

# **Determinant Factors of FDI Spillovers – What Do We Really Know?<sup>1</sup>**

**Nuno Crespo\* and Maria Paula Fontoura\***

**\* ISEG- Universidade Técnica de Lisboa**

**Abstract:** Empirical evidence about FDI spillovers to domestic firms has provided mixed results. This global evaluation has recently been complemented with the analysis of the factors that determine the existence, dimension and sign of FDI spillovers. We survey the arguments that support these factors and analyze the empirical evidence already produced. FDI spillovers depend on many factors, frequently with an indeterminate effect. Absorptive capacity of domestic firms and regions are a precondition for incorporating the benefits of FDI spillovers. Concerning the remaining factors, the results suggest opposite effects or, in some cases, are still insufficient to legitimate decisive conclusions.

**JEL Codes:** O12, F23.

**Keywords:** productivity, spillovers, FDI, determinant factors.

Corresponding Author:

Maria Paula Fontoura

Rua Miguel Lúpi, 20

1200-781 Lisboa, Portugal

[fontoura@iseg.utl.pt](mailto:fontoura@iseg.utl.pt)

# **Determinant Factors of FDI Spillovers - What Do We Really Know?**

## 1. Introduction

Foreign Direct Investment (FDI) is considered, in most countries, to be an important component of their development strategy, and policies are accordingly designed to stimulate inward flows. An important motivation for this interest is the possible existence of FDI spillovers, a concept that embodies the fact that MNEs (multinational enterprises) own technology<sup>2</sup> which can be transmitted to domestic firms and thereby raise their productivity level. The spread of productivity spillovers is thus a matter of externalities being transmitted from established foreign producers to domestic ones. Since the pioneering study of Caves (1974), the occurrence of FDI spillovers has been widely investigated. However, empirical evidence, as surveyed for instance by Meyer (2003) or Görg and Greenaway (2004), has provided mixed results.

Recently, there has been an effort to increase the knowledge about the factors that determine the existence, sign and magnitude of FDI spillovers. Perhaps the most important lesson to be learned from the existing studies is that we need to complement the “global evaluation” of whether FDI spillovers exist or not with a detailed analysis of “the different circumstances and policies of countries, industries and firms that promote or obstruct spillovers” (Lipsey, 2002, p. 32). A substantial body of work along these lines can already be extracted from the literature on the subject.

While previous surveys on this topic focused on the “global evaluation” of FDI spillovers, this paper provides a comprehensive description of the determinant factors of this phenomenon, both in terms of the arguments that have been proposed so far and the empirical evidence already produced.

The remainder of the paper is organized as follows: section 2 presents the channels through which domestic firms may benefit from FDI spillovers; section 3 analyzes the factors that determine these spillovers; section 4 focuses on the empirical evidence on this question; and section 5 concludes.

## 2. Channels of technological diffusion

FDI spillovers can occur through five main channels: demonstration/imitation, labor mobility, exports, competition and backward and forward linkages with domestic firms.

Demonstration (by MNEs)/imitation (by domestic firms) is probably the most evident spillover channel (Das, 1987; Wang and Blomström, 1992). The introduction of a new technology into a given market may be too expensive and risky for a domestic firm to undertake due to the costs inherent in acquiring its knowledge and the uncertainty of the results that may be obtained. If a technology is used successfully by a MNE, this will encourage domestic firms to adopt it. Obviously, the relevance of this effect increases with the similarity of the good produced by the two types of firms (Barrios and Strobl, 2002).

The second channel is related to the possibility of domestic firms hiring workers who, having previously worked for a MNE, know about the technology and are able to implement it in the domestic firm (Fosfuri et al., 2001; Glass and Saggi, 2002).<sup>3</sup> Nevertheless, it is important to stress a possible negative impact arising through this channel, as MNEs may attract the best workers from domestic firms by offering higher wages (Sinani and Meyer, 2004). The influence of this labor mobility on the efficiency of local firms is, however, difficult to evaluate as it involves tracking the workers in order to investigate their impact on the productivity of other workers (Saggi, 2002). It is not surprising, therefore, that there is a shortage of detailed studies in relation to this particular aspect.

Exports are a third channel through which the presence of MNEs may benefit domestic firms (Aitken et al., 1997; Greenaway et al., 2004). Several studies have highlighted the positive impact of MNEs on the export capacity of domestic firms (Rhee, 1990; Aitken et al., 1997; Kokko et al., 2001). Among other aspects, export activity involves costs associated with the establishment of distribution networks, transport infrastructures or knowledge of consumers' tastes in foreign markets (Greenaway et al., 2004), which MNEs are better able to afford. By following the export processes of foreign firms (through imitation or, in specific circumstances, through collaboration), domestic firms may reduce the costs of entry into the foreign market.<sup>4</sup> The gains obtained in this way may have favorable repercussions on the productive efficiency of domestic firms.

The increased competition induced by MNEs is a fourth channel of FDI spillovers (Wang and Blomström, 1992; Markusen and Venables, 1999). Competition in the

domestic economy between MNEs and domestic firms is an incentive for the latter to make a more efficient use of existing resources and technology or even to adopt new technologies; it may also restrict the market power of domestic firms.<sup>5</sup> However, the efficiency of domestic firms may also be negatively affected through this channel, as the presence of MNEs may imply significant losses of their market shares, forcing them to operate on a less efficient scale, with a consequent increase in their average costs (Harrison, 1994; Aitken and Harrison, 1999).

A final channel concerns the relationships that domestic firms establish in local markets with MNEs as their suppliers (backward linkages) or customers of intermediate inputs (forward linkages)<sup>6</sup> as pointed out, for instance, by Lall (1980), and formalized by Rodríguez-Clare (1996), Markusen and Venables (1999) or Lin and Saggi (2004).

Let us firstly consider the case of backward linkages. With increasing returns to scale, the presence of MNEs may benefit domestic suppliers if it increases the demand for local inputs. In their attempts to assure a certain quality pattern, MNEs may also benefit domestic suppliers in several ways: providing technical support for the improvement of the quality of goods or for the introduction of innovations, through labor training for instance; providing support for the creation of productive infrastructures and for the acquisition of raw materials, as well as support at the organizational and management levels, among other aspects (Lall, 1980). We should also consider the possible increase in the efficiency of domestic firms brought about by the competition among them to become MNE suppliers. Furthermore, Matouschek (1999) considers that the benefits for domestic suppliers resulting from the presence of MNEs may be extended to other domestic firms that produce end-user consumer goods.

As far as the channel of forward linkages is concerned, the most evident link consists in the MNEs' supply of a higher quality inputs and/or at a lower price to domestic producers of end-user consumer goods (Markusen and Venables, 1999). Nevertheless, it is not possible to exclude the fact that the upgrade of production quality may lead to an increase in prices. If domestic firms do not have the capacity to benefit from this upgrade of quality, they will suffer the negative effects associated with increased costs (Javorcik, 2004b).

This short summary of the spillover channels clearly shows the existence of several, and frequently opposite, effects, making it difficult to formulate a clear expectation as to their global impact. Besides, "it is (...) difficult to distinguish one from

the other since the mechanism of technology spillovers from FDI is complex and often interdependent” (Kinoshita, 2001, p. 5).

