

Görg, Holger; Greenaway, David

Working Paper

Foreign direct investment and intra-industry spillovers: a review of the literature

Research Paper, No. 2001,37

Provided in Cooperation with:

Kiel Institute for the World Economy (IfW)

Suggested Citation: Görg, Holger; Greenaway, David (2001) : Foreign direct investment and intra-industry spillovers: a review of the literature, Research Paper, No. 2001,37, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham, Nottingham

This Version is available at:

<http://hdl.handle.net/10419/2709>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



research paper series

Globalisation and Labour Markets Programme

Research Paper 2001/37

Foreign Direct Investment and Intra-Industry Spillovers: A Review of the Literature.

By H. Görg and D. Greenaway

The Centre acknowledges financial support from The Leverhulme Trust under Programme Grant F114/BF



Leverhulme Centre
for Research on Globalisation and Economic Policy

The Authors

Holger Görg is a Research Fellow in the Leverhulme Centre for Research on Globalisation and Economic Policy. David Greenaway is Professor of Economics and Director of the Leverhulme Centre.

Acknowledgements

This paper was prepared for a UNECE/EBRD Export Meeting held in Geneva in December 2001. The authors are grateful to participants at the Meeting for comments. The authors gratefully acknowledge support from The Leverhulme Trust under Programme Grant F114/BF.

FOREIGN DIRECT INVESTMENT AND INTRA-INDUSTRY SPILLOVERS: A REVIEW OF THE LITERATURE

by

Holger Görg and David Greenaway

Abstract

Many governments offer significant inducements to attract inward investment, motivated by the expectation of spillover benefits. This paper reviews the possible sources of such spillovers and the empirical evidence for their existence in developing, developed and transitional economies. Although theory can identify a range of possible spillover channels, empirical support is hard to find. In the light of this, the paper concludes with a review of policy aspects.

Outline

1. Introduction
2. What Does Theory Tell Us
3. What Does Evidence Tell Us
4. Is There a Role for Policy
5. Conclusion

Non-Technical Summary

Public subsidies to attract foreign direct investment (FDI) are common. They seem to be motivated by a belief that some of the firm specific advantages possessed by multinational enterprises (MNEs) will spill over to indigenous firms, resulting in higher productivity levels and/or growth than otherwise. The theoretical literature does provide a basis for accepting that spillovers could occur, through imitation, competition effects, transfers of skills through labour mobility and learning to export. Moreover, host country characteristics and in particular its absorptive capacity might be important.

There is now a very extensive empirical literature aimed at identifying intra-industry spillovers, with econometric work on developing, developed and transitional economies. Most is targeted at productivity spillovers, some at wages and exports spillovers. Across all 'country types' the evidence on productivity spillovers is weak, with only a small proportion of studies finding supportive evidence. This lack of supportive evidence could be due to one or more of a number of factors. First, although the potential for spillovers exists, MNEs could in practice be very effective in protecting their firm specific advantages and preventing spillovers from occurring. Second, much of the existing literature is based on sector/industry level data rather than firm/plant level data, which is the appropriate focus for analysis. Third, most work uses cross-section methodology, which has shortcomings for this purpose, rather than panel based longitudinal data. Finally, such evidence as there is suggests that absorptive capacity is important and this has not as yet been extensively explored.

What, if anything, can we conclude with regard to policy? Intervention takes place both by way of offering incentives and via so-called TRIMS (trade related investment measures) like local content requirements and minimum export requirements. Evidence on the efficacy of specific policy instruments is sparse and not very supportive. It may be that the factors that are important to attracting FDI are the same as those that raise the probability of positive spillovers, i.e. infrastructure policies that increase absorptive capacity, minimise transactions costs and engender labour market flexibility.

1. Introduction

Over the last twenty years or so, the globalisation of economic activity has continued apace. The process by which economic activity becomes more globalised and economies become more 'joined up' and interdependent is fuelled by the international exchange of goods, services and factors of production. Most economists would view the outcomes of the process as fundamentally benign, certainly in the long run, with benefits flowing from the allocation of factors to their most productive use, more rapid factor accumulation and wider consumer choice. That is not to say, of course, that adjusting to globalisation will be costless: short run costs may be borne by displaced factors and/or the relative returns to some may decline and go uncompensated. It is these 'costs' that are generally the focus of public hostility to globalisation.¹

Of all the drivers of globalisation (armslength trade, migration of workers, cross border investment), the latter is probably the most publicly visible. This presumably explains why public hostility to globalisation often manifests itself as hostility towards multinationals. From an economic standpoint, cross-border investment may also be, at the margin, the most important manifestation of globalisation. Annual flows of FDI now exceed US\$700 billion and the total stock exceeds US\$6 billion. Over the last decade FDI flows have grown at least twice as fast as trade.

As with armslength trade, the environment within which FDI takes place is a policy distorted one. But, like the trading environment, it has been taking place in an increasingly liberalised framework. Thus, in 1998, of 145 regulatory changes made by 60 countries, 94% created more favourable conditions for FDI (UN 1999). Thus Governments have been taking action to stimulate FDI but in many cases that has extended beyond creating a more liberal environment to providing substantial public subventions to attract inward investment. For example, it is estimated that the British Government provided the

¹ For an evaluation of the adjustment process, see Davidson and Matusz (2000). For a review of the empirical literature, see Matusz and Tarr (2000).

equivalent of \$30,000 and \$50,000 per employee to attract Samsung and Siemens respectively to the North East of England (Girma, Greenaway and Wakelin 2001). The British Government is far from being unique in this regard.

So why expend public funds in this way? Presumably it is motivated by an assumption that the presence of foreign firms yields benefits over and above the immediate jobs they create, since other instruments exist that could probably create an equivalent number of jobs more cheaply. Generally it is assumed that foreign firms more than 'pay their way' through benefits that spill over to the host economy in various ways, resulting in productivity growth, or export growth being higher than otherwise.

The potential presence of such (intra-industry) spillovers is the subject of this paper. In Section 2 we begin by asking what guidance theory can give us on two counts: first, what are the possible channels for transmission of spillover benefits; second, are host country characteristics likely to make a difference to the extent or speed with which spillovers occur? Section III examines the empirical evidence on spillovers in developed, developing and transitional economies. In Section IV we focus on policy: should governments intervene? If so, what policies should they use? Does policy make any difference? Finally, Section V concludes.

2. What does theory tell us

2.1. Context

There is a well developed framework and literature which addresses the issue of why multinational enterprises (MNEs) choose to set up production facilities overseas rather than export directly and/or licence their product/technology. The most persuasive explanations are those that emphasise the co-existence of proprietary knowledge of some form and market failures in protecting that knowledge. Thus the firm internalises certain transactions to protect its brand/technology/ marketing advantages. This literature has been extensively surveyed (see Caves, 1996 and Markusen, 1995) and we take these motives as given. In particular, we take as a given the existence of some kind of firm specific asset, usually some

kind of technological advantage. Note that ‘technological advantage’ should be interpreted broadly to include innovative management and organisational processes as well as new production methods and technologies. The first question is then, having chosen a particular location how might any technological advantages spill over to the local economy via firms in the same industry? Having identified potential transmission channels, we then need to ascertain whether particular host economy characteristics will make a specific host more or less likely to benefit from spillovers. Later in the paper we address the issue of whether particular policy interventions are likely to be important in influencing choice of location and the benefits from spillovers.

2.2. Spillover channels

When a firm sets up a plant overseas, or acquires a foreign plant, it does so in the expectation of realising a higher rate of return on that investment than a given domestic firm would realise with an equivalent investment. The source of the higher return is the technological advantage alluded to above. Traditionally the literature emphasises some form of superior production or distribution technology than is available locally. Increasingly, however, it is recognised that it may just as readily be superior organisation and management ‘technology’ (such as just-in-time methods or innovative customer relationship management methods). Whatever the source, clearly the only way in which indigenous firms can gain from external benefits is if some form of *indirect* technology transfer takes place. After all, the MNE is unlikely to willingly hand over the source of its advantage. The theoretical literature identifies four channels through which the host country can boost its productivity via spillovers, as set out in Table 1: imitation; skills acquisition; competition; enhanced export propensity.

Imitation is the classic transmission mechanism for new products and processes. A transmission mechanism commonly alluded to in the theoretical literature on ‘North-South’ technology transfer is reverse engineering (e.g. Das, 1987; Wang and Blomström, 1992). Clearly the scope here depends very much on product/process complexity, with simple manufactures and production processes rather easier to imitate than more complex ones. The same principle applies even more so to managerial/organisational innovations though

arguably these are in principle, at any rate, easier to imitate. Imitation is, of course, not the same as replication and it would be surprising if the rents accruing to MNEs were entirely dissipated by the process. However, *any* upgrading to local technology deriving from imitation could result in a productivity spillover from the MNE to the local economy, with consequent benefits for the productivity of local firms.

