

PRODUCTIVITY SPILLOVERS FROM MULTINATIONAL COMPANIES

HOLGER GÖRG¹

ABSTRACT

Many host country governments assume that inward Foreign Direct Investment (FDI) can bestow large benefits to the economy, bringing not only new investment that boosts national income but also an inflow of new foreign knowledge and technology. The purpose of this chapter is to review the evidence of the importance of these productivity spillovers from inward FDI. It finds that the international evidence on productivity spillovers is mixed. It argues that the most plausible interpretations for the lack of consistent findings are that, firstly, characteristics specific to individual countries can influence the extent to which spillovers happen, secondly, individual firms' level of absorptive capacity is important and thirdly, focusing purely on horizontal spillovers misses important vertical channels of knowledge transfer, in particular through backward linkages, which may bestow larger external effects.

¹ The author is grateful to Aoife Hanley for helpful comments on an earlier draft.

14.1 Introduction

FDI by multinational companies is undoubtedly one of the most visible and, at the margin, arguably most important aspects of economic globalisation. As the latest United Nations' *World Investment Report* shows, annual flows of FDI were around \$700 billion with the total stock being around \$9 trillion in 2004 (UN, 2005). In that year, Europe was host to almost half of the world-wide inward FDI stock and, within the continent; Ireland is an important player in that regard. In terms of the absolute level of inward FDI stock it is the seventh most important host country in Europe. Taking account of the small size of the economy, Ireland's ratio of inward FDI stocks to GDP equals 126.3 in 2004, being second only to Luxembourg among European countries (UN, 2005).

Many host country governments assume that inward FDI can bestow large potential benefits to the economy, bringing not only new investment that boosts national income but also an inflow of new foreign knowledge and technology. This may lead to spillovers to the local economy, resulting in higher productivity and overall economic growth. These external effects from multinationals to domestic firms are generally referred to as 'productivity spillovers' or 'technology spillovers'. The expectation of such positive effects has led many governments to actively attract multinational companies and the associated FDI into their economies, with policies ranging from creating more liberal investment environments to providing substantial public subsidies. While it is difficult to obtain reliable data on such financial incentives, Head (1998) reports that the government of Alabama paid the equivalent of \$150,000 per employee to Mercedes for locating its new plant in the state in 1994. Across the Atlantic the UK government provided an estimated \$30,000 per employee to attract Samsung to the northeast of England in the late 1990s and \$50,000 per employee to attract Siemens (Girma et al., 2001).

It seems reasonable to ask whether such policy intervention can be justified. While the answer to such a question would involve some detailed cost-benefit analysis a simpler but nevertheless very important issue is whether the assumption that FDI brings with it spillovers that foster productivity growth stands up to scrutiny. This contribution attempts to provide some discussion of this question, focussing on the evidence provided from econometric analysis of micro level data.¹

Hence, the purpose of this chapter is to discuss the evidence on such productivity spillovers. In order to do so it is structured in the following way. In Section 14.2 the theoretical rationale for why multinationals may give rise to productivity spillovers is discussed. Also, the empirical evidence that examines whether multinationals are indeed more productive than domestic firms (as implied by the theory) is presented. Section 14.3 examines the empirical evidence that attempts to measure the magnitude of spillovers from multinationals in econometric analyses for a number of countries, while Section 14.4 focuses on the specific evidence for the Republic of Ireland. It also discusses a number of alternative approaches to measuring other potential spillovers from multinationals to domestic firms in Ireland. Section 14.5 concludes by setting out briefly the policy implications of the current research.

14.2 Multinationals' Spillover Potential

Before discussing the evidence on productivity spillovers it seems pertinent to start off by presenting the basic intuitive framework as to why multinationals can be a source of such effects.

In general, the availability of new foreign knowledge through inward FDI may benefit domestic firms as these can learn the technology from the multinationals, allowing them to upgrade their own production process and as a result increase productivity. The theoretical argument for why one may expect such productivity spillovers from multinationals is straightforward.