### 3. Determinant factors of FDI spillovers - the main arguments

Recently, empirical studies have shown that the existence, sign and magnitude of FDI spillovers to domestic firms depend on a multiplicity of factors related to the characteristics of the MNEs and of foreign investment, as well as on the characteristics of the host countries, sectors and firms. In this section, we summarize the several factors that have so far been taken into consideration.

The factor that has been analyzed in most detail is the absorptive capacity of domestic firms, together with the influence of the technological gap between foreign and domestic firms. Using the definition of Narula and Marin (2003), “absorptive capacity includes the ability to internalize knowledge created by others and modifying it to fit their own specific applications, processes and routines” (Narula and Marin, 2003, p. 23). It is maintained that there must exist some technological gap between the two groups of firms for spillovers to occur. If the technological gap is too low, MNEs will transmit few benefits to the domestic firms (Kokko, 1994). According to some authors – following Gerschenkron (1962) – the magnitude of FDI spillovers will increase with the technological gap, as it increases the opportunities for domestic firms to obtain higher levels of efficiency via imitation of foreign technology (Findlay, 1978; Wang and Blomström, 1992). However, the gap cannot be too high, as the domestic firm would be unable to absorb the MNEs’ technological advantage. The argument is that technology diffusion is not an automatic and direct effect deriving from the existence of a stock of knowledge at other firms: it also requires the recipient to have the capacity to absorb and adopt such technology (Lapan and Bardhan, 1973; Wang and Blomström, 1992; Perez, 1997, Kinoshita, 2001). The lesson to be drawn from these arguments is that domestic firms must have a moderate technological gap vis-à-vis MNEs in order to benefit from the higher technology associated with MNEs.

The concept of absorptive capacity has been expressed not only at the microeconomic level, but also at the macroeconomic level. It has usually been associated with the level of development of a particular country (Borensztein et al., 1998; Xu, 2000) and particularly with its human capital stock. Moreover, Blomström et al. (1994) and

Kokko and Blomström (1995) show that MNEs use more advanced technology in countries and sectors that have a higher share of skilled labor.

Nevertheless, the concept of “absorptive capacity” comprises other factors, which we could label as “support infrastructures”. For instance, Hermes and Lensink (2003) argue that a developed financial system favors the occurrence of FDI spillovers, as it reduces the risks inherent in the investment made by domestic firms to imitate the MNEs’ technologies or to upgrade the qualification of their employees.<sup>7</sup>

The relationship between the development level of the host country and the magnitude of FDI spillovers has also been established through two additional arguments. Firstly, in the context of the labor mobility channel, a lower spillover level should occur in less developed countries. On average, MNEs pay higher wages than domestic firms, among other reasons in order to avoid labor turnover (Lipsey and Sjöholm, 2004). In less developed countries, this wage differential is usually higher, making more difficult the transfer of workers from MNEs to domestic firms. Secondly, it is considered less likely that less developed countries (with a lower absorptive capacity) will attract MNEs that have strong linkages with local suppliers and customers (Rodríguez-Clare, 1996).

Another factor that may affect the occurrence of spillovers is related to the export capacity of domestic firms. It has been argued that exporting firms already face significant competitive pressure in the foreign market and that MNEs operating in the domestic market are not expected to create relevant additional pressures (Blomström and Sjöholm, 1999). One may also argue that, as a firm increases its exporting capacity, the relevance of the domestic market decreases and the positive effects associated with the competition from MNEs become less important. In view of this, FDI spillovers will be more evident in the case of non-exporting domestic firms. In contrast to this relationship, it is suggested that domestic firms already exposed to foreign competition will probably have a greater capacity not only to absorb foreign technology but also, as emphasized by Barrios and Strobl (2002) and Schoors and van der Tol (2002), for countering the competition provided by MNEs in the local market, precluding this way the negative effect through the competition channel.

The size of domestic firms has also been linked to their capacity for obtaining the benefits associated with the presence of MNEs. Small firms (in terms of employment or production) may be less apt to compete with MNEs, suffering more significant losses (Aitken and Harrison, 1999). Furthermore, such firms may not have a sufficient

production scale to imitate some of the technologies introduced by MNEs. We therefore expect larger firms to benefit more from the presence of foreign companies.

It has also been maintained that spillovers have a circumscribed geographical dimension or, at least, that they decrease with distance (Audretsch and Feldman, 1996; Audretsch, 1998). Several reasons have been suggested for this fact (Girma and Wakelin, 2001; Girma, 2003; Torlak, 2004). For example, labor turnover is considered to be regionally confined. The existence of demonstration effects is also limited in space. Finally, due to transport costs, backward linkages are expected to occur mainly at a regional level. However, in the context of the model proposed by Fosfuri et al. (2001), spillovers increase if the domestic firm and the MNE do not directly compete in the same region. In that case, the MNE is less affected by the transfer of the trained worker (who knows the MNE's technology) to the domestic firm and it becomes easier for the latter to hire that worker.

Is FDI from different countries equally prone to generate spillovers to domestic firms? The different sources of FDI can be expressed through several factors such as culture, language, levels of protection and the sectoral structures of FDI, among other aspects. For instance, in a study for the Indian economy, Banga (2003) argues that Japan invests in more standardized sectors whilst the USA preferentially invests in capital-intensive sectors. Considering the characteristics of the Indian economy, the expectation is that Japanese FDI produces more spillovers.

Rodríguez-Clare (1996) argues that backward linkages depend positively on transport costs (and, hence, probably on distance) between the home country of the MNE and the host country, as well as on cultural, social and legal differences. If they are high enough, the MNE may have an incentive to buy inputs in the host country. Nevertheless, we can also consider that differences in cultures and languages may limit the domestic firms' capacity for assimilating the new technology, and therefore the net impact of these elements is ambiguous.

FDI spillovers to domestic firms are also influenced by the entry mode of FDI. The argument is as follows: when the MNE enters through a merger or acquisition, technological transfer occurs gradually, restricting, or at least delaying, spillovers. On the contrary, when FDI occurs through greenfield investment, the introduction of the new technology is instantaneous (Braconier et al., 2001). In opposition to this effect, if FDI takes place through a merger or acquisition, the MNE, due to its pre-integration in the local economy, is expected to establish wider inter-sectoral linkages with domestic firms

than when entry occurs through greenfield investment (Scott-Kennel and Enderwick, 2001; Belderbos et al., 2001). In considering 272 Japanese MNEs operating in 24 countries, Belderbos et al. (2001) confirm this hypothesis.

Another determinant factor of FDI spillovers is the degree of foreign ownership of investment projects (Blomström and Sjöholm, 1999; Dimelis and Louri, 2001, 2002; Javorcik and Spatareanu, 2003). Minority ownership reduces the incentive for the parent firm to transfer more advanced technology to its affiliate due to its reduced control over the management. In view of this, the technology transferred increases with the degree of foreign ownership, making it more possible for spillovers to occur (Ramachandran, 1993). However, one can also assume that a larger share of local ownership allows for easier access to foreign technology. Furthermore, affiliates with a greater degree of local participation can be expected to create more inter-sectoral linkages with the local economy, as was confirmed by Toth and Semjen (1999) in the Hungarian case.