Table 1: Spillover channels

Driver	Sources of Productivity Gain
Imitation	<ul style="list-style-type: none">• Adoption of new production methods.• Adoption of new management practices.
Competition	<ul style="list-style-type: none">• Reduction in X-inefficiency.• Faster adoption of new technology.
Human Capital	<ul style="list-style-type: none">• Increased productivity of complementary labour.• Tacit knowledge
Exports	<ul style="list-style-type: none">• Scale economies.• Exposure to technology frontier.

Adoption of new technology can also occur through *acquisition of human capital*. Even when the locational pull for MNE investment is low wages, relative to the home country, they nevertheless demand relatively skilled labour in the host country. Generally they will invest in that labour through training. In the absence of slavery, it is impossible to lock-in such resources completely.² As a result, the movement of labour from MNEs to existing firms, or to start new firms can generate productivity improvement via two mechanisms. First, a direct spillover to complementary workers, as skilled labour working alongside

² It is interesting to note that this inability to protect investment in human capital fully has long been seen as an argument for infant industry protection as a response to potential first mover disadvantages (see Baldwin 1968).

unskilled labour tends to raise the productivity of the latter. Second, workers that move carry with them knowledge of new technology; new management techniques and consequently can become direct agents of technology transfer. Some analysts argue that this is potentially the most important channel for spillovers; Haaker (1999) and Fosfuri, Motta and Ronde (2001), for instance. Moreover, some empirical work supports the case, including ILO (1981), Chen (1983) Djankov and Hoekmann (1999).

Many models of spillovers emphasise the key role which *competition* can play (Wang and Blomström, 1992; Glass and Saggi, 1998). Unless an incoming firm is offered monopoly status, which can and does happen in highly protected markets, it will produce in competition with indigenous firms. Even if the latter are not in a position to imitate the MNE's technology/production processes, they are of course under pressure to use existing technology more efficiently, yielding productivity gains. Greater competition leading to a reduction in X-inefficiency is analogous to one of the standard gains from armslength trade and is frequently identified as one of the major sources of gain.³ In addition, of course, competition may increase the speed of adoption of new technology or the speed with which it is imitated.

A further indirect source of productivity gain might be via *market access*, or *export spillovers*. Crudely, domestic firms may learn how to export from multinationals (see Aitken, Hanson and Harrison, 1997). Exporting generally involves fixed costs in the form of establishing distribution networks, creating transport infrastructure, learning about consumers' tastes, regulatory arrangements and so on in overseas markets. MNEs will generally establish already armed with such information and will often exploit it to export from the new host. Through collaboration, or more likely imitation, domestic firms can learn how to penetrate export markets. It is possible to argue that exporting raises productivity, as it allows firms to exploit scale economies, become exposed to new production and management methods and so on. Recent work on the US, Germany and UK suggests that productivity levels of exporting firms are higher than non-exporting firms and,

in the case of the UK, that productivity growth may also be higher for indigenous exporters.⁴ Thus, learning to export may be another vehicle for productivity spillovers.

³ For instance, the Cecchini Report on the benefits of completing the Single Market in Europe identified such pro-competitive effects as the single most important source of gain.

⁴ See Bernard and Jensen (1999), Bernard and Wagner (1997) and Girma, Greenaway and Kneller (2002).

2.3. Host Country Characteristics and Spillovers

Theory then suggests a number of potential mechanisms via which new technology can be imitated/acquired by host countries and therefore a number of potential channels for productivity spillovers resulting from the establishment of MNEs. Does theory give any guidance as to the role that host country characteristics may play?

The literature on the determinants of FDI gives great emphasis to locational characteristics as these are important factors in the multinationals' decisions as to where to invest (e.g., Barrios, Görg and Strobl, 2001a; Girma, 2001). But this is a different issue entirely, relating to the particular features of the host economy in attracting the inward investment in the first instance. What we wish to focus on here is the issue of whether there are location specific characteristics which affect the speed of adoption of new technology/ spillover of productivity gains.

A pioneering contribution to this literature is Findlay (1978) who emphasised the importance of *relative backwardness* and *contagion*. The former refers to the distance between two economies in terms of development. Findlay's model suggests that the greater this distance, the greater the backlog of available opportunities to exploit in the less advanced economy, the greater the pressure for change and therefore the more rapidly new technology is imitated/adopted following the arrival of the MNE. Moreover, in the Findlay model, speed of adoption is also a function of contagion, which refers to the extent to which the activities of the foreign firm with its superior technology pervades the local economy. Thus, if the MNE quickly establishes upstream and downstream networks, technology transfer will be more rapid.

Contagion has in recent years attracted a great deal of attention from economists, particularly in relation to financial markets (see Edwards 2000). Many would find the notion of contagion in the spillover context intuitively plausible – supply and distribution chains are obvious mechanisms for gaining exposure to and familiarity with new technology. The notion of relative backwardness as a driver of, rather than impediment to,

technology transfer is more controversial. Findlay's model is essentially demand side driven, with the pressure for adoption deriving from pent up demand.

Glass and Saggi (1998) also see a key role for technological distance between the host and home country but a quite different one to Findlay. That distance, or technology gap, signals something to the MNE about *absorptive capacity*. The bigger it is, the less likely the host country is to have the human capital, physical infrastructure and distribution networks to support inward investment. This influences not only the decision to invest but also what kind of technology to transfer. Specifically, the bigger the gap the lower the quality of technology transferred and, of course, the lower the potential for productivity spillovers. This seems inherently more plausible than Findlay's notion of a lack of absorptive capacity being the important driver. Clearly technological distance will be directly related to the potential gains from spillovers but it is also likely to be inversely related to the probability that indigenous firms are actually able to access them. Ultimately, it is an empirical question and one that, as we shall see later, has been investigated by a number of analysts.

2.4. Summary

In summary then, economic theory does give us some guidance in terms of what to expect where cross-border investment and spillovers are concerned. In general, MNEs have firm specific advantages which might be related to the production methods they use, the way they organise their activities, the way they market their products/services and so on. Once they have set up a foreign subsidiary, they may not be able to prevent some of the benefits of these advantages from spilling over to indigenous firms via imitation, labour mobility, competition or local firms learning how to export. Such spillovers have the potential to raise productivity and their exploitation might be related to the structural characteristics of the host economy. In particular the host's absorptive capacity is likely to be important.

3. What does evidence tell us

3.1 Overview

The empirical literature on productivity spillovers was pioneered by Caves (1974) and Globerman (1979) using data for Australia and Canada, respectively. Since then, their empirical models have been extended and refined although the basic approach has remained fundamentally similar. Following these authors, an analysis of the existence of spillovers is

usually undertaken in an econometric framework in which labour productivity or total factor productivity of domestic firms is regressed on a number of independent variables assumed to affect productivity. To measure intra-sectoral spillovers from multinationals a variable is included which proxies the presence of foreign firms in the sector, usually calculated as the share of employment or sales in multinationals over total industry employment/sales. If the regression analysis gives a positive and statistically significant estimate of the coefficient on the foreign presence variable, this is taken as evidence that spillovers have occurred from MNEs to domestic firms.⁵

The empirical results on the presence of spillovers are mixed. Table 2 sets out a number of studies that analyse productivity spillovers in manufacturing industries in developing, developed and transition economies.

Table 2: Papers on productivity spillovers

	Author(s)	Country	Year	Data	Aggregation	Result
	<i>Developing Countries</i>					
1	Blomström & Persson (1983)	Mexico	1970	cs	industry	+
2	Blomström (1986)	Mexico	1970/1975	cs	industry	+
3	Blomström & Wolff (1994)	Mexico	1970/1975	cs	industry	+
4	Kokko (1994)	Mexico	1970	cs	industry	+
5	Kokko (1996)	Mexico	1970	cs	industry	+
6	Haddad & Harrison (1993)	Morocco	1985-1989	panel	firm & ind.	?
7	Kokko et al. (1996)	Uruguay	1990	Cs	firm	?
8	Blomström & Sjöholm (1999)	Indonesia	1991	Cs	firm	+

⁵ Görg and Strobl (2000) present a different way of examining productivity spillovers. They postulate that, if domestic firms benefit from spillovers from MNEs they are able to produce more efficiently, i.e., at lower costs which will, ceteris paribus, increase their probability of survival. They present empirical results that the presence of foreign firms increases firms' probability of survival in Irish manufacturing industries, which they take as evidence for the existence of spillovers. Their result thus differs from the findings by Barry, Görg and Strobl (2001) reviewed below who find evidence for negative spillovers in Irish manufacturing. This difference is possibly due to the use of different data (Barry et al 2001 use data on firms with more than 20 employees for 1990 to 1998 while Görg and Strobl 2000 use data on virtually the population of manufacturing firms for 1973 to 1996) but can also be due to the different estimation techniques used. The present paper focuses on papers of productivity studies.

