment in 1975, and this share has risen to around 45 percent in 1995. The data in the table show that there are considerable sectoral differences for both entry rates and foreign presence.

To model empirically the entry of indigenous manufacturing firms, we follow Geroski (1991, Chapter 3) who shows that the rate of entry into a market is positively related to the level of expected post-entry profits which, in turn, depend on the level of existing barriers to entry and other structural and transitory factors. This simple model implies that the rate of entry is directly related to the level of entry barriers and other factors. Combining this with the result by Markusen and Venables (1999), we may suggest that the entry rate of indigenous firms in Irish manufacturing may be related to a number of barriers to entry, the presence of multinational companies, and other factors.[8]

Similar to other empirical studies of firm entry, such as, for example, Orr (1974) or Mata (1993), we postulate the following empirical model of the relationship between the entry rate and other factors,

$$E_{jt} = \beta_0 + \beta_1 GR_{jt} + \beta_2 MES_{jt} + \beta_3 SIZE_{jt} + \beta_4 AGE_{jt} + \beta_5 MNC_{jt} + \alpha_j + \nu_t + \varepsilon_{jt} \quad (2)$$

where α_j is a sector specific term, ν_t is a year specific effect, and ε_{jt} is the remaining error term, assumed to be independent across sectors and over time. GR_{jt} denotes the growth rate of industry j, MES_{jt} represents the minimum efficient scale, $SIZE_{jt}$ is the size of the industry, AGE_{jt} denotes the average age of all existing plants in the industry, MNC_{jt} represents the presence of foreign multinational companies. The first three independent variables are

[8] Empirical studies of firm entry frequently include past profitability as a proxy for expected profits, since the latter is an unobservable variable (Mata, 1991, 1993). The problem with such a measure is that it assumes that firms do not adjust their profit expectations following the entry of firms, but base their entry decision entirely on past profits. Firms, however, can be expected to take into account that firm entry affects the level of expected profits.

widely accepted in the literature as having an effect on the rate of firm entry (Acs and Audretsch, 1989; Mata, 1993, 1991; Mata and Machado, 1996; Orr, 1974).

GR_{jt} is measured as the annual net employment growth rate of industry *j*. The industry growth rate is assumed to have a positive effect on the entry rate because a growing market offers a higher probability of survival for an entrant and makes entry, therefore, more likely. This follows from the possibility that incumbent firms may be able to maintain their relative position in a growing market even after the entry of the new firm, which reduces the likelihood of retaliation on part of the incumbent (Mata and Machado, 1996).

MES_{jt} is measured as the average plant size of existing plants in industry *j*.[9] Minimum efficient scale serves as a proxy for barriers to entry in the industry. When MES is high, new entrants may be deterred from entering the market because capital requirements may be too high. Thus, we would expect a negative relationship between MES and the rate of entry (see Geroski, 1991).

$SIZE_{jt}$ is defined as total employment in industry *j* as a measure of industry size. One rationale for including this variable is to control for the fact that a fraction of entry occurs simply to replace exiting firms. This replacement entry can be expected to depend on the size of the market, and therefore, industry size is included in the regression (Mata, 1991). Also, entry may be easier in a larger market as there may be a lower probability of retaliation by incumbents, all other things equal. We would hence expect a positive relationship between industry size and entry.

AGE_{jt} represents average age of all existing plants in industry *j*. We take this as a proxy to identify traditional industries in which long-established incumbents may be expected to have absolute cost advantages *vis-à-vis* entrants. This, thus, creates an additional barrier to entry for new firms and we would predict a negative relationship between this variable and the rate of entry of indigenous firms.

The *MNC* variable is intended to capture the effect of foreign multinational companies on the entry of new firms. As suggested by Markusen and Venables (1999), we would expect the

[9] Lyons (1980) suggests to measure the minimum efficient scale as one half of the average number of workers in firms that, on average, operate 1.5 plants. We do not have data available to calculate such a

presence of multinational companies to have a stimulating effect on firm entry, other things being equal, due to the linkage effects.[10] On the other hand, however, the competition effect may lead to foreign multinationals crowding out indigenous firms, which should, ceteris paribus, have a negative effect on the entry rate. As pointed out above, we would not expect a strong negative effect for the period analysed, however.