Given the foreign multinationals' limited knowledge of the local market, and the distance from their parent firm, they are generally at a disadvantage compared with local firms in the host country (Caves, 1996). Hence, multinationals will only be able to locate profitably abroad if they have some sort of offsetting advantage. This takes the form of a 'firm specific asset' (FSA), such as superior production technique, know-how or management strategy, which has at least to some extent the characteristics of a public good and enables the firm to locate profitably abroad (Markusen, 2002). Most importantly, these FSA can be transferred at low or zero cost between subsidiaries of the same firm.² The possibility of productivity spillovers then arises because multinationals may find it difficult to protect a leakage of the FSA in the host country, as other firms may somehow 'learn' about, for example, the production technology or management strategy. They can then apply it in their own firm, thus allowing them to improve technology and ultimately productivity. The public good characteristics imply that once the FSA is out on the external market it can be used by other firms, due to it being at least to some extent non-rival and non-excludable.

The inability of the multinationals to protect the asset is due to a number of reasons. Firstly, domestic firms may just imitate the multinationals in terms of products, production techniques or management techniques. Secondly, labour may move from multinationals to domestic firms, taking with them some of the knowledge of the FSA. Thirdly, domestic firms supplying to or purchasing inputs from multinationals may be exposed to the superior technology and, hence, be able to upgrade their own production techniques. Fourthly, competition from multinationals may force domestic rivals to up-date production techniques to become more productive and competitive. This is frequently referred to as a 'competition effect'. As Aitken and Harrison (1999) point out, however, this competition effect may also reduce productivity in domestic firms, if multinationals attract demand away from their domestic competitors, forcing domestic firms to reduce output and, hence, productivity.

While this appears to be a very intuitive and plausible theoretical proposition, the question is whether it also stands up to empirical scrutiny. The first step in evaluating this is to start off by considering the importance of FSA. If these are indeed crucial then one should observe that multinationals use 'superior' technology compared to their domestic competitors. The use of technology is, of course, difficult to observe and measure, but it should arguably be correlated with a number of other measurable firm characteristics, and in particular with productivity. If a firm uses a superior technology one would, all other things equal, expect it to show higher levels of labour or Total Factor Productivity (TFP) than its rivals.

There is a large body of evidence that looks at the question as to whether multinationals indeed have higher levels of productivity than domestic firms, as would be predicted by the 'firm specific asset argument'. For example, Doms and Jensen (1998) and Girma and Görg (2007) provide discussions of this issue and evidence for the US and the UK to the extent that multinationals indeed have a productivity advantage compared to domestic firms, even when taking into account other firm characteristics such as sector, size of the firm, etc.

A number of studies have also undertaken comparisons of firm characteristics between domestic firms and foreign multinationals for Ireland.³ For example, Barry et al. (1999) use data from the Irish Census of Production, as well as data available from Forfás, to show that, on average, foreign multinationals based in Ireland are larger, have higher labour productivity (measured as net output per worker) as well as higher profits, employ more skilled workers and

spend more on Research and Development (R&D). Furthermore, decomposing productivity growth using plant level data from the Central Statistics Office, Ruane and Ugur (2005a) provide evidence that foreign owned firms in Ireland have far higher levels of labour productivity growth than domestic-owned firms.⁴

It is important to point out that most of the literature, including the studies looking at Irish data, compares foreign-owned multinationals with domestic-owned firms. This is understandable for a number of reasons, most importantly the policy concern with inward investment and the availability of data for many countries distinguishing foreign and domestic firms. However, it must be made clear that the theoretical argument relates to multinationals per se (and not only to foreign multinationals) compared to non-multinationals in the domestic economy. Hence, the former category includes domestic multinationals as well (with subsidiaries in foreign countries), and the theory predicts that these firms should also have FSA that allow them to use superior technology, and show higher productivity, than purely domestic non-multinational firms. This idea has been picked up in a number of recent studies. For example, Girma et al. (2004) use data from the Forfás Annual Business Survey of Economic Impact (ABSEI) for the year 2000 and find evidence that Irish-owned multinationals are more productive (in terms of labour productivity) than Irish exporters and purely domestic market oriented Irish firms.⁵

What we can take from this discussion is that there are plausible theoretical reasons for why there may be spillovers from multinationals, and that the evidence also suggests that these firms indeed have ‘superior characteristics’ – hence, the potential for spillovers should be taken as given. The next section looks at the vast empirical evidence amassed in international studies that directly examines productivity spillovers from multinationals, before discussing in more detail the case of Ireland in Section 14.4. Note that the literature referred to in the next sections investigates purely whether there are spillovers from foreign multinationals to domestic firms, neglecting completely the possibility of spillovers emanating from domestic-owned multinationals.