9	Sjöholm (1999a)	Indonesia	1980-1991	Cs	firm	+
10	Sjöholm (1999b)	Indonesia	1980-1991	Cs	firm	+
11	Chuang & Lin (1999)	Taiwan	1991	Cs	firm	+
12	Aitken & Harrison (1999)	Venezuela	1976-1989	Panel	firm	-
13	Kathuria (2000)	India	1976-1989	Panel	firm	?
14	Kokko et al (2001)	Uruguay	1988	Cs	firm	?
15	Kugler (2001)	Colombia	1974-1998	Panel	industry	?
<i>Developed Countries</i>						
16	Caves (1974)	Australia	1966	cs	industry	+
17	Globerman (1979)	Canada	1972	cs	industry	+
18	Liu et al. (2000)	UK	1991-1995	panel	industry	+
19	Driffield (2001)	UK	1989-1992	cs	industry	+
20	Girma et al. (2001)	UK	1991-1996	panel	firm	?
21	Girma and Wakelin (2001a)	UK	1988-1996	Panel	Firm	?
22	Girma and Wakelin (2001b)	UK	1980-1992	panel	firm	?
23	Harris and Robinson (2001)	UK	1974-1995	panel	firm	?
24	Barry et al. (2001)	Ireland	1990-1998	Panel	Firm	-
25	Barrios and Strobl (2001)	Spain	1990-1994	panel	firm	?
26	Dimelis and Louri (2001)	Greece	1997	cs	firm	+
<i>Transition Countries</i>						
27	Djankov & Hoekman (2000)	Czech Republic	1993-1996	panel	firm	-
28	Kinoshita (2001)	Czech Republic	1995-1998	Panel	firm	?
29	Bosco (2001)	Hungary	1993-1997	Panel	Firm	?
30	Konings (2001)	Bulgaria	1993-1997	panel	firm	-
		Poland	1994-1997			?
		Romania	1993-1997			-
31	Damijan et al (2001)	Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Slovakia, Slovenia	1994-1998	Panel	Firm	? or -, + only for RO

Notes:

(i) Data: CS denotes cross-sectional data, while Panel denotes use of combined cross-sectional time-series data in the respective analysis

(ii) Aggregation: Use of either Industry or Firm level data in the analysis

(iii) Result: Regression analysis finds a + positive and statistically significant, - negative and statistically significant, ? mixed results or statistically insignificant sign on the foreign presence variable.

The studies by Aitken and Harrison (1999), Barry, Görg and Strobl (2001), Damijan, Majcen, Knell and Rojec (2001), Djankov and Hoekman (2000) and Konings (2001) find some evidence of *negative* effects of the presence of multinationals on domestic firms. These papers use firm level panel data for manufacturing industries in Venezuela, Ireland, eight CEECs, the Czech Republic, and Bulgaria, Poland and Romania, respectively. Twelve papers listed in Table 2 do not find *any* statistically significant effects of multinationals on domestic productivity while sixteen papers report statistically significant positive effects.⁶

Note, however, that all but two of those reporting positive spillovers use cross sectional data which may lead to biased results as argued by Görg and Strobl (2001), who find that research design can crucially affect whether or not spillovers are found. They argue that panel studies, using data on a firm rather than an industry level, appear to be the most appropriate to determine the true extent of productivity spillovers. This is due to two main reasons. Firstly, panel data studies allow a researcher to follow the development of domestic firms' productivity over a longer time period, rather than studying only one data point in time in cross sectional data. Secondly, panel data allow the researcher to investigate in more detail whether spillovers take place by 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. If such time-invariant factors exist and are not properly controlled for, coefficients on cross-section estimates may be biased. For example, assuming that productivity in the electronics sector is higher than, say, the food sector, multinationals may be attracted into the former rather than the latter. In a cross sectional study, one would find a positive and statistically significant relationship between the level of foreign investment and productivity, consistent with spillovers, even though foreign investment did not cause the high levels of productivity but rather was attracted by them.

⁶ The magnitude of the coefficients, which indicates the strengths of the spillovers, also differs across studies.

To control properly for such unobservable constant differences in productivity across sectors, panel data, ideally at a firm level, need to be employed.

Taking this into consideration a look at Table 2 suggests that the evidence on productivity spillovers is even bleaker. As pointed out above, the overwhelming majority of studies finding positive spillovers use cross sectional data and should therefore be treated with caution. There are only two papers employing panel data which find positive results (Liu, Siler, Wang and Wei, 2000 and Damijan et al., 2001) for the UK and Romania respectively. The former, however, uses industry level data that may also be considered sub-optimal as they aggregate over heterogeneous firms. This leaves one study using appropriate data and estimation techniques which finds evidence for positive spillovers. All other studies using panel data find either negative or no statistically significant effects.

Various explanations have been put forward to explain negative results. For example, the presence of foreign firms could reduce productivity of domestic firms through competition effects, as pointed out by Aitken and Harrison (1999). Since foreign firms can be assumed to possess firm-specific assets that allow them to use a superior production technology, they may have lower marginal cost than a domestic competitor and can attract demand away from domestic firms. This will force domestic firms to reduce production and move up their average cost curve. However, it should be acknowledged that such “product market competition” is unlikely to be an important factor for domestic firms in host countries where multinationals are primarily export oriented and competition with domestic firms is limited or non-existent. Barry et al. (2001) argue that Ireland is such an example.⁷ They postulate, however, that there can be competition on labour markets between domestic firms and multinationals, in particular for skilled labour in short supply. As multinationals enter the host country they increase demand for skilled labour, driving up the wage rate and therefore “crowding out” domestic firms. Barry et al find evidence for negative spillovers from multinationals which they argue supports this conjecture.

⁷ Even for those domestic firms that do export, export destinations are quite different for multinationals and domestic firms.

There are two types of explanations for why one may fail to find any evidence for productivity spillovers. Firstly, one could argue that theory should lead us in this direction on the grounds that MNEs guard their firm specific advantages closely and prevent any leakage to domestic firms. In the absence of technology spillovers from multinationals the only channel through which domestic firms can improve their productivity if multinationals are present is through competitive pressure which forces them to adopt more efficient production techniques. Such competition, however, may also lead to negative effects on domestic productivity in the short run, as pointed out above, which could cancel out any positive effects of competitive pressure or limited technology spillovers through leakage from foreign MNEs.

The second argument asserts that positive spillovers only affect a certain group of firms and aggregate studies, therefore, underestimate the true significance of such effects. For example, Kokko, Zejan and Tansini (2001) argue that the nature and magnitude of productivity spillovers depend on the trade regime in the host country. If multinationals locate in a country with an import-substituting trade regime they will be in competition with domestic firms. To compete profitably they have to bring with them their technological advantages which, through contacts with domestic firms, may spill over. On the other hand, if multinationals establish in an export promoting host country the points of contacts between domestic and multinationals firms are far less. Multinationals are more likely to rely on skills in international marketing or distribution networks rather than production technologies implying that there is less potential for productivity spillovers.⁸ Kokko et al. provide evidence for Uruguay consistent with this view. They show that there is evidence for positive productivity spillovers only from multinationals which located in Uruguay during the import substituting trade regime, and no evidence for spillovers of export oriented multinationals.

Kokko, Tansini and Zejan (1996) hypothesise that domestic firms can only benefit from spillovers if the technology gap between the multinational and the domestic firm is not too

wide so that domestic firms can absorb the knowledge available from the multinational.⁹ Thus domestic firms using very backward production technology and low skilled workers may be unable to learn from multinationals and therefore no spillovers occur. Kokko et al find evidence for productivity spillovers only to domestic firms with moderate technology gaps *vis-à-vis* foreign firms but not for firms which use considerably lower levels of technology.

We now turn to reviewing papers on productivity spillovers in more detail.¹⁰ One should keep in mind, however, that many of these papers use cross-sectional data and the results should therefore be treated with caution.

3.2 Developing countries

There have been a number of papers (Blomström and Persson, 1983, Blomström, 1986, Blomström and Wolff, 1994, Kokko, 1994, 1996) investigating productivity spillovers from MNEs in Mexico. All use industry level cross sectional data for the 1970s although they are different in that they look at various aspects of productivity spillovers. Blomström and Persson (1983) and Blomström and Wolff (1994) examine whether there is evidence that, on average, there are productivity spillovers. Blomström (1986) attempts to determine the sources. He finds that the rate of technological progress in the host country is not related to the entry of multinationals, suggesting that the transfer of technology does not appear to be the mechanism through which productivity spillovers work. He concludes that the competitive pressure from MNEs on domestic firms is likely to be the most important channel for productivity spillovers.