We employ different proxies for the *MNC* variable. First, we calculate $MNC1_{jt}$ as the share of manufacturing employment in foreign plants, i.e., employment in foreign plants divided by total employment in industry *j* at time *t*, while $MNC2_{jt}$ is defined as the ratio of foreign plants to the total number of plants in industry *j*. $MNC3_{jt}$ denotes the net entry rate of foreign plants into industry *j*, calculated as the number of foreign entries minus exits between *t* and *t*+1, divided by the total number of plants in time *t* in industry *j*.

4 Econometric Results

We estimate the model described in equation (2) using the fixed-effects panel data regression technique as described by Baltagi (1995), which was deemed preferable for the estimation of the sector-specific effects to a random-effects specification since our data set consists of essentially the population of manufacturing industries in Ireland. Specifically we apply (2) to a number of alternative specifications and data sets to determine whether the presence of multinationals has had a positive effect on the incidence of indigenous firm entry in Irish manufacturing.

Intra-Industry Effect

If our three foreign presence variable alternatives, as described in the previous section, are calculated for the same sector as the indigenous entry rate, then they may be considered to be proxies for measuring the *intra-industry* effects of MNCs, i.e., the coefficients on these variables should indicate whether the presence of multinationals in sector *j* has an impact on the entry of indigenous firms within the same sector. One may expect such intra-industry effects for two reasons. First, as pointed out above, there is an effect on indigenous final good producers which may be in the same sector as MNCs. Second, one may expect heterogeneities across firms even within our 68 sector definition, i.e., even within sectors

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measure. We also experimented using median size as a proxy for MES but found that the results were qualitatively and quantitatively similar.

there may be upstream (suppliers) and downstream (final good) firms. Multinationals can be assumed to be mainly downstream firms, thus an intra-industry effect may show that multinationals affect the entry of indigenous suppliers in the same sector.

All variables included in (2) are calculated from the *Employment Survey* for the 68 sector breakdown of Irish manufacturing for the period 1974 to 1995. Table 4 presents some summary statistics for these. One point to note is that, as indicated by the average of within sector standard deviation given in the last column, a substantial proportion of variation of our variables is due to their movement over time within sectors.

[Table 4 here]

The results of the analysis of intra-industry effects of MNCs on the entry of indigenous firms, using data for all manufacturing sectors are presented in Table 5.[11] It is noteworthy from this and subsequent tables that the R^2s are fairly low for all our estimations. However, Geroski (1995) in his survey of the literature on entry concedes that: "Virtually all of the regressions designed to explain variations in entry across industries and over time have reported very low R^2s" (p. 430), and thus we view our results as no exception to this apparent "rule". Despite the low explanatory power of our independent variables, the F-tests for the joint significance of the βs reject the hypothesis that all βs are equal to zero for these estimations.

Columns (1) to (3) of Table 5 show the results of the estimation using the net entry rate as dependent variable, while columns (4) to (6) were estimated with the gross entry rate. Inspection of the results shows that the results are qualitatively and quantitatively similar and thus all subsequent estimations were carried out using the net entry rate as this may be more appropriate for an analysis of the effects suggested by the Markusen and Venables (1999) model.[12] We proxy the presence of foreign firms using the three different measures as described above. The specifications in columns (1) and (4) include the foreign share of employment in sector *j*, columns (2) and (5) use the foreign share of plants in sector *j* while columns (3) and (6) utilise current and lagged values of the entry rate of foreign firms in

[10] Ideally, we would also want to include the extent of linkages between multinationals and indigenous firms for each sector. However, such dis-aggregated data on linkages were not available to us.
[11] All specifications include time dummies to control for year specific effects.
[12] We, however, also tried all specifications presented here with the gross entry rate; the results were qualitatively and quantitatively similar and are available from the authors.

sector *j*. In line with Geroski (1989), we have allowed for three years lags of the foreign entry rate.