According to Kokko et al. (2001), trade policy influences the technological characteristics of inward FDI (particularly in developing countries) and, consequently, the level of FDI spillovers. In countries with an inward-oriented trade policy, MNEs are focused on the local market. In order to succeed in that market, MNEs may be led to use technologies that are not available to domestic firms (or are only weakly developed), thus creating a vast potential for the existence of demonstration and learning effects. With an outward-oriented trade policy, MNEs will base their advantage mainly on their international distribution and marketing networks. Although in this latter case FDI spillovers may be created through exports, they can be expected to be more relevant in the first case (Kokko et al., 2001) not only on account of the above-mentioned reason, but also because of the greater competition with domestic firms.<sup>8</sup> It has also been argued that MNEs that are more focused on the local market establish greater inter-sectoral relationships with domestic firms, increasing the possibility of spillovers (Reuber, 1973; Altenburg, 2000). Nevertheless, we should note that an outward-oriented regime will probably attract a greater volume of FDI since the size of the domestic market ceases to act as a constraint (Bhagwati, 1978).<sup>9</sup>

Still in the context of the same determinant factor, it has been observed that if MNEs produce for the foreign market and domestic firms produce for the local one, the possibility of spillovers via imitation will be diminished if goods produced for the local market use different production processes to goods produced for export due to differences in quality (or other characteristics), as emphasized by Javorcik (2004b). However, if the



requirements imposed by MNEs serving foreign markets are greater, more significant adjustments may be induced in local suppliers and the potential for spillovers will be increased.

Intellectual property rights are another important factor, not only increasing the probability of MNEs investing in a given country (Lee and Mansfield, 1996), but also increasing the likelihood of the occurrence of spillovers, since, when there is weak protection, there will be a tendency to attract mainly low-technology FDI (Javorcik, 2004a) and MNEs will tend to opt for fully-owned investment projects (Sherwood, 1990).<sup>10</sup> Javorcik (2004a) also suggests that a weak protection of intellectual property rights will induce MNEs to opt for investment projects centered preferentially on distribution and not on local production. All these factors work against the emergence of spillovers. Nevertheless, intellectual property rights can be considered an additional cost for those who imitate, and, consequently, they will be seen as a restriction on the potential benefits for domestic firms. In the context of a model in which MNEs choose between exports and FDI, Markusen (2001) concludes that the optimal solution for the domestic economy is a level of intellectual property rights equal to the minimum amount needed to guarantee entry.

Two other factors that determine the existence of FDI spillovers can be inferred from the model of Fosfuri et al. (2001). The first concerns the type of training received by workers at MNEs. If the worker receives training in a more firm-specific technology, local firms have less advantage in obtaining that technology as it is more costly to adapt it to their own production process. The second is connected with the duration of the work contract and/or the existence of restrictions on labor mobility. Both aspects may limit the transfer of workers from MNEs to domestic firms, and, as such, the occurrence of spillovers through the labor mobility channel.

In the model proposed by Wang and Blomström (1992), if MNEs face stronger competition in the local market, they will be forced to use more advanced technology in order to assure their market share. This is empirically confirmed by Blomström et al. (1994), in a study for the Mexican economy. In such case, spillovers can be expected to increase with competition in the local market. However, the high level of competition may also lead MNEs to protect their technological advantage in a more active way, as, for instance, in the model of Fosfuri et al. (2001).

As we mentioned in Section 2, in the context of the model proposed by Matouschek (1999), downstream firms can also take advantage of the presence of a MNE,

due to upstream improvements induced by its entry into the market. However, this effect will only occur when the MNE chooses a supplier arrangement that leads to a net increase in the domestic production of the input.

Another element obviously affecting the possible emergence of inter-sectoral spillovers is an intensive use by MNEs of intermediate inputs, as this is a critical condition for the occurrence of spillovers through backward linkages (Rodríguez-Clare, 1996).

What motivates a MNE when it decides to locate abroad also affects the existence of FDI spillovers. The motivation implicit in most studies in this literature is based on the argument of traditional FDI theories that “when firms establish affiliates abroad and become multinational (...) they bring with them some amount of proprietary technology that constitutes their firm-specific advantage and allows them to compete successfully with local firms who have the superior knowledge of local markets, consumer preferences and business practices” (Blomström and Sjöholm, 1999, p. 915-916). FDI is thus technology sourcing, according to this view. Nevertheless, there has been empirical evidence showing that FDI may instead be technology exploiting, in the sense that it is attracted by the wish to gain access to the technological advantages of the host country (Cantwell, 1989; Kogut and Chang, 1991; Neven and Siotis, 1996). Fosfuri and Motta (1999) consider this last possibility in theoretical terms. In their model, the affiliate of a MNE, by locating abroad close to technologically-advanced local firms, may benefit from spillovers induced by the latter (which may then be transferred to the parent firm). There are therefore good reasons to consider that FDI spillovers will be greater when the traditional motivation for investing abroad prevails, i.e. when FDI is technology sourcing (Driffield and Love, 2003).

The “value” of the technology (in a broad sense that incorporates the innovative level of that technology) is a final determinant factor (and, perhaps, the most obvious one) of FDI spillovers. On the one hand, it incites domestic firms to try to accede to the technology but, on the other hand, it motivates MNEs to protect it (Blomström et al., 2000). If we accept that MNEs that are more recently established in the host economy make use of more advanced technology, we can argue, as in Karpaty and Lundberg (2004), that their impact will be negatively related to the length of time elapsing since their entry into the local market.

#### 4. Determinant factors of FDI spillovers - the empirical evidence

In view of the contrasting arguments in the case of certain factors presented in the previous section, empirical analysis becomes increasingly important for clarifying the determinant factors of FDI spillovers. In this section, we consider the empirical evidence produced in this area.

As the knowledge content of the spillover effect is inherently an abstract concept and thus not directly measurable, the approach usually adopted in the empirical literature consists in capturing the spillover effect in the framework of an econometric analysis in which labor productivity (or total factor productivity) of domestic firms is regressed on a number of covariates assumed to have an effect on productivity, including the presence of foreign firms. In the present context, we take into account a range of studies which divide the sample in order to evaluate if the impact of the foreign presence on the domestic productivity differs according to the specific factor that determines that partition.

As mentioned in section 3, the determinant factors of FDI spillovers that have been most widely investigated are absorptive capacity (both at firm and country level) and the influence of the technological gap. It is therefore not surprising that this topic is the most profusely analyzed in empirical terms.

The importance of absorptive capacity emerges as a solid conclusion in most studies on this subject. Kinoshita (2001) uses R&D investment as a proxy for absorptive capacity, as it is considered that this increases the capacity of domestic firms to imitate new technologies (Cohen and Levinthal, 1989; Griffith et al., 2000, 2003). With statistical information for the Czech Republic, he confirms that domestic firms only benefit from the presence of MNEs when they perform R&D actively, i.e. when they develop the ability to imitate new technologies. R&D activity and FDI thus appear to be complementary in their effect on the productivity of domestic firms. Keller and Yeaple (2003) analyze the case of the USA and conclude that only firms operating in high technology sectors – which invest more in R&D – benefit from positive FDI spillovers. In a sequence of studies for the Indian case, Kanturia (2000, 2001, 2002) separates “scientific” from “non-scientific” sectors and notes that, besides there being a distinct impact in the case of the group of sectors taken into account, as far as the “scientific sectors” are concerned, there is a positive impact in the case of firms with a higher absorptive capacity. The importance of absorptive capacity is also stressed by a vast group of additional studies, including those undertaken by Schoors and van der Tol (2002), Barrios et al. (2002), Girma (2003), and

Karpaty and Lundberg (2004).<sup>11</sup> The study of Damijan et al. (2003) is a partial exception to this evidence, as they obtain a positive relation in the case of Hungary and Slovakia, but a negative one in the cases of Estonia and Latvia.