Using the theoretical model of Wang and Blomström (1992), Kokko (1996) argues that competition between the indigenous and multinational firms should have two effects. Firstly, productivity in both types of firms should be jointly determined. Secondly,

⁸ In the case of export oriented multinationals there is, however, a potential for export spillovers, i.e., domestic firms can improve their export performance through learning from foreign firms' experience, as discussed in more detail below.

⁹ This argument is thus similar to the point made in the theoretical literature by Glass and Saggi (1998) as reviewed above.

¹⁰ Given the surge in papers on productivity spillovers recently it is likely that this survey misses out on papers, in particular most recent ones which are not published yet.

productivity in multinationals should positively affect domestic firms' productivity, and vice versa. Estimating simultaneous equations for domestic firms' and MNEs' productivity, Kokko finds evidence for both effects suggesting that competition is indeed an important channel for spillovers. In an earlier paper, Kokko (1994) advances the idea that spillovers depend on the complexity of the technology transferred by multinationals, and the technology gap between domestic firms and MNEs and finds no evidence for spillovers in industries where multinationals use highly complex technologies (as proxied by either large payments on patents or high capital intensity). A large technology gap *per se* does not appear to hinder technology spillovers on average, although industries with large technology gaps and a high foreign presence experience lower spillovers than other industries. Kokko argues that these industries show many of the characteristics of being "enclaves" where multinationals have little interaction with domestic firms and, hence, there is little scope for spillovers. By contrast, Sjöholm (1999a) finds that, in Indonesian manufacturing industries, productivity spillovers from foreign to domestic firms are larger the larger the technology gap between those groups of firms and the higher the degree of competition in the industry.

Blomström and Sjöholm (1999) argue that the magnitude of spillovers may differ with the degree of ownership of the multinationals. They contend that multinationals which are only minority owned by foreign owners may offer more potential for spillovers as the local partner can get into closer contact with the technology and may also be more willing to share it with other domestic firms. Also, joint ventures provide better scope for spillovers for the same reasons. In their empirical analysis of cross-sectional data for Indonesian manufacturing, however, they fail to find evidence to support their conjecture.

The geographic nature of spillovers has also been investigated for some developing countries. Calculating proxies for foreign presence at the regional level, Sjöholm (1999b) using cross-sectional data for Indonesia fails to find evidence that there is a regional component to spillovers. Aitken and Harrison (1999) using firm level panel data for Venezuela also fail to find positive spillovers from the presence of multinationals in a region on domestic firms in the same region, though they find negative spillovers from multinationals located in the same sector in any region in the country.

Two other studies for developing countries using firm level panel data also fail to find positive spillovers. Haddad and Harrison (1992) use data for Moroccan manufacturing industries. Estimating a variety of specifications they find mostly statistically insignificant results on the spillovers coefficients. They also break up the sample into industries facing high or low levels of protection (measured by tariffs or quotas) but still fail to find significant evidence for spillovers. Kathuria (2000) analyses panel data for Indian manufacturing. Like Haddad and Harrison, Kathuria finds that the evidence for spillovers is weak. While the presence of foreign firms in the sector reduces domestic productivity the availability of foreign technical capital stock by other firms in the industry has a positive effect.

Kugler (2001) uses cointegration techniques to determine whether or not a relationship exists between capital accumulation by MNEs and domestic productivity in a sector. If there is such a relationship this is taken as evidence for productivity spillovers. This estimation framework allows him to distinguish between intra-industry and inter-industry spillovers. Using industry-level panel data for ten Colombian manufacturing sectors for the period 1974 to 1998 he finds widespread evidence for inter-industry linkages. However, only in one sector (machinery equipment) is there evidence of intra-industry spillovers.

3.2 Developed Countries

Among developed countries most work on intra-industry productivity spillovers has focused on the UK. Using industry level panel data Liu et al (2000) find evidence for positive productivity spillovers on UK owned firms. In particular, they find that spillovers are higher in industries in which the technology gap between foreign and domestic firms is small, i.e., where domestic firms have a high absorptive capacity. Estimation of a simultaneous equation model of domestic firms' and multinationals' productivity also suggests that competition between domestic and foreign firms is important.

Using cross section industry data for UK manufacturing, Driffield (2001) allows for spillovers through output and investment of multinationals by including a measure of sales and investment by MNEs in the sector in an equation of domestic productivity growth. Furthermore he includes R&D undertaken by foreign-owned firms in order to test for R&D or technology spillovers more generally. Finally, a proxy for competition through

multinationals, *viz*, foreign productivity is also included in the regression. Driffield's estimates show that there do not appear to be any sign of output, investment or R&D spillovers, but that domestic productivity growth is higher the higher is foreign productivity. This again suggests that competition with multinationals is an important mechanism by which domestic firms improve their productivity performance.

In a series of papers Girma, Greenaway and Wakelin (2001) and Girma and Wakelin (2000, 2001) use firm level panel data to re-examine the evidence for productivity spillovers in the UK. Girma et al find that there is no evidence for productivity spillovers on average, *i.e.*, under the assumption that spillovers are homogeneous across different types of domestic firms. They do find evidence for spillovers for firms in industries with high levels of import competition or skills. Spillovers are lower, however, the higher the productivity gap between the firm's productivity level and the industry frontier.¹¹ Girma and Wakelin (2000, 2001) examine whether there is a regional dimension. In their 2000 paper they find evidence for positive spillovers from FDI located in the same region and sector as domestic firms. However, they are only significant for firms that have a low technology gap *vis-à-vis* multinationals. Girma and Wakelin (2001) using a different estimation technique and data set find support for this earlier finding. Moreover, they qualify their earlier results through the new evidence which shows that the nationality of the FDI may also affect whether or not spillovers take place. In fact, their results suggest that spillovers are strongest from Japanese FDI while there do not appear to be any positive effects on domestic productivity from US investment. This is attributed to the latter being of generally older vintage using older more established production techniques than Japanese firms.

In a further study using plant-level data for the UK, Harris and Robinson (2001) examine the evidence by estimating productivity equations for twenty manufacturing sectors separately. They include three measures of spillovers, namely, foreign presence (measured as the proportion of capital in the industry owned by foreign firms) in the sector, foreign presence in the region (either in the same or other sectors) and foreign presence in upstream

¹¹ The industry frontier is measured as the 90th percentile total factor productivity of the industry.

and downstream industries as identified by input-output tables. The first measure is intended to capture “traditional” intra-industry spillovers, the second spillovers through agglomerations and the third inter-industry spillovers. Their results suggest that inter-industry spillovers are much more prevalent than either of the other two. None of the three is always positive, however; there is plenty of evidence for negative spillovers in many of the sectors.

Three recent studies investigate spillovers in geographically peripheral EU countries, namely Ireland, Spain and Greece. Barry et al (2001) find that, on average, there are strong negative spillovers from FDI on domestic productivity in Irish manufacturing industries attributed to competition between domestic firms and multinationals on labour markets. Barrios and Strobl (2001) find little evidence for any spillovers from MNEs in Spanish manufacturing. There is only evidence for positive spillovers from foreign presence to domestic exporters but not to non-exporters, which they interpret as evidence that absorptive capacity matters. They argue that exporting firms are more exposed to international competition and therefore likely to use higher technologies and more prone to benefit from positive spillovers than non-exporters. Dimelis and Louri (2001) using cross sectional data also conclude that Greek manufacturing firms benefit from productivity spillovers from multinationals, in particular from minority owned foreign MNEs. However, since they cannot control for time invariant unobserved effects in their cross-sectional estimation this result should be treated with caution.

3.4. Transition Countries

Djankov and Hoekman (2000) analyse firm level panel data for the Czech Republic and show that there are negative spillovers on domestic firms’ productivity from foreign presence if the latter is measured as the share of assets of firms with foreign direct investment and joint ventures. Excluding firms with joint ventures from the foreign presence variable and re-estimating the model they find that the spillover variable turns out to be statistically insignificant. However, their results certainly do not provide evidence for any positive productivity spillovers from multinationals located in the Czech Republic. Kinoshita (2001) also examines data for the Czech Republic and his results somewhat

qualify those of Djankov and Hoekman. Kinoshita also finds statistically insignificant effects of foreign presence on domestic productivity on average but positive spillovers for local firms that are R&D intensive. We can interpret this as evidence that absorptive capacity is important.

