
Disentangling FDI Spillover Effects: What Do Firm Perceptions Tell Us?

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Policymakers in developing countries place attracting foreign direct investment (FDI) high on their agenda, expecting FDI inflows to bring new technologies and know-how to their economy, which will help increase the productivity and competitiveness of domestic industries. Many governments go beyond national treatment of multinationals by offering foreign companies, through subsidies and tax holidays, more favorable conditions than those granted to domestic firms. As economic rationale for this special treatment, policymakers often cite positive externalities generated by FDI through productivity spillovers to domestic firms.

Despite its importance to public policy choices, there is little conclusive evidence on whether domestic firms benefit from foreign presence in their country. Research based on firm-level panel data, which examines whether the productivity of domestic firms is correlated with the extent of foreign presence in their sector, tends to produce mixed results and often fails to find a significant effect in developing countries. However, the picture is more optimistic for vertical spillovers, namely those occurring through contact between multinationals and their local suppliers of intermediate inputs. New research (e.g., Javorcik 2004b) demonstrates that the productivity of domestic firms is positively correlated with the presence of multinationals in downstream industries.

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This chapter's purpose is to shed some light on the difficulties facing researchers tackling the issue of FDI spillovers. We examine horizontal and vertical spillovers in the context of Romania and the Czech Republic and demonstrate how starkly the conclusions may differ depending on the country analyzed, despite using the same methodology and comparable data. Then we discuss potential explanations for these differences by arguing that a plethora of issues may have prevented researchers from reaching clear-cut conclusions on the subject.

In the context of intraindustry (or horizontal) spillovers researchers face the challenge of disentangling the positive impact of knowledge flows from the potentially negative short-run effect that an increase in competitive pressures from foreign entry may have on some domestic firms.¹ Since it is difficult to capture each phenomenon separately, most of the empirical results reflect the combined effect of the two forces. To demonstrate that the two effects actually occur, we choose a somewhat unconventional approach and focus on local firms' perceptions of how foreign presence in the same sector has affected their performance. The perceptions, collected in surveys commissioned by the World Bank in Latvia and the Czech Republic in 2003, confirm the existence of knowledge transfer through the demonstration effect and the movement of labor. The perceptions also confirm the presence of the competition effect, which in the short run may have an adverse effect on some firms. Moreover, they illustrate that the relative prevalence of the two effects differs across countries and thus provide a plausible explanation for the differences in the results for different economies.

The situation is no less complex in the case of vertical spillovers from multinationals to their local suppliers, since several scenarios are also possible. The first possibility is "cherry picking." In this scenario multinationals simply award contracts to the best local firms that already possess the required level of sophistication and thus spillovers do not occur. The second scenario is that potential suppliers experience a positive productivity shock and subsequently reach a sufficient level of productivity to work with a multinational. This shock may come from either the multinational's assistance before starting a sourcing relationship or a local firm's own efforts motivated by the prospect of a new business relationship. It may also be completely unrelated to either cause. The third possibility is that local suppliers improve their performance *while* doing business with a multinational due to more stringent requirements or knowledge transfer from the multinational. Finally, a combination of these mechanisms may occur. All, except the first scenario, would lead researchers to conclude that

1. Keep in mind that spillovers are only one way in which FDI inflows affect the host economy. Thus, even if spillovers result in a negative distributional effect on a particular group (e.g., shareholders in local businesses in this case), the host economy as a whole may benefit from the presence of foreign investors.

the productivity of domestic firms in the supplying sector is positively correlated with the presence of foreign firms in downstream industries. Again, all, apart from the “cherry picking” scenario, can be viewed as broadly defined spillovers. However, the analysis, which relies on industry-level proxies for vertical spillovers, does not pinpoint which of the above-mentioned mechanisms is at play. Doing so would be interesting and useful as each scenario may have a different policy implication. To learn about the plausibility of each scenario we again turn to the survey data.

Finally, we review several recent studies that suggest that the existence and extent of FDI spillovers may be driven by the composition of FDI inflows, adding to the difficulties facing researchers examining this question. For instance, spillovers may be affected by the incidence of wholly owned subsidiaries relative to projects with shared domestic and foreign ownership as well as by the nationality of foreign investors.