14.3 International Evidence on Productivity⁶

When it comes to examining productivity spillovers from multinationals, i.e., the transfer of knowledge from foreign to domestic firms, it is important to point out that these are difficult to measure since, as Krugman (1991: 53) puts it, “knowledge flows [...] leave no paper trail by which they may be measured and tracked”. The approach adopted in the empirical literature therefore largely avoids the (arguably difficult to answer) question as to how exactly productivity spillovers actually take place, but focuses on the simpler issue of whether or not the presence of multinationals affects productivity in domestic firms.

Over the last thirty years, a large empirical econometric literature has developed, starting with Caves (1974), Globerman (1979) and Blomström (1986) using data for Australia, Canada and Mexico, respectively. Since then, their empirical models have been extended and refined in studies covering a large number of countries, although the basic approach is still, by and large, similar. Most econometric analyses are undertaken in a framework in which labour productivity or TFP of domestic firms is regressed on a range of independent variables. To measure productivity spillovers from foreign multinationals a variable is included which proxies the extent of foreign firms’ penetration of an industry in order to gauge the importance of multinationals in the sector. This variable is usually calculated as the share of employment or sales in multinationals over total industry employment/sales in a given sector. In other

words, the regression allows for an effect of FDI on productivity of domestic firms in the same industry. If the regression analysis yields a positive and statistically significant coefficient on the foreign presence variable, this is taken as evidence that positive intra-industry (or horizontal) spillovers have occurred from multinationals to domestic firms. Most studies use either the contemporaneous level of foreign presence or relatively short lags as their explanatory variables. If anything, therefore, these studies usually measure short-run effects of foreign presence on domestic productivity.

A large body of evidence has been amassed in terms of studies of productivity spillovers for many developing, transition and developed countries.⁷ Early papers such as Caves (1974), Globerman (1979) and Blomström (1986) generally find positive spillover effects. However, their results have to be taken with a grain of salt as they use cross sectional data (i.e., for a number of firms or industries for one particular year) for their analysis. As Görg and Strobl (2001) discuss, the use of this data may lead to biased and, hence, unreliable results.⁸ Focussing on studies using panel data it is apparent that, though much econometric work has been done in it provides, at best, mixed results as to the importance of spillovers.

While a number of authors (Haskel et al. (2002) for the UK and Keller and Yeaple (2003) for the US) find unambiguously positive spillovers, several studies (such as Aitken and Harrison, 1999 for Venezuela or Konings, 2001, for Bulgaria) find negative effects of the presence of multinationals on domestic firms' productivity. Furthermore, a number of papers find no statistically significant impact on average of multinationals on domestic productivity (e.g., Girma and Görg, 2006 for the UK and Konings, 2001, for Poland). There is some supportive evidence from case studies of spillover benefits to domestic firms (e.g., Moran, 2001) although there is, even at that level, disagreement in particular instances.⁹

The most plausible explanation for negative effects of multinational presence on domestic firms' productivity is that foreign firms reduce their productivity through competition effects, as suggested by Aitken and Harrison (1999). They argue that domestic firms compete with multinationals (which have lower marginal costs due to their firm-specific advantage) on domestic product markets. When multinationals enter, they steal business away from the domestic firms, which due to increasing returns to scale reduce their output and are forced up their average cost curve, reducing productivity as a result. Note that this argument is not necessarily inconsistent with the idea that competition can act as one of the channels through which positive spillovers are transmitted. Some firms may experience negative competition effects in the short run (moving up a given average cost curve), while other firms may improve efficiency (shifting down their average cost curve) because of increased competition in the short run as well as the long run.¹⁰

There are also other explanations for a failure to find evidence of positive aggregate spillovers in the short run. Firstly, there may be lags in domestic firms' learning from multinationals, which short-run analyses do not pick up. Secondly, spillovers may be localised as geographic proximity may be important for technology transfer. Hence, they may not be picked up in the standard regression analysis. Thirdly, multinational firms may be able to guard their firm-specific advantages closely, preventing leakages to domestic firms and, therefore, spillovers as well. These explanations are straightforward and plausible and require little comment.

A further explanation that is discussed by Lipsey and Sjöholm (2005) is that countries, and firms within countries, differ in their ability to benefit from spillovers. They argue that there may be instances, particularly in developing or transition countries, where the domestic industry is too small or too backward to be able to learn from multinational firms. Since it is difficult to control for such country characteristics in studies using data for only one country, the empirical literature has paid more attention to the notion that only a subset of firms may be able to

capture positive spillovers. The basic idea is that only domestic firms that have a certain level of ability are able to assimilate the knowledge available from multinationals. More specifically, the more backward a domestic firm is in its level of technology compared to the multinational, the less likely it is to have the appropriate level of human and physical capital, and know how, it needs to benefit from spillovers.