[Table 5 here]

For all specifications we find a positive and statistically significant effect of the presence of foreign multinationals on the entry of indigenous firms in the same sector. The interpretation of the coefficients is straightforward, as both dependent and independent variables are specified as percentages. In the case of the specification in column (1), for example, a one-percent increase in the employment share of foreign firms leads to an increase in the net entry rate of indigenous firms by 0.06 percentage points. These results indicate that there is evidence that, *ceteris paribus*, foreign firms have indeed had positive effects on the entry of indigenous firms, as speculated by Barry and Bradley (1997).[13]

The coefficients for the age, minimum efficient scale and net growth rate variable are generally statistically insignificant, which suggests that these variables do not appear to have any effect on the entry rate of indigenous firms. The coefficient of the industry size variable shows a negative and statistically significant sign in four out of the six specifications.[14] This is contrary to our expectations, as we would have predicted that a larger market size has a positive effect on entry of indigenous firms, all other things equal. One possibility is that in larger sectors less firms enter relative to the total number of incumbent firms, but that these can afford to be of larger size due the lower probability of retaliation from the incumbent firms. Running a simple fixed effects regression of the average/median size of indigenous entrants on industry size we find that these are positively related, thus suggesting that this may indeed be the case in Irish manufacturing.

[13] We also investigated whether the level of technology in a sector affects the degree of linkages between indigenous and foreign firms by breaking our total sample into high-tech and low-tech sectors based on an OECD classification as used by Kearns and Ruane (2000). For high-tech firms, only the foreign plant share has a positive and statistically significant coefficient, while for low-tech firms all three measures of foreign presence have statistically significant positive effects on the entry of indigenous firms. On the other hand, the magnitude of the positive effect of the foreign plant share is higher for high-tech sectors than for low-tech sectors. In high-tech sectors, a one-percent increase in the foreign plant share leads to a 0.52 percentage-point increase in the rate of indigenous entry, all other things being equal, while the equivalent effect on entry of indigenous low-tech firms is 0.15 percentage points.

[14] We also explored the possibility that the indigenous entry rate responds to changes in the explanatory variables over a number of years, rather than in only one year, by including the lagged indigenous entry rate as an explanatory variable. The results for a dynamic panel GMM estimation of our total sample using the foreign share of employment as our preferred measure of foreign presence show that the lagged dependent variable, although of the expected sign, is not significant, suggesting that our model does not involve a

Long Run Effect

The definitions of our *MNC1* and *MNC2* variables as used above implicitly assume that increases in multinational presence in one year lead to entry in the industry in the same year, which is to say that all adjustments take place over the short run. To investigate whether there are long run effects of MNC presence as well, we calculated the three foreign presence variables as averages of their values at time *t*, *t*-1, *t*-2 and *t*-3 to get an average of the present and the previous three years for each year. This average may then serve as a reasonable long run proxy. The results of including these averages instead of the single year values in the estimation are reported in columns (1) to (3) of Table 6. As can be seen, all three proxies of multinational presence turn out to have statistically significant and positive signs, which suggests that there are also long run positive effects of MNC presence on the entry of indigenous firms.

[Table 6 here]

Linkages Effect

While our foreign presence proxies as defined above are likely to capture some of the linkage effects within industries, some intermediate goods suppliers may of course be supplying industries outside of their own industry as defined above. We thus also examine further the prediction that multinational presence in one industry also leads to entry in upstream industries that are not necessarily in the same industrial group, i.e., we allow for *inter-industry* linkages effects in addition to *intra-industry* linkages effects of multinationals. To do so we calculate three MNC proxies that are similar to the ones above, but that additionally take into account inter-industry linkages effects as follows. Based on the 1993 Input-Output Tables for the Irish economy[15], which provides data on breakdown of manufacturing into twenty sectors, we are able to determine the destination of output produced by sector *j*, which can either go to final demand, or as an input into its own industrial group or other (downstream) industries. Using these data we calculate the three *MNC* proxies as an average of the foreign presence in the downstream sectors to which sector *j* supplies, including its own, in each year, weighted by the importance of the

dynamic adjustment process. The coefficient on the foreign presence variable is positive and significant, although only at the ten per cent level. The results of the estimation are reported in Görg and Strobl (1999).

[15] The Input-Output Tables are only published intermittently and the latest ones available are those of 1993. See Central Statistics Office (1999).

downstream sector as a destination for output (in terms of output received) in 1993.[16] This allows us to investigate whether entry of indigenous firms into industry *j* is affected by the presence of multinationals in downstream sectors both within its own and other industrial groups.