In the face of difficulties associated with capturing spillover effects and the multitude of factors that can influence the extent of spillovers in each economy, we caution researchers about drawing generalized conclusions about the existence of externalities associated with FDI in developing countries.

A Tale of Two Countries and Two Spillover Patterns

A Brief Look at the Relevant Literature

Spillovers from FDI occur when the entry or presence of multinational corporations increases the productivity of domestic firms in a host country and the multinationals do not fully internalize the value of these benefits. Spillovers may occur when local firms improve their efficiency by copying technologies or marketing techniques of foreign affiliates either through observation or by hiring workers trained by the affiliates. Another kind of spillover occurs if multinational entry leads to more severe competition in the host country market and forces local firms to use their existing resources more efficiently or to search for new technologies (Blomström and Kokko 1998).

If domestic firms and multinationals compete in the same sector, the latter have an incentive to prevent technology leakage and spillovers from occurring. This can be achieved through formal protection of their intellectual property, trade secrecy, paying higher wages to prevent labor turnover, or operating only in countries or industries where domestic firms have limited imitative capacities to begin with. Several studies (for example, Aitken, Harrison, and Lipsey 1996, Girma, Greenaway, and Wakelin 2001) document that foreign firms pay higher wages than domestic enterprises. Multinationals are also sensitive to the strength of intellectual property rights protection in host countries (Javorcik 2004b).

However, multinationals have no incentive to prevent technology diffusion to upstream sectors, since they may benefit from the improved performance of intermediate input suppliers. Thus, contacts between multinational firms and their local suppliers are the most likely channel through which spillovers would manifest themselves. Such spillovers may occur through: (1) direct knowledge transfer from foreign customers to local suppliers; (2) imposing higher requirements for product quality and on-time delivery, which provide incentives to domestic suppliers to upgrade their management or technology; and (3) multinational entry increasing the demand for intermediate products, which allows local suppliers to reap the benefits of scale economies.

Indeed, existing literature has found more evidence in favor of vertical rather than horizontal spillovers in developing countries. For instance, studies by Aitken and Harrison (1999) on Venezuela, Djankov and Hoekman (2000) on the Czech Republic, and Konings (2001) on Bulgaria, Romania, and Poland cast doubt on the existence of horizontal spillovers from FDI in these countries. These researchers either fail to find a significant positive effect or produce evidence of negative spillovers. In other words, the presence of multinational corporations is found either to have no impact or to negatively affect domestic firms in the same sector. This result, however, cannot be generalized to include all developing countries. For example, Damijan et al. (2003) detect the presence of positive intraindustry spillovers in Romania but not in six other transition economies, including the Czech Republic. At the same time, Kinoshita (2001) reports that research and development (R&D)-intensive sectors in the Czech Republic benefit from horizontal spillovers.²

The evidence that vertical spillovers occur through contact between multinationals and their local suppliers appears to be stronger. The results, which are consistent with the existence of such spillovers in developing countries, have been provided by Blalock and Gertler (2004) for Indonesia, Javorcik (2004a) for Lithuania, and Schoors and van der Tol (2001) for Hungary. However, as we discuss later in this chapter, not all types of FDI appear to be associated with vertical spillovers.

Searching for Spillovers in Romania and the Czech Republic

We use case studies of Romania and the Czech Republic to examine the differences in horizontal and vertical spillovers. To make the results as comparable as possible, we use the same data source (*Amadeus* database), the same time period (1998–2000), use and the same methodology. Both

2. For a survey of the literature on horizontal spillovers, see Görg and Strobl (2001).

countries share the common heritage of more than 40 years of central planning, both started transformation to a free-market economy in the early 1990s, and both enjoy relatively large pools of skilled labor. However, their transition paths have been different: Although the Czech Republic made large strides in reform at the beginning of the last decade, reforms in Romania have lagged behind. As a result, the Czech Republic has been receiving large FDI inflows for over 10 years while foreign investors have been more cautious with Romania and started entering the country on a larger scale only in the second half of the 1990s.