It has also been shown that the particular characteristics and development level of the region/country are relevant for the occurrence of the spillover phenomenon. According to Ponomareva (2000) and Yudaeva et al. (2003), who used data for Russia, FDI spillovers depend positively on the education level of the region considered. In turn, Sgard (2001) analyzes the existence of a distinct impact of FDI in spatial terms in the Hungarian case. He considers a region between Budapest and the border with Austria – which is more developed than other parts of the country and closer to the EU border – and another region comprising the remaining area towards the border with Yugoslavia, Romania and Ukraine. Although there is a positive impact in both regions, it is stronger in the first one. Imbriani and Reganati (1999) develop a similar investigation, considering three large regions in the context of the Italian economy. The results show that only the North-West region (the most dynamic region and the one where, for example, a large part of the R&D activity developed by large firms is concentrated) benefits from the foreign presence. This last group of studies emphasizes an important message: although FDI may work as a convergence mechanism at a national level if it produces significant gains in efficiency for domestic firms, it can also increase domestic inequalities at a regional level. This is an important result that certainly justifies further investigation.

In spite of the strong evidence concerning the relevance of absorptive capacity at both levels of the analysis (micro and macro), “the full potential of the concept of absorptive capacity is yet to be exploited. Future research ought to explore the concept in more detail to assert what contributes to a strong absorptive capacity on the firm as well on the national level” (Meyer, 2003, p. 22). For instance, Alfaro et al. (2003) show the importance of a developed financial system as a condition for obtaining benefits from the presence of MNEs.

Let us now evaluate the impact of the technological gap between domestic firms and MNEs. Kokko (1994) represents a pioneering contribution in this area. In order to investigate the influence of the technological characteristics of the sectors on the extent of spillovers, he considers three variables: the level of technological complexity (proxied by the amount of patent fees per employee in different industries), the average capital intensity of MNEs and the technological gap (evaluated by the difference in labor productivity between domestic firms and MNEs). The results suggest that an increase in

technological complexity and capital intensity makes the occurrence of FDI spillovers less likely, but that the influence of the technological gap is neutral. However, Kokko (1994) also concludes that wide technological gaps, together with large foreign market shares, generate a less favorable situation for the emergence of spillovers since, in this case, MNEs may operate in “enclaves”, without connection with domestic firms.

Other studies do not allow to generalize the neutrality of the technological gap as drawn by Kokko (1994). In Sjöholm (1999a), the results differ in terms of the dependent variable used, thereby precluding a clarifying conclusion. Using data for Uruguay, Kokko et al. (1996) distinguish between domestic establishments with low and high technological gaps vis-à-vis MNEs operating in the same sector and obtain evidence of positive spillovers only in the first group. The same result emerges from the studies of Cantwell (1989), Tsou and Liu (1998), Imbriani and Reganati (1999), Girma and Wakelin (2000) and Kanturia (1998).

Flôres et al. (2002) and Proença et al. (2002) try to identify, for the Portuguese case, the range in terms of productivity within which spillovers are maximized. The results of Flôres et al. (2002) suggest that spillovers are maximized when the average level of domestic productivity is between 50% and 80% of the corresponding productivity level of foreign firms.<sup>12</sup> Proença et al. (2002) perform a similar exercise, obtaining a range between 60% and 95%. This non-coincidence of results may be due mainly to the different proxies used for the technological gap.

Narula and Marin (2003) analyze the case of Argentina by including the two above-mentioned topics - absorptive capacity and technological gap. They conclude that, regardless of the technology gap, the influence of the foreign presence at the sectoral level is not significant when absorptive capacity is not taken into account. When a proxy for the absorptive capacity of domestic firms is included – more specifically, investment in new equipment oriented to product/process innovation or investment in training activities – they observe positive spillovers to those domestic firms that have an absorptive capacity but not to the remaining ones, which reinforces the relevance of this determinant factor.

Blomström and Sjöholm (1999) investigate whether the effect of the presence of MNEs differs according to whether domestic firms export or instead are oriented towards the domestic market. Using statistical information for Indonesia, they detect a positive effect (significant at the 1% level) in the case of non-exporting firms while, by contrast, the variable is not significant when exporting firms are considered.<sup>13</sup> Following the same line of analysis, Ponomareva (2000) includes a dummy variable equal to one if the

domestic firm belongs to a sector exporting over 30% of its production and notes, in confirmation of the results obtained by Blomström and Sjöholm (1999), that the spillover effect is higher for non-exporting firms (or those with a low level of exports). However, Sinani and Meyer (2004) fail to find any remarkable difference concerning the impact on the two groups of domestic firms. Schoors and van der Tol (2002) split their sample into three groups: “closed” sectors (exporting less than 1/3 of their production), “open” sectors (exporting between 1/3 and 2/3 of their production) and “very open” sectors (exporting more than 2/3 of their production) and find that positive intra-sectoral spillovers only occur in the more open sectors. In the case of inter-sectoral spillovers through backward linkages, the influence of the degree of openness is also clear: it is positive in both the open and very open sectors, but mainly so in the latter. However, as far as spillovers through forward linkages are concerned, the effect is negative in both the closed and very open sectors and non-significant in the intermediate group. Summing up, the contradictory results preclude a clear-cut conclusion as regards this factor.

Aitken and Harrison (1999) analyze the impact of the firms’ size on the existence of FDI spillovers. They distinguish between firms with more or less than 50 workers (on average, throughout the period analyzed) and conclude that the impact on the efficiency of domestic firms of the foreign presence at the sectoral level is negative in both cases, but only significant for the smaller firms. This result confirms the idea that such firms have a lower capacity for obtaining positive effects from the presence of MNEs and are less suited to face competition from MNEs. Nevertheless, Dimelis and Louri (2001) find evidence to the opposite. In their study, only small domestic firms (those with less than 50 workers) benefit from positive spillovers. Considering FDI from Japan and from the rest of the world (mainly Europe), Girma and Wakelin (2001) also conclude that small-sized firms are the ones which benefit more from FDI spillovers. However, in the case of FDI from the USA, the impact is not significant for either small or large domestic firms. Finally, Sinani and Meyer (2004) note that only small-sized domestic firms (with less than 50 workers) and medium-sized domestic firms (employing between 50 and 100 workers) benefit from FDI spillovers, the effect being greater in the first case. The impact is not significant when larger firms are considered. In short, the evidence concerning this determinant factor is inconclusive.