The results of our linkages effects estimations are reported in columns (4) to (6) of Table 6. Accordingly, we find statistically significant and positive results for all of the foreign presence variables, which suggest that there are significant inter-industry and intra-industry linkages effects of multinational companies. In other words, the entry of indigenous firms in industry *j* is positively influenced by the presence of multinationals in industries downstream of industry *j*.

UK Sectoral Characteristics

In the estimations reported above we assume that certain characteristics of industries in Ireland, for example the MES in sector *j* in Ireland, matter for the entry decision of indigenous firms. One may put forward the argument, however, that market conditions in the, on a global scale, small Irish market do not necessarily matter for new entrants, in particular if they are producing for export markets. O'Malley (1998) shows that indigenous Irish manufacturing firms export on average 36 percent of gross output in 1995, with large fluctuations across individual manufacturing sectors. This may suggest that it is not the characteristics of the small Irish sectors that matter, but rather the characteristics of those industries in countries to which Irish indigenous firms export.

To examine this issue we start off from the finding that the UK is the largest single destination for exports of Irish-owned manufacturing firms, as shown by Barry and Bradley (1997) and O'Malley (1998). It may therefore be reasonable to assume that the market conditions in the UK are important determinants for the performance of Irish firms, and the entry decisions of new Irish firms (see Burke, 1996). Based on this assumption, we calculate the industry growth, size, and minimum efficient scale variables described in equation (2) using data for the UK available from the Census of Production, for 20 manufacturing sectors over the period 1980 – 1990 as constrained by availability and

[16] This implicitly assumes that the importance of linkages between the 20 sectors is time invariant and that the 1993 data are representative of these relationships.

comparability to our Irish data.[17,18] The results, which are reported in columns (1) to (3) of Table 7 show that the MNC variables are still significant, while all sectoral variables are statistically insignificant. This suggests that sectoral conditions in the UK do not appear to affect entry of Irish firms to any significant extent.

[Table 7 here]

Cost Competitiveness

O'Malley (1998) discusses in some detail factors which might have affected the performance of indigenous Irish firms over the decade 1987 to 1997. In particular he argues that improvements in cost competitiveness have enhanced the ability of indigenous firms to compete on export markets, a factor which could also be expected to impact on the decision of whether or not to enter the market. In order to take this issue into account, we calculate a relative wage variable *RELW* as the ratio of real wages and salaries per employee in Irish manufacturing over real wages and salaries per employee in UK manufacturing, converted to a common currency. This variable can be calculated using data available from the Census of Industrial Production for Ireland, and the Census of Production for the UK. We calculate the relative wage variable for our 20 manufacturing sectors over the period 1980 to 1990.

The results of the estimation including *RELW* and sectoral variables calculated using UK data are presented in columns (4) to (6) of Table 7. Inspection shows that the coefficients on the multinational presence variables are very similar to the coefficients reported in (1) to (3), while the relative wage variable turns out to be statistically insignificant. This indicates that changes in cost competitiveness do not appear to have influenced the entry decision of indigenous firms in Irish manufacturing. We also estimated this specification including sectoral variables calculated using Irish data, which produces similar results to the ones shown here.[19]

O'Malley (1998) discusses other possible factors which might have affected the performance of Irish industries, such as the national pay agreements which led to only moderate increases in nominal wages in the economy, thus helping to maintain cost competitiveness. Also, he

[17] We are not able to calculate *AGE* due to the unavailability of UK data.
[18] These twenty sectors are slightly different from those used to measure the linkages effects.
[19] An obvious objection could be that the *RELW* variable and the three *MNC* proxies are correlated given that MNCs are likely to pay higher wages; an inspection of correlation coefficients shows that there is only weak correlation between these variables, however.

points to improvements in human capital, assisted by educational policies, as well as physical capital infrastructure which provide a favourable environment for both indigenous and foreign firms in Ireland. Furthermore, the stable macroeconomic environment and the growth performance of the Irish economy are seen as having improved the basis for the performance of firms based in Ireland (see also Bradley et al., 1997). While the latter effect would, to some extent, have been picked up by the time dummies included in our estimations it is, due to data constraints, beyond the scope of the present paper to analyse explicitly the effects of improvements of human and physical capital on firm entry.