For each country we estimate a production function regression in which we allow foreign firms to affect the productivity of domestic enterprises through horizontal and backward linkages. We estimate the model in first differences and employ the semiparametric estimation procedure suggested by Olley and Pakes (1996) to calculate the total factor productivity (TFP). Since we are interested in the effect foreign presence has on the local economy, we estimate the model on the sample of domestic firms. In addition, we include time, industry and region dummies, and correct standard errors to take into account the fact that the measures of potential spillovers are industry specific while the observations in the dataset are at the firm level.³

The results for Romania, presented in the first two columns of table 3.1, provide evidence consistent with the existence of intraindustry spillovers from FDI. The magnitude of the effect is economically meaningful as a one-standard-deviation increase in the presence of multinationals in the same sector results in a 3.3 percent increase in the value added of each domestic firm. The presence of a positive effect confirms the results of Damijan et al. (2003), who examined this question using the Romanian data from the same source but concentrated on the earlier period (1994–98) and employed a different methodology. As for vertical spillovers, we do not find a significant effect in our preferred specification with the Olley-Pakes correction and thus conclude that FDI in downstream sectors has no effect on the productivity of domestic firms in the supplying industries.

The results for the Czech Republic (presented in columns three and four) contrast with the findings for Romania. The proxy for intraindustry effects is not statistically significant, which is again consistent with the results of Damijan et al. (2003). Furthermore, there appears to be no evidence of vertical spillovers.

How can we explain the differences between the findings for Romania and the Czech Republic? While it is possible that they can be attributed to differences in the host country characteristics, the short period covered by the analysis, or the shortcomings of the dataset, in the remainder of the chapter we focus on other potential explanations.

3. More details about the dataset, variable definitions, and other methodological issues can be found in Javorcik and Spatareanu (2003).

Table 3.1 Production function regression: Results for Romania versus Czech Republic, 1998–2000

	Romania		Czech Republic	
	$\Delta \ln VA$	$\Delta \ln TFP$	$\Delta \ln VA$	$\Delta \ln TFP$
$\Delta \ln K$	0.127*** (0.004)		0.116*** (0.022)	
$\Delta \ln L$	0.573*** (0.010)		0.313*** (0.077)	
$\Delta \ln horizontal$	0.0031* (0.0016)	0.0028* (0.0016)	0.0047 (0.0041)	-0.0003 (0.0043)
$\Delta \ln vertical$	20.0043** (0.0021)	-0.0034 (0.0022)	0.0095 (0.0167)	0.0095 (0.0168)
Observations	71,517	71,517	7,400	7,303
Adjusted R ²	0.13	0.02	0.04	0.02
F-stat	53.15	10.87	3.57	2.54
Prob > F-stat	0.00	0.00	0.00	0.00

***, **, * denotes significance at the 1, 5, and 10 percent level, respectively.

Δ = change in

F-stat = F-statistic

K = capital

L = labor

\ln = natural logarithm

TFP = total factor productivity

VA = value added

Notes: Logarithm of TFP has been calculated using the Olley-Pakes methodology. All models include year, industry, and region-fixed effects. Standard errors corrected for clustering on industry year are listed in parentheses.

Source: Authors' calculations.

Dissecting Horizontal Spillovers

Aitken and Harrison (1999) postulated that the presence of multinationals may have two opposing effects on domestic firms operating in the same industry. On the one hand, foreign presence may enhance the productivity of domestic firms through knowledge transfer. Such transfer may occur as local producers observe technologies and marketing techniques used by multinationals or hire workers trained by foreign companies. On the other hand, foreign firms entering the same industry may take market share away from local companies forcing them to spread the fixed costs over a smaller production scale, increasing the average cost and resulting in a lower observed productivity. While this effect may disappear in the long

run as less competitive local producers exit, it may be observable in the period immediately following the foreign entry.