The interaction between the size of the domestic firms and absorptive capacity is emphasized by Girma and Wakelin (2001). They conclude that large and highly-skilled domestic firms do not benefit from foreign presence because they are “probably the

nearest to foreign multinationals in terms of technology and market share, and may already operate at the technological frontier” (Girma and Wakelin, 2001, p. 17). However, the group of firms that gain most from foreign presence consists of small firms with a high proportion of skilled labor.

A different topic is to analyze whether FDI spillovers have a local/regional dimension. This is one of the factors that enjoys a wider empirical evaluation but, once again, the results are differentiated. Sjöholm (1999b), Aitken and Harrison (1999) and Yudaeva et al. (2003) do not confirm this geographically circumscribed dimension. The first of these studies considers the case of Indonesia and concludes that the variable that measures intra-sectoral spillovers has a positive coefficient at the national level but a negative one when the evaluation is confined to a regional level. A similar result is obtained by Aitken and Harrison (1999) for the case of Venezuela and by Yudaeva et al. (2003) with data for Russia. However, Ponomareva (2000), also analyzing the Russian economy, confirms the hypothesis of a regional dimension in the spillover effect.

Torlak (2004) follows the same line of research using statistical information for five countries. The existence of positive spillovers at the regional level is detected in the cases of the Czech Republic and Poland. Nevertheless, when the so-called agglomeration effect is controlled (by taking as an additional independent variable, the total number of firms in the region) the positive influence at the regional level only holds firm in the case of the Czech Republic and a negative effect is even detected in the Bulgarian case. Girma and Wakelin (2001) and Girma (2003) arrive at an opposite conclusion. The former detect a positive impact on the productivity of domestic firms caused by the foreign presence in the same region, both in the sector defined at a 4-digit level (intra-sectoral spillovers) and in the one defined at a 2-digit level (inter-sectoral spillovers)<sup>14</sup>, although the effect of the foreign presence outside the region is found to be non-significant. The latter study also concludes favorably as to the existence of a regional dimension in the spillover effect, using data for the UK.

A distinct question is evaluated by Haskel et al. (2002), Harris and Robinson (2002) and Konings (2001) concerning, in the two first cases, the UK and, in the third one, Poland, Romania and Bulgaria. Instead of capturing the foreign presence with the MNEs’ share in the sector and region, these studies consider the MNEs’ presence in the region as a whole (without sectoral disaggregation). Konings (2001) does not confirm the expected positive impact, with a negative sign even being detected in the Polish case (albeit only significant at the 10% level). The paper by Harris and Robinson (2002) estimates the

impact of the MNE's presence on each sector taken individually. Analyzing 20 sectors, they find that the impact is non-significant in 13, negative in four and positive in three. Finally, Haskel et al. (2002) try alternative specifications with different lags for the foreign presence variable and, in general, they obtain non-significant results. As a general rule, therefore, this empirical evidence is not in favor of a positive impact. However, as Girma (2003) has pointed out, this evaluation relates to the agglomeration effect and not to intra-sectoral spillovers.

Another factor that may determine the magnitude of the spillover effect is related to the nationality of FDI. Banga (2003) concludes that Japanese FDI is more susceptible to create spillovers to Indian domestic firms than FDI from the USA. Haskel et al. (2002) detects evidence of positive spillovers associated with FDI from the USA and France (greater in the French case), a non-significant effect in the case of German MNEs and a negative one when Japanese FDI is considered. Using data for the Swedish economy, Karpaty and Lundberg (2004) distinguish between FDI from the USA, Japan and the rest of the world and, in spite of the fact that FDI spillovers are always significant, the greatest effect occurs in the Japanese case. The main lesson to be drawn from this group of studies is that the nationality of FDI is important for the existence of FDI spillovers. Hu and Jefferson (2002) investigate this aspect using evidence for the electronic and textile sectors in China. They examine whether there are relevant differences between the impact of FDI from Macao, Hong-Kong and Taiwan in comparison with FDI from OECD countries. The results show that only FDI from OECD countries has a significant – and negative – effect on the performance of local firms, which they relate to the higher technological level of firms from OECD countries and the consequent stronger competition on the local market.

Some studies have evaluated the influence on the spillover effect of the degree of foreign ownership of the affiliates of MNEs obtaining mixed results. Blomström and Sjöholm (1999) do not find a significant impact of this determinant factor. This result differs from that obtained by Dimelis and Louri (2001, 2002). Using three alternative variables to measure the foreign presence – sales, employment and capital – Dimelis and Louri (2002) discover that the impact of MNEs with minority foreign ownership is clearly greater. Through quantile regressions, this study concludes that majority foreign ownership only influences the 25% more efficient domestic firms, while the impact of minority foreign ownership is positive at any efficiency level of domestic firms. Javorcik and Spatareanu (2003) in turn, working with data for Romania, concluded that, in the case



of intra-sectoral spillovers, the impact is positive only when there is no local participation. However, as far as inter-sectoral spillovers through backward linkages are concerned, they find a positive effect in the case of firms with local participation and a negative one in the opposite case. This last result is corroborated by Javorcik (2004b).

Kokko et al. (2001) examine the role of trade policy on the dimension of FDI spillovers. Considering the Uruguayan case, they separate the MNEs which were established there in the period before 1973 (characterized by an import substitution regime) and those which were established after that period (in a more open regime). They obtain a positive coefficient for the variable relating to the presence of MNEs established in the former period and a negative one in the case of the MNEs established in the subsequent period. Therefore, inward-oriented MNEs appears to generate a more favorable impact on the productivity of local firms. Nevertheless, when they analyze, with a probit model, the impact of the foreign presence on the probability of the local firms beginning to export, a positive impact is only detected in the case of MNEs established during the outward-oriented period, which suggests that gains may be obtained through the export channel. Javorcik (2004b), using data for Lithuania, finds some (weak) evidence to suggest that FDI projects oriented towards the domestic market generate more spillovers. This aspect is also analyzed by Li et al. (2001), using Chinese data, in a study that distinguishes between the impact on domestic firms caused by the foreign presence and the impact resulting from competition with MNEs. It produces two interesting conclusions. Firstly, the negative effect of competition for domestic firms is restricted to those sectors where FDI is preferentially oriented towards the domestic market. Secondly, as far as the effect directly related with the existence of foreign presence is concerned, domestic firms only benefit, in terms of increased efficiency, in the case of export-oriented FDI. To sum up, once again, the conclusions from this set of studies do not legitimate an unequivocal interpretation.

The impact of different competition levels on the magnitude of the spillover effect is analyzed by Sjöholm (1999a) and his results suggest that a higher level of competition increases the possibility of FDI spillovers.

Another factor that has been analyzed concerns the MNEs' motivation for investing abroad. The analysis of this factor is, however, faced with an important difficulty: how to measure this motivation? Driffield and Love (2003) proxy it with the R&D intensity differential between the host country and the home country, at the sectoral level. The assumption is that, if this differential is positive, FDI is technology exploiting

and, by contrast, if the differential is negative, FDI is technology sourcing. It has been argued that the latter type of FDI is likely to produce greater productivity spillovers to domestic firms, as mentioned in section 3. Driffield and Love (2003) check this assumption by considering FDI inflows in the UK from 13 countries. They obtain a positive sign in the case of FDI with the traditional motivation (technology sourcing) and a negative sign in the case of technology exploiting FDI. Both results are highly significant (at 1% level). Girma (2003) performs a similar exercise, but with an analysis at the firm level, and broadly confirms these results.