5 Conclusions

This paper presents an empirical study of the effect of the presence of foreign multinational companies on the entry rate of indigenous firms in Irish manufacturing sectors. A model developed in a recent paper by Markusen and Venables (1999) provides the starting point for our analysis. The model shows that multinational companies, through the creation of linkages with indigenous suppliers, can exert positive effects on the development of indigenous suppliers. Our results indicate that such an effect has, indeed, taken place in Irish manufacturing. We also find that "traditional" determinants of firm entry have only limited explanatory power for the entry of indigenous firms in Irish manufacturing industries.

Arguably, foreign multinationals may also have negative effects on indigenous firms through the crowding out mechanism. As pointed out above, the Markusen and Venables (1999) model acknowledges this by including a competition effect, i.e., multinationals can crowd out indigenous firms through competition in product markets. Even though this may not have been a problem in Ireland for the time period analysed, as multinationals were generally not in competition with indigenous firms on product markets, there could be other channels for crowding out. For example, Barry and Hannan (1995) discuss the possibility of foreign firms crowding out indigenous firms through the resource-movement and spending effects familiar from "Dutch Disease" models. A thorough empirical investigation of this effect has not been carried out thus far and may present a question to be tackled in further research.

Tables

Table 1: Decomposition of the Change in the Indigenous Share of Manufacturing Employment: 1974-95

	ΔShare	Between	Within
1974-85	-0.064	-0.040	-0.024
1985-95	-0.052	-0.051	-0.001
1974-95	-0.114	-0.087	-0.027

Source: Own estimations based on Forfás Employment Survey data

Table 2: Linkages of Foreign Firms in Manufacturing*, 1986-1995

(Irish raw materials as percentage of total raw material purchases)

	1986	1989	1992	1995
Non-food manufacturing	16.2%	16.5%	19.2%	19.8%
£m (1996 prices)	353	546	734	1,326

Note: * Excluding Food, Drink and Tobacco
Source: Forfás (1998)

Table 3: Indigenous Entry rate and Foreign Presence

Sector	1974	1978	1982	1986	1990	1992	1994	1995
Indigenous Gross Entry Rate								
Chemicals	7.0	7.5	14.0	11.3	3.0	7.4	7.0	6.8
Clothing & Textiles	4.8	9.3	9.7	13.3	7.2	7.8	6.4	4.6
Food, Drink & Tobacco	2.1	3.7	6.0	7.6	9.6	12.1	12.7	4.9
Furniture & Timber	5.7	11.7	9.2	4.9	4.4	4.8	4.5	3.8
Metals & Engineering	6.6	15.0	9.9	9.0	5.0	4.6	6.9	4.9
Non-Metallic Minerals	4.9	6.3	11.3	6.2	5.6	3.4	3.7	3.8
Paper & Printing	5.1	4.9	6.0	6.4	5.3	2.9	5.0	3.1
Miscellaneous	4.3	16.6	15.1	13.7	16.0	13.9	11.2	4.7
Total	4.8	9.8	9.4	8.8	7.2	7.3	7.9	4.6
Indigenous Net Entry Rate								
Chemicals	0.5	1.5	3.1	2.6	-2.1	-2.5	0.3	1.4
Clothing & Textiles	-0.3	3.2	1.0	2.1	-6.7	-6.3	-5.0	-3.8
Food, Drink & Tobacco	-1.0	1.3	3.0	0.4	1.8	2.2	3.5	-3.9
Furniture & Timber	2.4	8.8	3.8	-3.2	-3.4	-5.9	-2.5	-2.4
Metals & Engineering	3.0	9.7	2.8	1.3	-2.3	-3.1	0.3	-1.1
Non-Metallic Minerals	0.8	4.3	5.4	1.1	-0.6	-5.5	-1.6	-2.4
Paper & Printing	3.6	1.9	2.4	1.5	-0.2	-6.2	-0.4	-2.5
Miscellaneous	1.6	10.8	8.4	5.7	6.7	1.6	1.1	-4.0
Total	1.2	5.9	3.4	1.1	-1.1	-2.6	0.0	-2.5
Foreign Employment Share								
Chemicals	59.4	71.8	73.5	77.0	78.3	79.8	80.2	80.3
Clothing & Textiles	29.7	36.4	39.8	41.9	43.7	44.2	43.7	43.1
Food, Drink & Tobacco	28.7	28.4	29.9	29.6	28.8	26.7	26.8	26.2
Furniture & Timber	7.1	7.2	5.7	6.5	6.7	6.6	6.5	6.7
Metals & Engineering	50.3	52.2	55.7	57.3	60.1	60.0	61.8	61.9
Non-Metallic Minerals	21.8	21.3	22.3	19.5	20.1	20.5	19.8	18.6
Paper & Printing	14.8	13.3	13.2	14.4	14.1	13.1	14.5	15.0
Miscellaneous	41.3	45.0	45.6	42.2	42.2	40.9	41.2	40.0
Total	33.4	36.4	39.3	40.5	42.9	42.8	44.3	44.8