This explanation has received substantial support in the empirical literature. For example, Kokko et al. (1996) using firm-level data for Uruguay find evidence for productivity spillovers to domestic firms with moderate technology gaps (measured as the difference between the domestic firm's labour productivity and the average labour productivity in foreign firms) but not for firms that use considerably lower levels of technology. Also, Girma (2005) and Girma and Görg (2006) find support for the hypothesis that only firms with some minimum level of absorptive capacity benefit from productivity spillovers in their analysis using British establishment level data.

Arguably, and this has been put forward in the recent literature as another explanation for the lack of evidence on positive spillovers, a simple search for purely horizontal spillovers misses a much more complex picture of knowledge diffusion. If multinationals prevent the transfer of their firm-specific knowledge to domestic competitors in the same industry, there is no scope for intra-industry knowledge spillovers. It is possible, however, that multinational firms voluntarily or involuntarily help to increase the efficiency of domestic suppliers or customers through vertical input-output linkages. Multinationals may provide technical assistance to suppliers to help them raise the quality of the intermediate products they produce, or they may simply insist on high quality standards for local inputs, providing incentives for local suppliers to upgrade their technology.¹¹ Multinationals may also provide active assistance or passive guidelines to domestic customers on the most effective way to use the products the firms supply.

Several recent studies have empirically investigated vertical spillovers. The most frequently cited of those is Javorcik (2004) who develops the idea that spillovers are more likely to occur through vertical relationships, rather than horizontally as has been the predominant view in the literature. Using firm level panel data for Lithuania for 1996 – 2000 she finds evidence consistent with her conjecture. Domestic firms in sector j increase their productivity following the presence of multinationals in industries which are being supplied by j . She refers to this as spillovers through backward linkages. While the evidence on such backward linkages is robust to a number of amendments, there is no robust evidence that domestic firms benefit from horizontal spillovers from multinationals. Blalock and Gertler (2003) also find results suggesting positive productivity spillovers through backward linkages in their analysis of Indonesian plant-level panel data. They do not find evidence for horizontal spillovers, however. Furthermore, Girma et al. (2005), using UK firm-level data, find that vertical linkages are important for spillovers, and that there are substantial differences in such spillover benefits, depending on whether multinationals are export or domestic-market oriented.

14.4 Evidence for Ireland

This section focuses on the evidence for spillover effects from multinationals in Ireland. Few would doubt that the influx of FDI over the last three decades has been an important factor for the Irish growth experience (e.g., Sachs, 1997; Barry, 1999) not least since multinationals, due to their being on average more productive than domestic firms (as pointed out in Section 14.2) contribute to higher aggregate productivity growth in the economy. However, there remains the

question as to whether the more productive multinationals also contribute spillover benefits to local firms. Perhaps surprisingly, there is little formal econometric evidence addressing this issue and linking the presence of foreign multinationals to productivity growth in domestic firms at the micro level.

Ruane and Ugur (2005b) implement the conventional approach of measuring productivity spillovers for the Irish economy. They use plant level panel data available from the Irish Central Statistics Office for manufacturing industries covering the period 1991 to 1998. They regress labour productivity (defined as net output per worker) on the employment share of foreign-owned firms in the same industry (defined alternatively at the two, three and four digit level) and control for capital intensity, skill intensity as well as firm specific time invariant effects. They do not find any statistically significant evidence for productivity spillovers from these regressions.

In alternative estimations, they use a similar set up but include the *level* of employment in foreign-owned firms in the industry (rather than employment *share*) as the ‘spillover variable’, controlling additionally for total employment in domestic firms also. They argue that this may perhaps be a more appropriate approach to measuring spillovers in the Irish case, as the employment *share* of foreign owned firms changed only marginally over the period analysed (due to an increase in the level of domestic employment), while the *level* of employment in foreign multinationals increased substantially. It is noteworthy that, from these estimations they find robust evidence for horizontal spillovers based on the 4-digit definition of the industry, however, not for two or three digit definitions. In other words, only when industries are defined very narrowly do they find evidence for spillovers. This may reflect that spillovers vary substantially across narrowly defined sectors and that they cannot be detected when aggregating industries.