Finally, using data for the Swedish economy, Karpaty and Lundberg (2004) investigate whether FDI spillovers depend on the length of time elapsing since the MNEs entered the local market. The evidence shows that only MNEs established after 1990 (and therefore probably using more advanced technology) generate positive spillovers.

## 5. Final Remarks

In this paper, we have shown that FDI spillovers to domestic firms depend on a multiplicity of factors associated with the entry mode of FDI, as well as with the characteristics of the MNEs and of the recipient economies, sectors and firms. These factors often work in opposite directions making the overall effect difficult to establish.

As far as the empirical evidence is concerned, it is insufficient to allow us to draw definitive conclusions for most of the factors. The most robust empirical result relates to the importance of the absorptive capacity of domestic firms, which appears to be a fundamental precondition for enabling them to capture these indirect benefits from FDI. Furthermore, empirical evidence also shows that FDI spillovers appear to be greater in more developed regions. This last result allows us to consider that, although FDI spillovers may accelerate convergence at the national level by increasing the productivity of domestic firms, they may also contribute towards increased inequalities within each country. The evidence concerning the remaining factors is, in some cases, inconsistent or, in other cases, still too scarce to allow for unequivocal conclusions.

The research into this subject is far from being exhausted, but it already gives interesting insights into the mixed evidence resulting from the empirical literature as regards the existence of FDI spillovers. The main challenge now is to deepen the analysis of their determinant factors along the lines we have suggested in this survey, including the way in which they interact, in both theoretical and empirical terms.



## References

Aitken, B., G. Hanson and A. Harrison (1997), “Spillovers, Foreign Investment and Export Behaviour”, *Journal of International Economics*, 43, pp. 103-132.

Aitken, B. and A. Harrison (1999), “Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela”, *American Economic Review*, 89(3), pp. 605-618.

Alfaro, L., A. Chanda, S. Kalemli-Özcan and S. Sayek (2003), “FDI Spillovers, Financial Markets, and Economic Development”, IMF Working Paper No. 03/186.

Altenburg, T. (2000), “Linkages and Spillovers Between Transnational Corporations and Small and Medium-Sized Enterprises in Developing Countries: Opportunities and Policies”, Proceedings of the UNCTAD X Special Round Table “TNC-SME Linkages for Development”.

Audretsch, D. (1998), “Agglomeration and the Location of Innovative Activity”, *Oxford Review of Economic Policy*, 14, pp. 18-29.

Audretsch, D. and M. Feldman (1996), “Knowledge Spillovers and the Geography of Innovation and Production”, *American Economic Review*, 86, pp. 630-640.

Balasubramanyam, V. and M. Salisu (1991), “EP, IS and Direct Foreign Investment in LCD’s”, in A. Koekkoek e L. Mennes (eds.), *International Trade and Global Development*, London, Routledge.

Banga, R. (2003), “Do Productivity Spillovers from Japanese and U.S. FDI Differ?”, mimeo, Delhi School of Economics.

Barrios, S., S. Dimelis, H. Louri and E. Strobl (2002), “Efficiency Spillovers from Foreign Direct Investment in the EU Periphery: a Comparative Study of Greece, Ireland and Spain”, FEDEA Working Paper No. 2002-02.

Barrios, S. and E. Strobl (2002), “Foreign Direct Investment and Productivity Spillovers: Evidence from the Spanish Experience”, *Weltwirtschaftliches Archiv*, 138(3), pp. 459-481.

Belderbos, R., G. Capannelli and K. Fukao (2001), “Backward Vertical Linkages of Foreign Manufacturing Affiliates: Evidence from Japanese Multinationals”, *World Development*, 29(1), pp. 189-208.

Bhagwati, J. (1978), “Anatomy and Consequences of Exchange Control Regimes”, *Studies in International Economic Relations* 10, New York, National Bureau of Economic Research.

Blomström, M, S. Globerman and A. Kokko (2000), “The Determinants of Host Country Spillovers from Foreign Direct Investment”, CEPR Discussion Paper No. 2350.

Blomström, M. and A. Kokko (1998), “Multinational Corporations and Spillovers”, *Journal of Economic Surveys*, 12(3), pp. 247-277.

Blomström, M., A. Kokko and M. Zejan (1994), “Host Country Competition, Labour Skills, and Technology Transfer by Multinationals”, *Weltwirtschaftliches Archiv*, 130(3), pp. 521-533.

Blomström, M. and F. Sjöholm (1999), “Technology Transfer and Spillovers: Does Local Participation With Multinationals Matter?”, *European Economic Review*, 43, pp. 915-923.

Borensztein, E., J. Gregorio and J. Lee (1998), “How Does Foreign Direct Investment Affect Economic Growth?”, *Journal of International Economics*, 45, pp. 115-135.

Braconier, H., K. Ekholm, and K. Midelfart-Knarvik (2001), “In Search of FDI – Transmitted R&D Spillovers: a Study Based on Swedish Data”, *Weltwirtschaftliches Archiv*, 137(4), pp. 644-665.

Cantwell, J. (1989), “Technological Innovation and Multinational Corporations”, Oxford, Basil - Blackwell.

Caves, R. (1974), “Multinational Firms, Competition and Productivity in Host- Country Markets”, *Economica*, 41, pp. 176-193.

Cohen, W. and D. Levinthal (1989), “Innovation and Learning: Two Faces of R&D”, *Economic Journal*, 99, pp. 569-596.

Damijan, J., M. Knell, B. Majcen and M. Rojec (2003), “Technology Transfer Through FDI In Top-10 Transition Countries: How Important Are Direct Effects, Horizontal and Vertical Spillovers?”, William Davidson Working Paper No. 549.

Das, S. (1987), “Externalities and Technology Transfer Through Multinationals Corporations – A Theoretical Analysis”, *Journal of International Economics*, 22, pp. 171-182.

Dimelis, S. and H. Louri (2001), “Foreign Direct Investment and Efficiency Benefits: Do Size and Ownership Matter?”, paper presented at the “Business & Economics Society International Conference”, Paris, July.

Dimelis, S. and H. Louri (2002), “Foreign Ownership and Production Efficiency: a Quantile Regression Analysis”, *Oxford Economic Papers*, 54, pp. 449-469.

Driffield, N. and J. Love (2003), “Does the Motivation for Foreign Direct Investment Affect Productivity Spillovers to the Domestic Sector?”, mimeo, University of Birmingham.

Findlay, R. (1978), “Relative Backwardness, Direct Foreign Investment, and the Transfer of Technology: a Simple Dynamic Model”, *Quarterly Journal of Economics*, 92(1), pp. 1-16.

Flôres, R., M. Fontoura and R. Santos (2002), “Foreign Direct Investment and Spillovers: Additional Lessons from a Country Study”, *Ensaio Econômicos da EPGE*, No. 455, Fundação Getúlio Vargas, Rio de Janeiro.

Fosfuri, A. and M. Motta (1999), "Multinationals Without Advantages", *Scandinavian Journal of Economics*, 101(4), pp. 617-630.