Source: Own estimations based on Forfás Employment Survey data

Table 4: Summary Statistics for variables used for 68 sectors

	Mean	Standard Deviation	Minimum	Maximum	Standard Deviation (Within)
Gross entry rate	0.0881	0.1207	0.0000	1.3680	0.0470
Net entry rate	0.0195	0.0925	-0.3000	1.2380	0.0577
MNC1	0.4147	0.2909	0.0000	0.9958	0.0590
MNC2	0.2103	0.1766	0.0000	0.8750	0.0375
MNC3	0.004	0.0359	-0.2174	0.4375	0.0159
GR	0.0010	0.1056	-0.4909	0.9623	0.0638
SIZE	3113	3072	24	18981	569.7
MES	53.90	56.57	4.80	641.50	12.54
AGE	19.54	10.08	2.91	64.37	2.33

Source: Own estimations based on Forfás Employment Survey data

Table 5: Fixed Effects Estimates - intra-industry effects

	Net Entry Rate			Gross Entry Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
MNC1	0.060**	--	--	0.061***	--	--
	(0.027)			(0.024)		
MNC2	--	0.206***	--	--	0.161***	--
		(0.054)			(0.047)	
MNC3	--	--	0.185**	--	--	0.310**
			(0.086)			(0.136)
$MNC3_{t-1}$	--	--	0.224**	--	--	0.248**
			(0.092)			(0.116)
$MNC3_{t-2}$	--	--	-0.092	--	--	0.041
			(0.099)			(0.110)
$MNC3_{t-3}$	--	--	-0.019	--	--	0.026
			(0.088)			(0.110)
GR	0.042	0.040	0.061*	0.034	0.034	0.046
	(0.034)	(0.033)	(0.036)	(0.030)	(0.029)	(0.029)
$SIZE/10^5$	-0.522**	-0.420*	-0.370	-0.602***	-0.506***	-0.048
	(0.275)	(0.252)	(0.240)	(0.194)	(0.181)	(0.228)
$MES/10^3$	0.254	0.197	0.028	0.245	0.201	-0.764
	(0.272)	(0.264)	(0.202)	(0.267)	(0.260)	(0.185)
$AGE/10^2$	-0.105	-0.156	-0.028	-0.198	-0.232*	-0.832
	(0.137)	(0.137)	(0.145)	(0.130)	(0.130)	(0.135)
Sectors, periods	68, 22	68, 22	68, 19	68, 22	68, 22	68, 19
Observations	1496	1496	1292	1496	1496	1292
R^2	0.14	0.15	0.16	0.18	0.19	0.20
F (H_0: $v_i=v_j$)	6.47	4.64	5.82	3.65	3.76	3.52
F (H_0: $\beta_i=0$)	14.82	15.10	14.13	17.88	18.37	17.24
F (H_0: $\alpha_i=\alpha_k$)	2.06	2.15	1.78	3.15	3.19	3.52

Notes: Heteroskedasticity consistent standard error in parentheses; MNC1: foreign employment share, MNC2: foreign plant share, MNC3: foreign entry rate in case of (1) through (3) and net foreign entry rate in case of (4) through (5)