In line with the papers on the Czech Republic, Bosco (2001) using firm level panel data for Hungary also fails to find any statistically significant spillover effects from MNEs on domestic firms in the overall sample. Konings (2001) and Damijan et al (2001) examine the evidence for a number of transition countries using similar data, which allows them to compare results across countries. Konings analyses firm level data for Bulgaria, Romania and Poland and finds evidence for negative spillovers for the first two countries and no spillovers to domestic firms for the last. He interprets this as suggesting that negative competition effects outweighed any potential technology spillover effects.

Damijan et al (2001) is the most comprehensive study, in terms of country coverage, in the literature on productivity spillovers. They analyse firm level panel data for eight transition economies: Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Slovakia and Slovenia. Results for spillovers on average do not differ across countries, however: there is no statistically significant evidence for either positive or negative spillovers from MNEs to domestic firms, on average. Taking into account absorptive capacity through interacting the foreign presence variable with a firm's R&D expenditure yields some differences in results. For the Czech Republic and Poland, there is now evidence for negative spillovers which is in contrast to the findings by Kinoshita (2001), who finds positive spillovers for the Czech Republic once absorptive capacity is controlled for. Damijan et al (2001) only find positive spillovers for Romania when controlling for absorptive capacity. For all other countries, there is no evidence for productivity spillovers at all.

3.5. Wage spillovers

If there are positive productivity spillovers to domestic firms, firms increase productivity and, if at least some of this increase is due to increasing labour productivity, domestic firms will pay higher wages. Another field of empirical research on spillovers from MNEs has,

therefore, investigated the question as to whether the presence of multinationals leads to higher wages paid by domestic firms in the same sector.¹² Productivity spillovers are not the only channel for such so-called wage spillovers, however. Multinationals often pay higher wages than similar domestic firms in the host country, even after controlling for size and other firm and sectoral characteristics (Aitken, Harrison and Lipsey, 1996; Girma et al., 2001, Lipsey and Sjöholm, 2001). This is attributed to the multinationals' ownership of firm specific assets implying that they use higher levels of technology than domestic firms and, hence, pay higher wages. If multinationals and domestic firms use similar types of labour, domestic firms have to pay higher wages to attract workers. Wage spillovers can also be negative however, if there are negative productivity spillovers from multinationals.

Like empirical work on productivity spillovers, identifying wage spillovers usually involves estimating the determinants of the wage rate in domestic firms and including a measure of foreign presence (e.g. share of employment in foreign multinationals in the sector) as a covariate. Compared to the literature on productivity spillovers there have been relatively few papers analysing wage spillovers, perhaps due to the higher data requirements that have to be fulfilled in order to estimate the determinants of wages.

Table 3: Papers on wage spillovers

	Author(s)	Country	Year	Data	Aggregation	Result
1	Aitken et al (1996)	Mexico	1984-1990	Panel	Industry	-
		Venezuela	1977-1989	Panel	Industry	-
		US	1987	cs	industry	+
2	Girma et al (2001)	UK	1991-1996	Panel	Firm	?

¹² A related yet different issue is whether foreign direct investment contributes to the shift in labour demand towards skilled labour in the host country; see, for example, Feenstra and Hanson (1997), Figini and Görg (1999) and Blonigen and Slaughter (2001) for empirical analyses for Mexico, Ireland and the US, respectively.

3	Barry et al (2001)	Ireland	1990-1998	panel	firm	-
4	Sjöholm and Lipsey (2001)	Indonesia	1996	cs	firm	+

Notes: See Table 2

Table 3 sets out details of work on wages spillovers. Aitken et al (1996) analyse the effects of inward foreign direct investment on wages in domestic firms in Mexico, Venezuela and the US. They use industry level (four digit) data for manufacturing industries for 1984 to 1990 (Mexico), 1977 to 1989 (Venezuela) and 1987 (US).¹³ While they find positive effects from the presence of multinationals on wages in domestic firms in the US, their findings suggest that there are negative effects in the case of the first two countries.¹⁴ As with productivity spillovers, the result for the US should be treated with caution as it is obtained using cross sectional data where it is impossible to control for any sector specific effects that may bias the results. Lipsey and Sjöholm (2001) study the same effect for the Indonesian manufacturing sector using plant level data for 1996 and find that higher foreign presence in a sector leads to higher wages in domestic firms in the same sector. However, this result is again questionable due to the use of cross section data.

Girma et al. (2001) use firm level panel data for UK manufacturing for the period 1991 to 1996. They find that, on average, there is no effect of the presence of multinationals in a sector on the wage *level* in domestic firms but there is some weak evidence of a negative effect of foreign presence on domestic firms' wage *growth*. Barry et al. (2001) examine wage spillovers using plant level panel data for Irish manufacturing for the period 1990 to 1998 and find that, on average, there are unambiguously negative spillovers from foreign

¹³ While they have plant level data available for Mexico and Venezuela these are aggregated up in order to make them comparable to the US data where only industry level data are available. However, they reestimate their empirical models using the plant level data for the two countries and results are very similar to those obtained using industry level data.

¹⁴ These two specifications include sectoral dummies which control for unobserved sector specific effects.

presence on wages paid by domestic firms in the same sector. They attribute this to labour market crowding out effects.

3.6. Export spillovers

A third strand in the literature focuses on market access spillovers, whether multinationals or not, through their presumed better knowledge of global markets dissipate that knowledge to domestic firms and hence enable them to become more successful exporters. Domestic firms can be affected through three main channels (see Greenaway, Sousa and Wakelin, 2002). First, if multinationals have better access to information about foreign markets this can spill over to domestic firms through multinationals' export activities. This is referred to as export information externalities. Second, there are demonstration effects whereby domestic firms can learn the multinationals' superior production or management techniques, which in turn enable them to compete more successfully on export markets. Third, competition between domestic firms and multinationals on both home and foreign markets can induce domestic firms to improve and expand their export performance.

Work completed thus far on export spillovers is summarised in Table 4. Aitken, Hanson and Harrison (1997) was the first to study the importance of market access spillovers from multinationals to domestic firms. They estimate a probit model and include a proxy for export information externalities, namely the export activity by multinationals in the industry and region, as a covariate.¹⁵ The model is estimated using plant level data for Mexican manufacturing industries for 1986 and 1989. They find that export activities of MNEs in a sector have positive effects on the probability of whether a firm in the same sector, either foreign or domestic, is an exporter.

¹⁵ This variable is calculated as “the share of state-industry MNE exports in national industry exports, relative to the state share of national manufacturing exports” (Aitken et al, 1997, p. 117).

Table 4: Papers on export spillovers

	Author(s)	Country	Year	Data	Aggregation	Result
1	Aitken et al (1997)	Mexico	1986/1989	cs	firm	+
2	Sousa et al (2000)	UK	1992-1996	Panel	firm	+
3	Barrios et al (2001b)	Spain	1990-1998	panel	firm	?
3	Kokko et al (2001)	Uruguay	1998	cs	Firm	?

Notes: See Table 2

Using firm level panel data for the UK for the period 1992 to 1996, Greenaway et al. (2002) also investigate whether spillovers affect a firm's probability of exporting but extend the analysis to examining what affects a firm's export ratio, given that the firm decides to export. These two effects are examined by estimating a two-step Heckman selection model which, in the first step estimates the probability of exporting and, in the second, estimates the factors that affect a firm's export ratio, taking into account the sample selection mechanism given by the export decision equation. They include in both steps three measures of multinational presence to capture the three spillover channels discussed above. Firstly, they include MNEs' export activities in the industry to capture export information externalities. Secondly, MNEs' R&D activities in the sector are included as a proxy for demonstration effects while, thirdly, the share of employment by MNEs in the sector is assumed to capture any competition effects. Due to strong correlation between the variables capturing MNEs' export activities and MNE employment in the sector each of these two variables are only included in turn. Estimation results show that MNEs' exports have a positive effect on a domestic firm's probability of being an exporter but do not appear to impact on their export ratio. On the other hand, R&D spillovers from

multinationals to domestic firms and the presence of MNEs in the sector positively affect both the decision to export and the choice of export ratio. Thus, export information externalities appear to matter only for the decision of whether or not to export. This may not come as a surprise as these externalities can be expected to aid domestic firms in overcoming the sunk costs of exporting (e.g. cost of obtaining information about foreign markets, establishing contacts etc.) which should affect their probability of exporting but not their export ratio.

Barrios, Görg and Strobl (2001b) also focus on the role of export information externalities versus demonstration effects through R&D spillovers from multinationals. Using firm level panel data for Spanish manufacturing industries for 1990 to 1998 they estimate a probit model to explain why firms export and a tobit model to estimate what determines the firms export ratio, allowing for the truncated nature of the dependent variable in that case. In their estimations they find no evidence for any effects of either R&D activity or export activity by multinationals in a sector on the probability that domestic firms export, although they find spillovers from both types of activity on other foreign-owned firms. The tobit estimations, however, indicate that there is evidence for positive effects of multinationals' R&D activity on domestic firms' export ratios, while they again fail to detect any spillovers from MNEs export activities on domestic firms. Other foreign firms, again, benefit from both types of spillovers in terms of their export ratios as well. In an interesting extension Barrios et al. discover that R&D spillovers only increase domestic firms' exports to other EU/OECD countries but not to other countries. Thus domestic firms learn from multinationals in order to increase their exports to other developed countries which are generally markets with a superior technological capability.