Barry et al. (2005) provide a similar analysis based on plant level data from the Forfás Irish Economy Expenditure Survey for the period 1990 to 1998.¹² They estimate equations regressing alternatively labour or TFP in domestic firms on the employment share in foreign owned firms in the same two digit industry – in other words, sectors are fairly widely defined. Similar to the first set of regressions in Ruane and Ugur (2005b) they fail to detect any evidence for positive spillovers in their estimation.

While the two aforementioned studies are applications of the traditional spillover studies as found in the literature, Görg and Strobl (2003) present an alternative way of examining these. Their approach is based on the idea that an increase in productivity through spillovers will, all other things being equal, reduce a host country firm’s average cost of production and, hence, increase profitability. Profitability, in turn, has long been regarded as a main determinant of firm survival. Hence, technology spillovers from multinationals and the associated increase in productivity should lead to a higher probability of survival for host country firms.

They test their hypothesis using data from the Forfás Employment Survey covering the period 1973 to 1996. The advantage of using this data set is that it covers virtually the whole population of manufacturing plants in Ireland.¹³ In the empirical analysis, using a Cox proportional hazard model they find that, controlling for other plant and sector specific effects, the presence of multinationals (measured as the foreign employment share) has a life enhancing effect only on domestic plants operating in high technology sectors. This suggests that there may be productivity spillovers taking place in these industries. They do, however, not find any evidence for such effects on the survival of domestic plants in low technology industries.¹⁴ Their interpretation of these results is that firms in low tech sectors may not have the necessary absorptive capacity to utilise the relevant knowledge from multinationals and, hence, are not able to benefit from spillovers, an issue discussed in Section 14.3.

Görg and Strobl (2002) and Barrios et al. (2005) develop another alternative approach to gauge the effect of multinationals on the development of domestic plants in Ireland. They apply and extend a theoretical approach by Markusen and Venables (1999), which argues that multinationals, through developing backward linkages with domestic suppliers increase markets for these firms and, hence, increase their profits in the short run. This can lead to a further entry of new domestic firms in supplier industries, which will drive down the price of supplies, also increasing the scope for the entry of new domestic firms in final good industries.

In line with this idea, Görg and Strobl (2002) and Barrios et al. (2005) investigate econometrically whether the entry rate of domestic firms in an industry is positively related to the presence of multinationals (again measured as foreign employment share) in the same industry. Both studies use data from the Forfás Employment Survey since 1973. Supporting their theoretical expectation they find evidence that the presence of multinationals indeed has a positive effect on the entry rate of domestic firms. This is taken to indicate that spillovers from multinationals encourage Irish entrepreneurs to set up new firms, either in supplier or in final good industries.¹⁵

14.5 Conclusions

As was seen in Section 14.3, the international evidence on productivity spillovers from multinationals is mixed. The most plausible interpretations for the lack of consistent findings are that, firstly, country characteristics matter, secondly, individual firms' level of absorptive capacity is important (i.e., they must possess a certain ability before they can usefully apply the knowledge from a multinational) and, thirdly, focusing purely on horizontal spillovers misses important vertical channels of knowledge transfer, in particular through backward linkages, which may bestow larger external effects.

This provides important implications for policymakers as it suggests that policy can be usefully targeted at these issues in order to maximise spillover benefits, rather than focusing solely on attracting ever more multinationals into the economy. In order to assist domestic firms to strengthen their absorptive capacity government could aim to improve R&D and, more generally, innovation activity, as well as targeting training and general skill upgrading activities in the economy. Hence, innovation, education and training policies are likely to be key to facilitating spillovers. In order to boost vertical spillovers policy can be aimed at encouraging multinationals to generate linkages with the domestic economy.¹⁶ Here government can usefully act as a provider of information to potential new inward investors, on availability and location of sub-suppliers. Another potential area where government can act in this regard is to ensure quality standards of and competition among local suppliers.

For the Irish case, the few papers that applied the 'traditional approach' of measuring spillovers do not come up with overwhelming and unambiguous support for positive effects. Given that Ireland is widely regarded as having benefited from inward investment it is unlikely that it is a country that is, in Lipsey and Sjöholm's words "unable to learn from foreign-owned firms" (2005: 40). Also, the evidence from the 'alternative approaches' discussed in Section 14.4 suggests that there are positive effects on the development of domestic firms. Hence, multinationals can be regarded as having brought important spillover benefits to domestic firms in the Irish economy. What is a plausible interpretation of the results in the spillovers studies is that, in line with the findings of the international literature, they do not take adequate account of the importance of absorptive capacity and vertical linkages.