*** = significant at 1 per cent, ** at 5 per cent, * at 10 per cent level.

Table 6: Fixed Effects Estimates – long run and linkages effects

Dependent variable: net entry rate

	Long Run Effects			Linkages Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
MNC1	0.126	--	--	0.145	--	--
	(0.029)***			(0.053)***		
MNC2	--	0.231	--	--	0.450	--
		(0.059)***			(0.103)***	
MNC3	--	--	0.517	--	--	0.079
			(0.189)***			(0.145)
$MNC3_{t-1}$	--	--	--	--	--	0.043
						(0.076)
$MNC3_{t-2}$	--	--	--	--	--	0.085
						(0.133)
$MNC3_{t-3}$	--	--	--	--	--	0.236
						(0.077)***
GR	0.085	0.081	0.057	-0.053	-0.085	-0.012
	(0.035)**	(0.035)**	(0.036)	(0.085)	(0.081)	(0.046)
$SIZE/10^5$	-0.746	-0.561	-0.267	-0.082	0.055	-0.008
	(0.204)***	(0.204)***	(0.249)	(0.147)	(0.142)	(0.125)
$MES/10^3$	0.007	-0.015	-0.001	-0.052	0.077	-0.315
	(0.200)	(0.201)	(0.204)	(0.281)	(0.231)	(0.239)
$AGE/10^2$	-0.065	-0.091	0.004	-0.121	-0.133	-0.239
	(0.414)	(0.146)	(0.141)	(0.123)	(0.120)	(0.139)
Sectors, periods	68, 20	68, 20	68, 20	20, 22	20, 22	20, 20
Observations	1360	1360	1360	440	440	380
Adjusted R^2	0.16	0.16	0.16	0.33	0.40	0.42
F (H_0: $v_i=v_j$)	6.11	4.50	4.74	6.34	4.63	5.98
F (H_0: $\beta_i=0$)	16.22	16.23	15.75	10.79	13.97	13.35
F (H_0: $\alpha_i=\alpha_k$)	2.13	2.14	1.89	2.57	4.45	2.58

Notes: Heteroskedasticity consistent standard error in parentheses; MNC1: foreign employment share, MNC2: foreign plant share, MNC3: foreign entry rate, except in the case of (1) through (3) where these are the average over the present and the three previous years

*** = significant at 1 per cent, ** at 5 per cent, * at 10 per cent level.

Table 7: Fixed Effects Estimates – UK sectoral data and cost competitiveness controls

Dependent variable: net entry rate

	UK sectoral data			Cost Competitiveness		
	(1)	(2)	(3)	(4)	(5)	(6)
MNC1	0.152	--	--	0.166	--	--
	(0.064)**			(0.073)**		
MNC2	--	0.433	--	--	0.431	--
		(0.116)***			(0.119)***	
MNC3	--	--	0.329	--	--	0.334
			(0.162)**			(0.163)**
$MNC3_{t-1}$	--	--	-0.047	--	--	-0.043
			(0.094)			(0.095)
$MNC3_{t-2}$	--	--	0.144	--	--	0.141
			(0.079)*			(0.078)*
$MNC3_{t-3}$	--	--	0.036	--	--	0.034
			(0.107)			(0.108)
GR	0.026	0.034	0.014	0.030	0.033	0.009
	(0.054)	(0.053)	(0.057)	(0.055)	(0.054)	(0.058)
$SIZE/10^3$	0.085	0.099	0.138	0.076	0.101	0.148
	(0.113)	(0.110)	(0.114)	(0.115)	(0.112)	(0.116)
MES	-0.075	-0.066	-0.080	-0.074	-0.066	-0.079
	(0.058)	(0.053)	(0.057)	(0.057)	(0.053)	(0.058)
RELW	--	--	--	-0.022	0.006	0.031
				(0.050)	(0.044)	(0.043)
Sectors, periods	20, 11	20, 11	20, 11	20, 11	20, 11	20, 11
Observations	220	220	220	220	220	220
Adjusted R^2	0.38	0.40	0.38	0.37	0.40	0.38
F (H_0: $v_i=v_j$)	8.72	6.92	8.07	8.66	6.82	7.94
F (H_0: $\beta_i=0$)	14.14	15.22	11.87	13.09	14.07	11.16
F (H_0: $\alpha_i=\alpha_k$)	2.54	2.92	2.19	2.41	2.80	2.20

Notes: Heteroskedasticity consistent standard error in parentheses; MNC1: foreign employment share, MNC2: foreign plant share, MNC3: foreign entry rate

*** = significant at 1 per cent, ** at 5 per cent, * at 10 per cent level.

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