Kokko et al (2001) also investigate the effect of spillovers from MNEs on the decision to export by domestic firms in Uruguay using cross-sectional firm level data for 1998. They include only a simple measure of the presence of multinationals (not export activity) in terms of the output share of MNEs in an industry and it is, thus, not clear through which channel the presence of multinationals is supposed to lead to spillovers. However, they distinguish between multinational presence in import-substituting industries and in export-orientated industries and find that there is only evidence for spillovers from the latter group

of multinationals. This suggests that the type of trade regime within which multinationals operate may determine their potential for generating positive export spillovers.¹⁶

¹⁶ Recall, however, that in the same paper Kokko et al. find that domestic firms benefit from productivity spillovers only from import-substituting multinationals (although this result was obtained using cross sectional data and may therefore be biased).

3.7. Summary

As we have seen, there is an extensive array of empirical studies that have searched for evidence of intra-industry spillovers of various forms, most commonly productivity spillovers. Most of this work in the past has relied upon cross-section methods. With the growing availability of longitudinal data at the plant and firm level, however, more and more analysts are using panel techniques. This is a very helpful development for two reasons: first because the plant/firm is the most appropriate level of scrutiny in searching for spillovers; second, there are several methodological shortcomings associated with applying cross-section techniques to this issue.

Overall, only limited evidence in support of positive spillovers has been reported. Most work fails to find positive spillovers, with some even reporting negative spillovers, at the aggregate level. Evidence on wages and export spillovers is also mixed. Studies that further disaggregate data find, however, that there is some evidence for spillovers on firms that have a certain level of “absorptive capacity”. Further work is needed in order to determine the factors that allow domestic firms to build up such absorptive capacity through, for example, access to finance for investments, human capital, and management expertise.

4. Is there a role for policy

4.1. Context

Despite extensive research, the precise determinants of economic growth remain far from settled, both in theory and in the empirical literature. However, one driver which 'old' and 'new' growth theory persistently identifies as important is investment. Moreover, as Levine and Renelt (1992) showed, this is also one of the few explanatory variables which is genuinely robust across growth models in empirical analyses. Even if they are not familiar with the detail of empirical research, most policy makers in most settings understand this and see investment promotion as a priority.

In general, FDI would be seen by most governments as having the potential to impact on TFP to an even greater extent than an equivalent amount of indigenous investment. The reason for this is a belief that foreign firms are more likely to be bringing with them “best practice” or “better practice” technology and/or management than those available to domestic firms. This would be taken as axiomatic in developing and transitional economies

and, depending on the origin of the MNE, also in at least some developed countries. Add to this potential spillovers from MNEs to domestic firms which are believed to raise their productivity, thereby yielding a second growth bonus, and it becomes clear why attracting inward investment figures so prominently in the list of policy priorities of so many governments.

This leads naturally to three questions:

- Can active policy intervention influence the level and composition of inward investment?
- Can particular policies maximise the potential for spillovers?
- Do targeted policies yield net benefits?

4.2. Policy, level and composition of FDI

The role of policy in influencing the level and composition of FDI has been reviewed extensively (see, for example, Balasubramanyam and Salisu 2001, Pain 2000). Most of this work relates to developing countries probably because, in general, policy has been more active, though a growing volume of research relates to industrialised countries, where of course most FDI originates and is located. The key points that seem to emerge from this body of work are:

- i) Trade policy is a relevant factor. In general, economies with more open trade regimes have done better at attracting FDI and benefiting from it than countries with inward oriented regimes. This is partly a reflection of the fact that more FDI is of the export seeking than classic 'tariff jumping' variety (see Balasubramanyam, Salisu and Sapsford, 1996).
- ii) While there is some evidence that investment incentives can affect the location choice of multinationals the effect appears to be small (Coughlin, Terza and Arromdee, 1991; Head, Ries and Swenson, 2001). Head et al. (2001) even argue that competition between host governments to attract FDI may render incentives ineffective as they offset each other. Also, this form of competition for FDI may have impacted on the distribution of incentives and is highly likely to have redistributed income from host countries to FDI's (Haaland and Wooton, 1999).
- iii) Trade related investment measures (TRIMs), like local content requirements and minimum export requirements, are often introduced as a device to recapture some of

the rents which accrue to MNEs. Although they can have positive welfare effects on the host country, the evidence does not point to major effects on levels of inward investment in developing countries (see Greenaway, 1992).

- iv) The quality of local infrastructure is vitally important, in particular communication and transportation facilities, both in attracting initial investments and in sustaining clusters (Coughlin et al., 1991; Coughlin and Segev, 2000).
- v) Availability of a ready supply of relatively skilled labour is an important magnet to inward investment (Coughlin and Segen, 2000) as well as a key driver of agglomeration (Ottaviano and Puga, 1998).
- vi) It has also been argued that host countries are more likely to benefit from spillovers if they have a large supply of skilled labour (Keller, 1996) and if domestic firms have a high level of technological capacity (Glass and Saggi, 1998).

Overall, therefore, the evidence would seem to suggest that, in general, intervention should be targeted largely at providing a supportive economic environment. More specifically, this flags up the role for education and training policies aimed at upgrading general skills; technology policies aimed at developing clusters; public investment policies aimed at developing efficient and reliable transportation and communication networks.

4.3. Policy and spillovers

The evidence on spillovers reported in Section 3 is not encouraging in the sense that it suggests that whether one takes developing, developed or transitional economies, little evidence in support of the presence of spillovers has as yet been reported. This could be due to (one or more of) a number of factors. First, despite theoretical arguments pointing to their possible existence, they may simply be unimportant in reality. In practice, MNEs may be very effective at ensuring their firm specific assets and advantages do not spill over, thereby eroding their competitive advantage. This is plausible, as MNEs have a strong incentive to minimise spillovers. A second possibility is that spillovers do indeed exist and are some part of the 'residual' which appears in all growth equations but we have simply failed to develop the statistical methods and/or do not have the datasets to identify them. This too is plausible. As we saw earlier, Görg and Strobl (2001) have shown that there are convincing methodological reasons for mistrusting much of the evidence reported so far. Moreover, the lack of good quality, comprehensive firm/plant level datasets is a serious impediment to research and it is at this level that we should be searching for evidence.

If we take the most 'optimistic' view, i.e. that spillovers are impacting but we simply do not have fine enough measurement instruments to identify them, we can ask the question: are there policies governments can implement to maximise the prospects of extracting spillover benefits from MNEs? In addressing this issue, we first of all need to distinguish between general and specific policies. The former refer to policies designed to change the environment within which multinationals operate. These include industrial policy, infrastructure development, the orientation of trade policy, exchange rate policy and so on. These we have already mentioned above, since there is evidence to suggest that they are related to the *overall* level of inward investment into an economy over a given period of time. We mention them again here because they may turn out to be the most effective devices for raising the probability of positive spillovers occurring. If, for example, absorptive capacity is the critical driver, education and training policy is likely to be key to facilitating spillovers. We will return to this later, once we have discussed specific policies.

There are a range of investment specific policies which are grouped under the label of trade related investment measures, or TRIMs, many of which are targeted at encouraging spillovers. Table 5 sets out an illustrative list of input and output TRIMs and their intended effects. Local content requirements, which are widely used, are intended to raise the share of local value added in subsidiary production and in the process encourage upstream development, with the intention of stimulating inter-industry spillovers. As we saw earlier, one could argue that spillovers are more likely if there is some local ownership, which is what local equity requirements are geared to achieve. Local hiring targets/expatriate quotas are intended to raise the share of total employment accounted for locally, with a view to encouraging spillovers through the transfer of human capital. R and D and technology transfer requirements are intended to have MNEs commit to some minimum level of R and D expenditures and/or transfer technology to local firms.

Table 5: TRIMs Targetted at Spillovers

Instrument	Intended effect
<i>Input TRIMs</i>	
Local content requirements	Specify that some proportion of value added or intermediate inputs is locally sourced.
Local equity participation	Specifies that some proportion of the equity must be held locally.
Local hiring targets	Ensure specified employment targets are hit.
Expatriate quotas	Specify a maximum number of expatriate staff.
National participation in management	Specifies that certain staff must be nationals or sets a schedule for the 'indigenisation' of the management.
R&D requirements	Commit multinationals to investment in research and development.
Technology transfer	Commits multinationals to local use of specified foreign technology.
<i>Output TRIMs</i>	
Export controls	Specify that certain products may not be exported.
Licensing requirements	Oblige the investor to license production of output in the host country.
Technology transfer	Commits multinationals to a specified embodied technology.