The finding by Görg and Strobl (2003) that only firms in high tech industries benefit from multinationals in terms of having higher probabilities of survival is in line with the argument that firms are more likely to benefit from technology spillovers if they have the necessary absorptive capacity to do so. However, a simple distinction between high and low technology sectors is arguably a crude way of measuring absorptive capacity; further research into this direction should be fruitful in order to gauge the importance and magnitude of spillovers for different types of domestic firms with heterogeneous levels of absorptive capacity. As regards the role of vertical linkages, multinationals in Ireland have relatively strong backward linkages with the local economy and one would, therefore, expect a potential for vertical spillovers.¹⁷ Hewitt-Dundas et al. (2002) provide an interesting analysis as regards the importance of linkages. They report results from a survey, which asked managers of foreign-owned plants based in Ireland about their input-sourcing behaviour, and the perceived impact they had on the performance of local suppliers.¹⁸ They find, *inter alia*, that knowledge gaps exist between the multinationals and their best local suppliers, suggesting that there is a potential for knowledge spillovers. They also present some case study evidence of how these knowledge transfers take place. Furthermore, they report that a large proportion of multinationals argue to have had a significant impact on the performance of their local suppliers through knowledge spillovers.

Hence, the policy implications from the research on Irish data are similar to those from the international studies: targeting absorptive capacity and vertical linkages is crucial. However, more evidence should be useful to get a better idea of the precise importance of absorptive capacity and vertical linkages in Ireland, to inform policymakers and allow targeting policies appropriately.

Notes

- 1 There is a related literature which investigates whether inward FDI fosters economic growth using macro-level data. For example, Borensztein et al. (1998) and Alfaro et al. (2003) show that inward FDI can have positive growth effects if countries have a certain level of human capital or well developed financial markets.
- 2 For example, the know-how available in the microchip producer Intel can be seen as a FSA. This can be easily transferred within the firm, from the parent in the US to subsidiaries abroad.
- 3 In the datasets used, foreign firms are generally defined as those with at least 50 percent foreign ownership.
- 4 The data for foreign multinationals have of course to be taken with a grain of salt due to the possibility of the figures being distorted through transfer pricing. However, the evidence for Ireland, taken together with the large body of international evidence, can still be taken to suggest that foreign owned multinationals are 'better' along a number of firm characteristics than their domestic owned counterparts, even if the accurate level of foreign firms' advantage is unclear.
- 5 Their findings are in line with recent heterogeneous firms models which predict that among firms, the most productive will choose to become multinationals, less productive firms export and the least productive ones serve purely the domestic market (Helpman et al., 2004).
- 6 This section draws on earlier work by Görg and Strobl (2001) and Görg and Greenaway (2004).
- 7 See Görg and Greenaway (2004) for a review of this literature.

- 8 They argue that panels, using longitudinal firm or plant level data are the most appropriate estimating framework for two reasons. Firstly, longitudinal data studies allow one to investigate the development of domestic firms' productivity over a longer time period, rather than relying on one data point. Secondly, they allow one to investigate spillovers after controlling for other factors. Cross sectional data, in particular if they are aggregated at the sectoral level, fail to control for time-invariant differences in productivity across sectors which might be correlated with, but not caused by, foreign presence. Thus coefficients on cross-section estimates are likely to be biased. For example, if productivity in the electronics sector is higher than, say, the food sector, multinationals may be attracted into the former. In a cross section, one would find a positive and statistically significant relationship between the level of foreign investment and domestic productivity, consistent with spillovers, even though foreign investment did not cause high levels of productivity but rather was attracted by them.
- 9 For example, Larrain, Lopez-Calva and Rodriguez-Claré (2000) conclude that the location of Intel in Costa Rica has had positive effects on the local economy, while Hanson (2000) argues that there is little evidence for spillovers from Intel on domestic firms.
- 10 Evidence for positive effects of competition are found by Kokko (1996) for Mexico and Driffield (2001) for the United Kingdom.
- 11 Moran (2001) provides a number of case studies which show that this happens frequently in practice.
- 12 In comparison to the CSO data used by Ruane and Ugur (2005b), which include all industrial local units with three or more employees, their data set only includes a sample of plants with at least 20 employees.
- 13 One of the disadvantages is that only employment is recorded; hence, there is no possibility of using data from this survey for productivity analyses.
- 14 Their classification of industries is based on the OECD definition of high and low tech industries.
- 15 This is in line with earlier evidence provided by Cogan and Onyemadum (1981) which look at new domestic spin-off companies from foreign multinationals in the Irish electronics industry.
- 16 It is important to point out that this is not imply a supporting argument for the use of local content requirements, as these may have more harmful than beneficial effects – inter alia, they are likely to deter multinationals from investing in the country in the first place (Görg and Greenaway, 2004).
- 17 See Görg and Ruane (2001) for recent evidence using plant level data for the electronics industry from the Forfás Irish Economy Expenditure Survey.
- 18 An additional interesting point about the paper is that it includes a comparison of data for the Republic and Northern Ireland.