Fosfuri, A., M. Motta and T. Ronde (2001), "Foreign Direct Investment and Spillovers Through Workers' Mobility", *Journal of International Economics*, 53, pp. 205-222.

Gerschenkron, A. (1962), *Economic Backwardness in Historical Perspective*, Massachusetts, Belknap Press of Harvard.

Girma, S. (2003), "Absorptive Capacity and Productivity Spillovers from FDI: a Threshold Regression Analysis", Working Paper No. 25/2003, European Economy Group.

Girma, S. and K. Wakelin (2000), "Are There Regional Spillovers from FDI in the UK?", paper presented at the "International Economics Association Conference", Nottingham, July.

Girma, S. and K. Wakelin (2001), "Regional Underdevelopment: Is FDI the Solution? A Semi-Parametric Analysis", GEP Research Paper No. 2001/11, University of Nottingham.

Glass, A. and K. Saggi (2002), "Multinational Firms and Technology Transfer", *Scandinavian Journal of Economics*, 104(4), pp. 495-513.

Görg, H. and D. Greenaway (2004), "Much Ado About Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?", *The World Bank Research Observer*, 19(2), pp. 171-197.

Görg, H. and E. Strobl (2002), "Spillovers from Foreign Firms Through Worker Mobility: An Empirical Investigation", mimeo, University of Nottingham.

Greenaway, D., N. Sousa and K. Wakelin (2004), "Do Domestic Firms Learn to Export from Multinationals?", *European Journal of Political Economy*, 20(4), pp. 1027-1043.

Griffith, R., S. Redding and J. Reenen (2000), "Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries", CEPR Discussion Paper No. 2457.

Griffith, R., S. Redding and J. Reenen (2003), “R&D and Absorptive Capacity: Theory and Empirical Evidence”, *Scandinavian Journal of Economics*, 105(1), pp. 99-118.

Harris, R. and C. Robinson (2002), “Spillovers from Foreign Ownership in the United Kingdom – Estimates for UK Manufacturing Using the ARD”, paper presented at the “RES 2002 Conference”.

Harrison, A. (1994), “Productivity, Imperfect Competition and Trade Reform”, *Journal of International Economics*, 36, pp. 53-73.

Haskel, J., S. Pereira and M. Slaughter (2002), “Does Inward Foreign Direct Investment Boost the Productivity of Domestic Firms?” Working Paper No. 452, Department of Economics, Queen Mary, University of London

Hermes, N. and R. Lensink (2003), “Foreign Direct Investment, Financial Development and Economic Growth”, *Journal of Development Studies*, 40(1), pp. 142-163.

Hu, A. and G. Jefferson (2002), “FDI Impact and Spillover: Evidence from China’s Electronic and Textile Industries”, *The World Economy*, 25(8), pp. 1063-1076.

Imbriani, C. and F. Reganati (1999), “Productivity Spillovers and Regional Differences: Some Evidence on the Italian Manufacturing Sector”, Discussion Paper No. 48, Centro di Economia del Lavoro e di Politica Economica, Università degli Studi di Salerno.

Javorcik, B. (2004a), “The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights: Evidence from Transition Economies”, *European Economic Review*, 48(1), pp. 39-62.

Javorcik, B. (2004b), “Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages”, *American Economic Review*, 94(3), pp. 605-627.



Javorcik, B. and M. Spatareanu (2003), “To Share or Not To Share: Does Local Participation Matter for Spillovers from Foreign Direct Investment?”, World Bank Policy Research Working Paper No. 3118.

Kanturia, V. (1998), “Technology Transfer and Spillovers for Indian Manufacturing Firms”, *Development Policy Review*, 16(1), pp. 73-91.

Kanturia, V. (2000), “Productivity Spillovers from Technology Transfer to Indian Manufacturing Firms”, *Journal of International Development*, 12, pp. 343-369.

Kanturia, V. (2001), “Foreign Firms, Technology Transfer and Knowledge Spillovers to Indian Manufacturing Firms: a Stochastic Frontier Analysis”, *Applied Economics*, 33, pp. 625-642.

Kanturia, V. (2002), “Liberalisation, FDI, and Productivity Spillovers – an Analysis of Indian Manufacturing Firms”, *Oxford Economic Papers*, 54, pp. 688-718.

Karpaty, P. and L. Lundberg (2004), “Foreign Direct Investment and Productivity Spillovers in Swedish Manufacturing”, FIEF Working Paper Series 2004, No. 194.

Keller, W. and S. Yeaple (2003), “Multinational Enterprises, International Trade, and Productivity Growth: Firm-Level Evidence from the United States”, NBER Working Paper No. 9504.

Kinoshita, Y. (2001), “R&D and Technology Spillovers Through FDI: Innovation and Absorptive Capacity”, CEPR Discussion Paper No. 2775.

Kogut, B. and S. Chang (1991), “Technological Capabilities and Japanese Direct Investment in the United States”, *Review of Economics and Statistics*, 73(3), pp.401-413.

Kokko, A. (1994), “Technology, Market Characteristics, and Spillovers”, *Journal of Development Economics*, 43, pp. 279-293.

Kokko, A. and M. Blomström (1995), “Policies to Encourage Inflows of Technology Through Foreign Multinationals”, *World Development*, 23(3), pp. 459-468.

Kokko, A., R. Tansini and M. Zejan (1996), “Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector”, *Journal of Development Studies*, 32(4), pp. 602-611.

Kokko, A., M. Zejan and R. Tansini (2001), “Trade Regimes and Spillover Effects of FDI: Evidence from Uruguay”, *Weltwirtschaftliches Archiv*, 137(1), pp. 124-149.

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), pp. 619-633.

Lall, S. (1980), “Vertical Interfirm Linkages in LDCs: an Empirical Study”, *Oxford Bulletin of Economics and Statistics*, 42(3), pp. 203-226.

Lapan, H. and P. Bardhan (1973), “Localized Technical Progress and Transfer of Technology and Economic Development”, *Journal of Economic Theory*, 6, pp. 585-595.

Lee, J. and E. Mansfield (1996), “Intellectual Property Protection and U.S. Foreign Direct Investment”, *Review of Economics and Statistics*, 78(2), pp. 181-186.

Li, X., X. Liu and D. Parker (2001), “Foreign Direct Investment and Productivity Spillovers in the Chinese Manufacturing Sector”, *Economic Systems*, 25, pp. 305-321.

Lin, P. and K. Saggi (2004), “Multinational Firms and Backward Linkages: a Survey and a Simple Model”, mimeo, Lingnan University and Southern Methodist University.

Lipsey, R. (2002), “Home and Host Country Effects of FDI”, NBER Working Paper No. 9293.

Lipsey, R. and F. Sjöholm (2004), “Foreign Direct Investment, Education and Wages in Indonesian Manufacturing”, *Journal of Development Economics*, 73, pp. 415-422.

Markusen, J. (2001), "Contracts, Intellectual Property Rights, and Multinationals Investment in Developing Countries", *Journal of International Economics*, 53, pp. 189-204.

Markusen, J. and A. Venables (1999), "Foreign Direct Investment as a Catalyst for Industrial Development", *European Economic Review*, 43, pp. 335-356.