Derived from Greenaway (1992).

Until the Uruguay Round of multilateral trade negotiations, TRIMs were either legal or extra-legal and as a consequence proliferated in developing countries. The Uruguay Round Agreements proscribed the use of a number of instruments as well as laying out a range of reporting requirements. In addition, they placed an obligation to phase out certain TRIMs (those which violate Articles III and XI of the GATT), with local content requirements being the most prominent in Table 5. The key issue from the standpoint of this paper is whether they work.

The economics of TRIMs is not straightforward. In general they are second best measures. For example, analytically a local content requirement is equivalent to an input tariff, though the latter is more efficient. The same can be said of other TRIMs: as one would anticipate

from optimal intervention analysis, there are generally less distorting forms of intervention. With regard to spillovers more specifically, what little work has so far been completed has failed to establish a direct link between their presence and the transfer of useful technologies (see Blomström et al 1994, Greenaway 1992). This appears to be because many of the measures are difficult to specify precisely and difficult to monitor. But it is also because the more general policies referred to above are in practise rather more important.

5. Conclusions

Foreign direct investment is a key driver of economic growth and economic development. Most governments regard attracting FDI as a priority, particularly in developing and transitional economies. It is given such emphasis not just because it boosts capital formation but because it has the potential to enhance the quality of the capital stock. The reason for this is that in general multinationals are assumed to bring with them best practice or, as a minimum, better practice technology and management. Moreover, it is possible, perhaps even probable, that a given MNE will not be able to protect its superior technology/management fully and present some elements being absorbed by indigenous firms. If spillovers occur, they provide an external benefit from FDI, one that governments are hoping to secure when they offer inducements to attract inward investment.

In this paper we have reviewed the theoretical reasons why spillovers may occur, then surveyed the empirical evidence of their presence. Theory does point to several reasons why one might expect them to arise but finding hard empirical evidence to support their existence is more difficult. In fact, the evidence in support of positive spillovers is rather limited. Conceivably, this indicates that they are in fact illusory in that MNEs are extremely effective when it comes to protecting their assets. The other possibility is that we are looking in the wrong place and with the wrong microscope. With regard to the former, as we have seen, a great many studies are at the industry/sector level rather than the firm/plant level. As theory suggests, it is at that level that we should be focusing. With the growing availability of firm and plant level survey information, this is improving. With regard to methodology, most studies are cross section in their approach when what is required is a panel based methodology. As we have seen, this too is improving as panel

methods improve and as the data they rely upon improves. Since the stock of serious research on disaggregated data with both cross-section and longitudinal variation is still somewhat limited, the message is clear: more systematic research is needed. More discriminating work is also required, analysis which probes whether form of entry (greenfield or acquisition), ownership characteristics, corporate governance and so on matter.

The consensus from the literature on policy is so far also clear: 'general' policies aimed at altering the fundamentals are more important than specific policies geared to particular investments. The latter seem to affect primarily the distribution of rents. On the one hand, governments compete in offering investment incentives and in the process dissipate rents to MNEs. On the other hand, they then use (at least some) TRIMs to try to reclaim some of those rents. Both econometric evidence and survey/case study work suggests that in general the characteristics of the economic environment are much more important: infrastructure, local labour market conditions, reliability of communications systems and so on, as well as the overall macroeconomic and trade policy climate. That, of course, does not mean that selective interventions will cease to be extensively deployed. Governments will no doubt continue to see opportunities for targeted measures and MNEs will stand willing to accept them. This too is therefore an area for potential future work. We know very little about the comparative impact of alternative instruments.

References

- Aitken, Brian, Gordon H. Hanson and Ann E. Harrison (1997): "Spillovers, foreign investment, and export behavior", *Journal of International Economics*, Vol. 43, pp. 103-132.
- Aitken, Brian J. and Ann E. Harrison (1999): "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela". *American Economic Review*, Vol. 89, pp. 605-618.
- Aitken, Brian, Ann Harrison and Robert E. Lipsey (1996): "Wages and foreign ownership: a comparative study of Mexico, Venezuela, and the United States", *Journal of International Economics*, Vol. 40, pp. 345-371.
- Balasubramanyam, V.N. and Mohammed Salisu (2001): 'Foreign Direct Investment and Globalisation' in S. Lahiri (ed.) *Regionalism and Globalisation*, London, Routledge.
- Balasubramanyam, V.N., David Sapsford and Mohammed Salisu (1996): 'Foreign Direct Investment and Growth in EP and IS Countries', *Economic Journal*, Vol. 106, pp.92-105.
- Barrios, Salvador and Eric Strobl (2001): "Foreign Direct Investment and Productivity Spillovers: Evidence from the Spanish Experience", mimeo, CORE Catholic University of Louvain-la-Neuve.
- Barrios, Salvador, Holger Görg and Eric Strobl (2001a): "Multinational Enterprises and New Trade Theory: Evidence for the Convergence Hypothesis". CEPR Discussion Paper DP2827.
- Barrios, Salvador, Holger Görg and Eric Strobl (2001b): "Explaining Firms' Export Behaviour: The Role of R&D and Spillovers". GEP Research Paper 01/27, University of Nottingham.

Barry, Frank; Holger Görg and Eric Strobl (2001): "Foreign Direct Investment and Wages in Domestic Firms: Productivity Spillovers vs Labour-Market Crowding Out", mimeo, University College Dublin and University of Nottingham.

Bernard, Andrew and J. Bradford Jensen (1999): "Exceptional Exporter Performance: Cause, Effect or Both?". *Journal of International Economics*, Vol. 47, pp. 1-26.

Bernard, Andrew and Joachim Wagner (1997): "Exports and Success in German Manufacturing". *Weltwirtschaftliches Archiv*, Vol. 133, pp. 134-157.

Blomström, Magnus (1986): "Foreign Investment and Productive Efficiency: The Case of Mexico". *Journal of Industrial Economics*, Vol. 35, pp. 97-112.

Blomström, Magnus and Ari Kokko (1998): "Multinational Corporations and Spillovers". *Journal of Economic Surveys*, Vol. 12, pp. 247-277.

Blomström, M., A. Kokko and M. Zejan (1994): "Host Country Competition, Labor Skills, and Technology Transfer by Multinationals", *Weltwirtschaftliches Archiv*.

Blomström, Magnus and Håkan Persson (1983): "Foreign Investment and Spillover Efficiency in an Underdeveloped Economy: Evidence from the Mexican Manufacturing Industry". *World Development*, Vol. 11, pp. 493-501.

Blomström, Magnus and Fredrik Sjöholm (1999): "Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter?". *European Economic Review*, Vol. 43, pp. 915-923.

Blomström, Magnus and Edward N. Wolff (1994): "Multinational Corporations and Productive Convergence in Mexico". In Baumol, William J., Richard R. Nelson and Edward N. Wolff (eds.): *Convergence of Productivity: Cross National Studies and Historical Evidence*. Oxford: Oxford University Press, pp. 263-283.

- Blonigen, Bruce A. and Matthew J. Slaughter (2001): "Foreign-affiliate activity and U.S. skill upgrading", *Review of Economics and Statistics*, Vol. 83, pp. 362-376.
- Bosco, Maria Giovanna (2001): "Does FDI Contribute to Technological Spillovers and Growth? A Panel Data Analysis of Hungarian Firms", *Transnational Corporations*, Vol. 10, pp. 43-68.
- Caves, Richard E. (1974): "Multinational Firms, Competition, and Productivity in Host-Country Markets". *Economica*, Vol. 41, pp. 176-193
- Caves, Richard E. (1996): *Multinational Enterprise and Economic Analysis*. Second Edition. Cambridge: Cambridge University Press.
- Chen, E.K.Y. (1983): *Multinational Corporations, Technology and Employment*. Macmillan, London.
- Chuang, Yih-Chyi and Chi-Mei Lin (1999): "Foreign Direct Investment, R&D and Spillover Efficiency: Evidence from Taiwan's Manufacturing Firms". *Journal of Development Studies*. Vol. 35, pp. 117-137.
- Coughlin, Cletus C. and Eran Segev (2000): "Location Determinants of New Foreign-Owned Manufacturing Plants", *Journal of Regional Science*, Vol. 40, pp. 323-351.
- Coughlin, Cletus C.; Joseph V. Terza and Vachira Arromdee (1991): "State Characteristics and the Location of Foreign Direct Investment within the United States", *Review of Economics and Statistics*, Vol. 73, pp. 675-683.
- Damijan, Joze P.; Boris Majcen, Mark Knell and Matija Rojec (2001): "The Role of FDI, Absorptive Capacity and Trade in Transferring Technology to Transition Countries: Evidence from Firm Panel Data for Eight Transition Countries", mimeo, UN Economic Commission for Europe, Geneva.