References

- Aitken, B.J. and Harrison, A.E. (1999), “Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela”, *American Economic Review*, Vol. 89, 605-618.
- Alfaro, L., Areendam, C., Kalemli, K.O. and Sayek, S. (2003), “FDI and Economic Growth: The Role of Local Financial Markets”, *Journal of International Economics*.
- Barrios, S., Görg, H. and Strobl, E. (2005), “Foreign Direct Investment, Competition and Industrial Development in the Host Country”, *European Economic Review*, 49(7): 1761-1784.
- Barry, F. (1999), *Understanding Ireland’s Economic Growth*, London: MacMillan.
- Barry, F., Bradley J. and O’Malley, E. (1999), “Indigenous and Foreign Industry: Characteristics and Performance”, in Barry, F. (ed.), *Understanding Ireland’s Economic Growth*, London: MacMillan: 45-74.
- Barry, F., Görg, H. and Strobl, E. (2005), “Foreign Direct Investment and Wages in Domestic Firms in Ireland: Productivity Spillovers versus Labour-market Crowding Out” *International Journal of the Economics of Business*, 12(1): 67-84.
- Blalock, G. and Gertler, P. (2003), “Technology from Foreign Direct Investment and Welfare Gains through the Supply Chain”, mimeo, Cornell University, Ithaca, N.Y.
- Blomström, M. (1986), “Foreign Investment and Productive Efficiency: The Case of Mexico”, *Journal of Industrial Economics*, 35(1): 97–112.
- Borensztein, E., De Gregorio, J. and Lee, J.W. (1998), “How Does Foreign Direct Investment Affect Economic Growth?”, *Journal of International Economics*, 45(1): 115–35.
- Caves, R.E. (1974), “Multinational Firms, Competition, and Productivity in Host-Country Markets”, *Economica*, 41(162): 176–93.
- Caves, R.E. (1996), *Multinational Enterprise and Economic Analysis*. Second Edition. Cambridge: Cambridge University Press.
- Cogan, D. and Onyemadum, E. (1981), “Spin-Off Companies in the Irish Electronics Industry”, *Irish Journal of Business and Administrative Research*, 3(2): 3-15.
- Driffield, N. (2001), “The Impact on Domestic Productivity of Inward Investment in the UK”, *The Manchester School*, 69(1): 103–19.
- Girma, S. (2005), “Geographic Proximity, Absorptive Capacity and Productivity Spillovers from FDI: A Threshold Regression Analysis”, *Oxford Bulletin of Economics and Statistics*.
- Girma, S. and Görg, H. (2006), “The Role of the Efficiency Gap for Spillovers from FDI: Evidence from Quantile Regressions”, *Open Economies Review*, forthcoming.