Matouschek, N. (1999), "Foreign Direct Investment and Spillovers Through Backward Linkages", CEPR Discussion Paper No. 2283.

Meyer, K. (2003), "FDI Spillovers in Emerging Markets: A Literature Review and New Perspectives", DRC Working Paper No. 15, Centre for New and Emerging Markets, London Business School.

Narula, R. and A. Marin (2003), "FDI Spillovers, Absorptive Capacities and Human Capital Development: Evidence from Argentina", MERIT Research Memorandum 2003 - 016.

Neven, D. and G. Siotis (1996), "Technology Sourcing and FDI in the EC: an Empirical Evaluation", *International Journal of Industrial Organization*, 14(5), pp. 543-560.

Nunnenkamp, P. and J. Spatz (2004), "Intellectual Property Rights and Foreign direct Investment: a Disaggregated Analysis", *Review of World Economics*, 140(3), pp. 393-414.

Perez, T. (1997), "Multinational Enterprises and Technological Spillovers: an Evolutionary Model", *Journal of Evolutionary Economics*, 7, pp. 169-192.

Ponomareva, N. (2000), "Are There Positive or Negative Spillovers from Foreign-Owned to Domestic Firms?", Working Paper BSP/00/042, New Economic School, Moscow.

Proença, I., M. Fontoura and N. Crespo (2002), "Productivity Spillovers from Multinational Corporations in the Portuguese Case: Evidence from a Short Time Period

Panel Data”, Working Paper No. 06/2002, Department of Economy, ISEG/UTL, Technical University of Lisbon.

Ramachandran, V. (1993), “Technology Transfer, Firm Ownership, and Investment in Human Capital”, *Review of Economics and Statistics*, 75(4), pp. 664-670.

Reuber, G. (1973), *Private Foreign Investment in Development*, Development Centre, OCDE, Paris, Clarendon Press, Oxford.

Rhee, Y. (1990), “The Catalyst Model of Development: Lessons from Bangladesh’s Success With Garment Exports”, *World Development*, 18(2), pp. 333-346.

Rodríguez-Clare, A. (1996), “Multinationals, Linkages, and Economic Development”, *American Economic Review*, 86 (4), pp. 852-873.

Saggi, K. (2002), “Trade, Foreign Direct Investment, and International Technology Transfer: a Survey”, *The World Bank Research Observer*, 17(2), pp. 191 – 235.

Schoors, K. and B. van der Tol (2002), “Foreign Direct Investment Spillovers Within and Between Sectors: Evidence from Hungarian Data”, Working Paper No. 2002/157, University of Gent.

Scott-Kennel, J. and P. Enderwick (2001), “The Degree of Linkage of Foreign Direct Investment in New Zealand Industry”, mimeo, Victoria University of Wellington.

Sinani, E. and K. Meyer (2004), “Spillovers of Technology Transfer from FDI: the Case of Estonia”, *Journal of Comparative Economics*, 32, pp. 445-466.

Sgard, J. (2001), “Direct Foreign Investments and Productivity Growth in Hungarian Firms, 1992-1999”, William Davidson Institute Working Paper No. 425.

Sherwood, R. (1990), *Intellectual Property and Economic Development*, Boulder, Westview Press.

Sjöholm, F. (1999a), “Technology Gap, Competition and Spillovers from Direct Foreign Investment: Evidence from Establishment Data”, *Journal of Development Studies*, 36(1), pp. 53-73.

Sjöholm, F. (1999b), “Productivity Growth in Indonesia: the Role of Regional Characteristics and Direct Foreign Investment”, *Economic Development and Cultural Change*, 47(3), pp. 559-584.

Teece, D. (1977), “Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-How”, *Economic Journal*, 87, pp. 242-261.

Torlak, E. (2004), “Foreign Direct Investment, Technology Transfer, and Productivity Growth in Transition Countries - Empirical Evidence from Panel Data”, Cege Discussion Paper No. 26.

Toth, I. and A. Semjen (1999), “Market Links and Growth Capacity of Enterprises in a Transforming Economy: The Case of Hungary”, in I. Toth e A. Semjen (eds.), *Market Links, Tax Environment and Financial Discipline of Hungarian Enterprises*, Institute of Economics, Hungarian Academy of Sciences, Budapest.

Tsou, M. and J. Liu (1998), “The Spillover Effect From FDI: Empirical Evidence From Taiwan Manufacturing Industries”, *Taiwan Economic Review*, June, pp. 155-181.

Xu, B. (2000), “Multinational Enterprises, Technology Diffusion, and Host Country Productivity Growth”, *Journal of Development Economics*, 62, pp. 477-493.

Yudaeva, K., K. Kozlov, N. Malentieva and N. Ponomareva (2003), “Does Foreign Ownership Matter? The Russian Experience”, *Economics of Transition*, 11(3), pp. 383-409.

Wang, J. and M. Blomström (1992), “Foreign Investment and Technology Transfer: a Simple Model”, *European Economic Review*, 36, pp. 137-155.

## Notes

<sup>1</sup> The financial support provided by the Fundação para a Ciência e a Tecnologia under SFRH/BD/6412/2001 (supported by the European Social Fund) is gratefully acknowledged.

<sup>2</sup> According to Blomström and Kokko (1998), the concept of technology should be “(...) interpreted broadly to include both product, process, and distribution technology, as well as management and marketing skills” (Blomström and Kokko, 1998, p. 247).

<sup>3</sup> The workers who have gained skills at MNEs may also, of course, create their own firms (Görg and Strobl, 2002).

<sup>4</sup> On this subject, see Görg and Greenaway (2004).

<sup>5</sup> Furthermore, due to the significant costs involved in its transfer (Teece, 1977), the technology transferred to affiliate companies depends on the level of competition in the market (Kokko and Blomström, 1995).

<sup>6</sup> Nevertheless, it is argued that the extent of this effect is smaller because MNEs are largely involved in the production of end-user consumer goods (Damijan et al., 2003).

<sup>7</sup> As an alternative, Alfaro et al. (2003) propose a theoretical model in which the lower degree of development of the financial system works as an obstacle to the creation of new domestic firms and to the absorption of FDI spillovers.

<sup>8</sup> Assuming that it is the positive effect of the competition channel that prevails (see section 2). However, it is also possible to argue that, in this case, the negative effect is more obvious.

<sup>9</sup> Balasubramanyam and Salisu (1991) provide empirical support for this hypothesis.

<sup>10</sup> Furthermore, Nunnenkamp and Spatz (2004) find that R&D expenditure by US affiliates increases with the level of protection afforded by intellectual property rights.

<sup>11</sup> Barrios and Strobl (2002) stress the importance of the proxy chosen to evaluate the absorptive capacity of domestic firms. Using Spanish data, they note that when a dummy variable is considered with a value of one if the firm undertakes R&D, there are no FDI spillovers. On the contrary, when a dummy variable is included with a value of one if the firm exports, the impact is positive.

<sup>12</sup> Of course this is a data-driven range and we should therefore be cautious about its generalization.

<sup>13</sup> This contrasts with the above-mentioned result obtained by Barrios and Strobl (2002). See note 11.

<sup>14</sup> In this case, the sector at the 4-digit level is excluded.