- Das, Sanghamitra (1987): "Externalities, and Technology Transfer through Multinational Corporations: A Theoretical Analysis", *Journal of International Economics*, Vol. 22, pp. 171-182.
- Davidson, Carl and Steven Matusz (2000): "Globalization and Labour Market Adjustment: How Fast and at What Cost?". *Oxford Review of Economic Policy*, Vol. 16, pp. 42-56.
- Dimelis, Sophia and Helen Louri (2001): "Foreign Direct Investment and Efficiency Benefits: A Conditional Quantile Analysis", CEPR Discussion Paper DP2868.
- Djankov, Simeon and Bernard Hoekman (2000): "Foreign Investment and Productivity Growth in Czech Enterprises". *World Bank Economic Review*, Vol. 14, pp. 49-64.
- Driffield, Nigel (2001): "The Impact on Domestic Productivity of Inward Investment in the UK". *Manchester School*, Vol. 69, pp. 103-119.
- Edwards, Sebastian (2000): 'Contagion', *The World Economy*, Vol. 23, no. 7, pp.873-900.
- Feenstra, Robert C. and Gordon H. Hanson (1997): "Foreign direct investment and relative wages: evidence from Mexico's maquiladoras", *Journal of International Economics*, Vol. 42, pp. 371-393.
- Figini, Paolo and Holger Görg (1999): "Multinational companies and wage inequality in the host country: the case of Ireland", *Weltwirtschaftliches Archiv*, Vol. 135, pp. 594-612.
- Findlay, Ronald (1978): "Relative Backwardness, Direct Foreign Investment, and the Transfer of Technology: A Simple Dynamic Model", *Quarterly Journal of Economics*, Vol. 92, pp. 1-16.
- Fosfuri, Andrea; Massimo Motta and Thomas Ronde (2001): "Foreign Direct Investment and Spillovers Through Workers' Mobility", *Journal of International Economics*, Vol. 53, pp. 205-222.

Girma, Sourafel (2001): "The Process of European Integration and the Determinants of Entry by Non-EU Multinationals in UK Manufacturing", GEP Research Paper 01/20, University of Nottingham.

Girma, Sourafel; David Greenaway and Katharine Wakelin (2001): "Who benefits from Foreign Direct Investment in the UK?". *Scottish Journal of Political Economy*, Vol. 48, pp. 119-133.

Girma, Sourafel; David Greenaway and Richard Kneller (2002): "Exports and Productivity", forthcoming as GEP Research Paper, University of Nottingham.

Girma, Sourafel and Katharine Wakelin (2000): "Are there Regional Spillovers from FDI in the UK?". GEP Research Paper 00/16, University of Nottingham.

Girma, Sourafel and Katharine Wakelin (2001): "Regional Underdevelopment: Is FDI the Solution? A Semiparametric Analysis". GEP Research Paper 01/11, University of Nottingham.

Glass, A. and K. Saggi (1998): "Multinational Firms and Technology Transfer". Ohio State University Working Paper 97-04.

Globerman, Steven (1979): "Foreign Direct Investment and 'Spillover' Efficiency Benefits in Canadian Manufacturing Industries". *Canadian Journal of Economics*, Vol. 12, pp. 42-56.

Görg, Holger and Eric Strobl (2000): "Multinational Companies, Technology Spillovers and Firm Survival: Evidence from Irish Manufacturing". GEP Research Paper 00/12, University of Nottingham.

Görg, Holger and Eric Strobl (2001): "Multinational Companies and Productivity Spillovers: A Meta-analysis". *Economic Journal*, Vol. 111, pp. F723-F739.

Greenaway, David (1992): "Trade Related Investment Measures and Development Strategy, *Kyklos*, Vol. 45, pp. 139-160.

Greenaway, David, Nuno Sousa and Katharine Wakelin (2002 forthcoming): "Do Indigenous Firms Learn to Export from Multinationals?", mimeo, University of Nottingham.

Haacker, M. (1999): "Spillovers from Foreign Direct Investment Through Labour Turnover: the Supply of Management Skills". CEP Discussion Paper, London School of Economics.

Haddad, Mona and Harrison, Ann (1993): "Are there Positive Spillovers from Direct Foreign Investment? Evidence from Panel Data for Morocco". *Journal of Development Economics*, Vol. 42, pp. 51-74.

Haaland, Jan I. and Ian Wooton (1999): "International Competition for Multinational Investment", *Scandinavian Journal of Economics*, Vol. 101, pp. 631-649.

Harris, Richard and Catherine Robinson (2001): "Spillovers from Foreign Ownership in the United Kingdom: Estimates for UK Manufacturing Using the ARD", mimeo, University of Durham and University of Portsmouth.

Head, Keith C.; John C. Ries and Deborah L. Swenson (2000): "Attracting Foreign Manufacturing: Investment Promotion and Agglomeration", *Regional Science and Urban Economics*, Vol. 29, pp. 197-218.

International Labour Organisation (1981): *Multinationals' Training Practices and Development*. Geneva, ILO.

Kathuria, Vinish (2000): "Productivity Spillovers from Technology Transfer to Indian Manufacturing Firms". *Journal of International Development*, Vol. 12, pp. 343-369.

Keller, Wolfgang (1996): "Absorptive Capacity: Understanding the Creation and Acquisition of Technology in Development", *Journal of Development Economics*, Vol. 49, pp. 199-227.

Kinoshita, Yuko (2001): "R&D and Technology Spillovers through FDI: Innovation and Absorptive Capacity". CEPR Discussion Paper DP2775.

- Kokko, Ari (1994): "Technology, Market Characteristics, and Spillovers". *Journal of Development Economics*, Vol. 43, p. 279-293.
- Kokko, Ari (1996): "Productivity Spillovers from Competition between Local Firms and Foreign Affiliates". *Journal of International Development*, Vol. 8, pp. 517-530.
- Kokko, Ari; Ruben Tansini and Mario C. Zejan (1996): "Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector". *Journal of Development Studies*, Vol. 32, pp. 602-611.
- Kokko, Ari; Mario Zejan and Ruben Tansini (2001): "Trade Regimes and Spillover Effects of FDI: Evidence from Uruguay". *Weltwirtschaftliches Archiv*, Vol. 137, pp. 124-149.
- Konings, Jozef (2001): "The Effects of Foreign Direct Investment on Domestic Firms: Evidence from Firm Level Panel Data in Emerging Economies". CEPR Discussion Paper DP2586.
- Krugman, Paul R. (1991): *Geography and Trade*. Cambridge, MA: MIT Press.
- Kugler, Maurice (2001): "The Diffusion of Externalities from Foreign Direct Investment: The Sectoral Pattern of Technological Spillovers", mimeo, University of Southampton.
- Levine, Ross and David Renelt (1992) "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, Vol. 82, pp.946-963.
- Lipsey, Robert E. and Fredrik Sjöholm (2001): "Foreign Direct Investment and Wages in Indonesian Manufacturing", NBER Working Paper
- Liu, Xiaming; Pamela Siler, Chengqi Wang and Yingqi Wei (2000): "Productivity Spillovers from Foreign Direct Investment: Evidence from UK Industry Level Panel Data". *Journal of International Business Studies*, Vol. 31, pp. 407-425.

- Markusen, James R. (1995): "The Boundaries of Multinational Enterprises and the Theory of International Trade". *Journal of Economic Perspectives*. Vol. 9. pp. 169-189.
- Matusz, Steven and David Tarr (2000): "Adjusting to Trade Policy Reform" in A.O. Krueger (ed.) *Economic Policy Reform*, Chicago, University of Chicago Press.
- McCulloch, Neil, Alan Witners and Xavier Cirera (2001): *Trade Liberalisation and Poverty: A Handbook*, London, CEPR.
- Pain, Nigel (ed.) (2000): *Inward Investment Technological Change and Growth*, London, Palgrave.
- Sjöholm, Fredrik (1999a): "Technology Gap, Competition and Spillovers from Direct Foreign Investment: Evidence from Establishment Data". *Journal of Development Studies*, Vol. 36, pp. 53-73.
- Sjöholm, Fredrik (1999b): "Productivity Growth in Indonesia: The Role of Regional Characteristics and Direct Foreign Investment". *Economic Development and Cultural Change*, Vol. 47, pp. 559-584.
- Wang, Jian-Ye and Magnus Blomström (1992): "Foreign Investment and Technology Transfer: A Simple Model", *European Economic Review*, Vol. 36, pp. 137-155.