- Girma, S. and Görg, H. (2007), "Multinationals' Productivity Advantage: Scale or Technology?", *Economic Inquiry*, forthcoming.
- Girma, S., Görg, H. and Pisu, M. (2005), "Exporting, Linkages and Productivity Spillovers from Foreign Direct Investment". mimeo, University of Nottingham.
- Girma, S., Görg, H. and Strobl, E. (2004), "Exports, International Investment and Plant Performance: Evidence From a Non-Parametric Test", *Economics Letters*, 83, 317-324.
- Globerman, S. (1979), "Foreign Direct Investment and 'Spillover' Efficiency Benefits in Canadian Manufacturing Industries", *Canadian Journal of Economics*, 12(4): 42-56.
- Görg, H. and Greenaway, D. (2004), "Much Ado About Nothing? Do Domestic Firms Really Benefit From Foreign Direct Investment?", *World Bank Research Observer*, 19(2): 171-197.
- Görg, H. and Ruane, F. (2000), "An Analysis of Backward Linkages in the Irish Electronics Sector", *Economic and Social Review*, 31(3): 215-235.
- Görg, H. and Strobl, E. (2001), "Multinational Companies and Productivity Spillovers: A Meta-Analysis", *Economic Journal*, 111 (473): F723-39.
- Görg, H. and Strobl, E. (2002), "Multinational Companies and Indigenous Development: An Empirical Analysis", *European Economic Review*, 46(7): 1305-1322.
- Görg, H. and Strobl, E. (2003), "Multinational Companies, Technology Spillovers and Plant Survival", *Scandinavian Journal of Economics*, 105(4): 581-95.
- Hanson, G.H. (2001), "Should Countries Promote Foreign Direct Investment?", G-24 Discussion Paper 9, UNCTAD, Geneva.
- Haskel, J., Pereira, C. and Slaughter, M. (2002), "Does Inward Foreign Direct Investment boost the Productivity of Domestic Firms?", *NBER Working Paper* 8724, Cambridge, Mass: National Bureau of Economic Research.
- Head, K. (1998), Comment on "Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States". In Baldwin, R., Lipsey, R. and Richardson, J.D. eds., *Geography and Ownership as Bases for Economic Accounting*, Chicago, Chicago University Press.
- Helpman, E., Meltiz, M.J. and Yeaple, S.R. (2004), "Export versus FDI with Heterogeneous Firms", *American Economic Review*.
- Hewitt-Dundas, N., Andreosso-O'Callaghan, B., Crone, M., Murray, J. and Roper, S. (2002), "Knowledge Transfers from Multi-national Plants in Ireland – A Cross-border Comparison of Supply Chain Linkages", Working Paper No. 72, Northern Ireland Economic Research Centre, Belfast.

- Javorcik, B. (2004), “Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages”, *American Economic Review*.
- Keller, W. and Yeaple, S. (2003), “Multinational Enterprises, International Trade, and Productivity Growth: Firm-Level Evidence from the United States”, GEP Research Paper 03/03, University of Nottingham, United Kingdom.
- Kokko, A., Tansini, R. and Zejan, M. (1996), “Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector”, *Journal of Development Studies*, 32: 602–11.
- Konings, J. (2001), “The Effects of Foreign Direct Investment on Domestic Firms: Evidence from Firm Level Panel Data in Emerging Economies”, *Economics of Transition*, 9(3): 619–33.
- Krugman, P. (1991), *Geography and Trade*, Cambridge, MA: MIT Press.
- Larrain, F., Lopez-Calva, L. and Rodriguez-Claré, A. (2000), “Intel: A Case Study of Foreign Direct Investment in Central America”, Center for International Development Working Paper 58, Harvard University, Cambridge, Mass.
- Lipse, R. and Sjöholm, F. (2005), “The Impact of Inward FDI on Host Countries: Why Such Different Answers?” in Moran, T., Graham, E. and Blomström, M. (eds.): *Does Foreign Direct Investment Promote Development?*, Washington, D.C.: Institute for International Economics.
- Markusen, J. (2002), *Multinational Firms and the Theory of International Trade*, Cambridge, MA, MIT Press.
- Markusen, J. and Venables, A. (1999), “Foreign Direct Investment as a Catalyst for Industrial Development” *European Economic Review* 43: 335-356.
- Moran, T. (2001), *Parental Supervision: The New Paradigm for Foreign Direct Investment and Development*, Washington, D.C.: Institute for International Economics.
- Ruane, F. and Ugur, A. (2005a), “Labour Productivity and Foreign Direct Investment in Irish Manufacturing Industry: A Decomposition Analysis”, *Economic and Social Review*, 36(1): 19-43.
- Ruane, F. and Ugur, A. (2005b), “Foreign Direct Investment and Productivity Spillovers in Irish Manufacturing Industry: Evidence from Firm Level Panel Data”, *International Journal of the Economics of Business*, 11(3): 53-66.
- Sachs, J. (1997), “Ireland’s Growth Strategy: Lessons for Economic Development”, in Gray, A. (ed.): *International Perspectives on the Irish Economy*, Dublin.
- United Nations (2005), *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, United Nations: Paris.