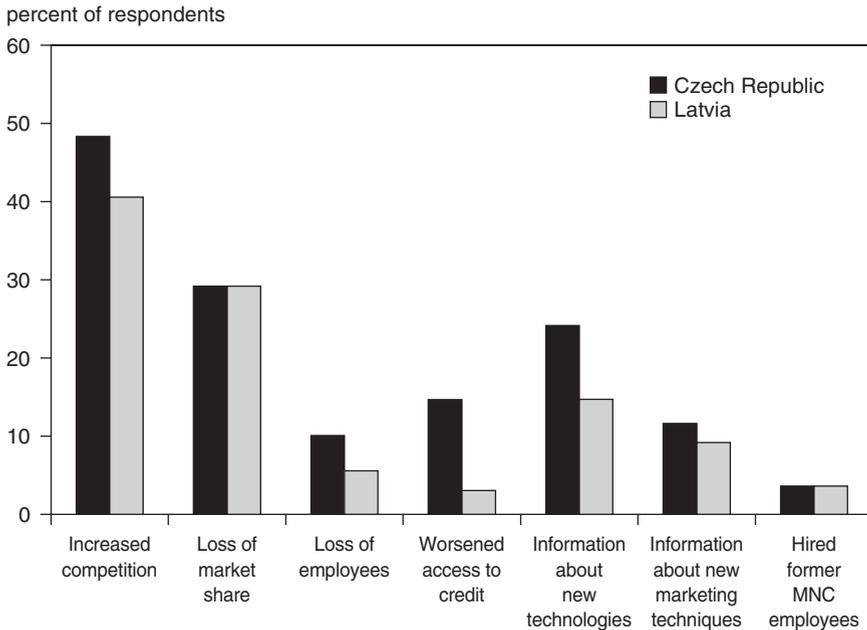
It is challenging to disentangle the two effects in an econometric analysis, and, thus, depending on the relative strength of the knowledge transfer versus the competition effect, various studies have produced very different results depending on the country and the time period in question or even the methodology applied. Moreover, very few studies have made a serious attempt to control for the competition effect. A notable exception is a study by Haskel, Pereira, and Slaughter (2002) that included proxies for industry concentration, import penetration, and a firm's market share in the estimation. However, the study focused on the United Kingdom and not on a developing country.

Even though the explanation focusing on the two opposing effects appears to be plausible, does any evidence confirm its validity? Rather than adding the above-mentioned controls to our econometric analysis, which would be associated with high data requirements as we would want to work with all the firms in the Czech Republic rather than a sample, we use a somewhat unconventional approach and simply ask firms about the effects the entry of multinationals into their sector has had on their operation.

This approach may be subject to several criticisms. First, survey respondents may not answer the questions truthfully. We believe that this is unlikely to be a serious concern, since both surveys were conducted by highly reputable companies that guaranteed full anonymity to respondents. Moreover, respondents were free to decline in participating in the survey or answering a particular question. The second, more serious, concern is that the perceptions of firms may be influenced by their performance. For instance, firms in a difficult financial situation may be likely to blame their poor performance on the "unfair competition" from foreign affiliates operating in their industry. While this concern is valid, the correlations between firms' perceptions and performance, presented below, do not always follow the expected direction, which provides some indication that the extent of bias may be limited. Nevertheless keeping this concern in mind, we only consider correlations without trying to infer the direction of causality. In sum, while we are aware of the potential pitfalls of our approach, we believe that the survey results can inform the discussion of FDI spillovers.

The enterprise surveys, presented in this chapter, were commissioned by the Foreign Investment Advisory Services (FIAS), a joint facility of the World Bank and the International Finance Corporation, in Latvia and the Czech Republic during 2003. Both surveys were conducted by professional polling companies through face-to-face interviews at respondents' offices. All respondents were guaranteed full anonymity. In Latvia, 407 firms were interviewed and 52 percent of respondents were located in the capital city of Riga while the rest were located around the country. Of the 407 firms, 67 percent of respondents were private domestic firms, 19 percent privatized state-owned companies, 2 percent were firms remaining in public hands, and

Figure 3.1 Perceived effects of FDI in the Czech Republic and Latvia



MNC = multinational corporation

Source: Authors' calculations.

11 percent were firms with foreign capital participation. In the Czech Republic, 391 local companies and 119 multinationals were interviewed. About 21 percent of the respondents were located in the capital city of Prague while the rest were located across all regions of the country. All of the companies included in the survey were private. In both countries, the surveys focused on the manufacturing sectors. The results of the Czech survey are supplemented with financial information on interviewed firms from the *Amadeus* database. Such information is available for about 114 local firms in the sample. The additional information mainly covers the 1995–2000 time period.

The perceptions of local firms collected in the surveys suggest that indeed there may exist two opposing effects associated with foreign entry. As illustrated in figure 3.1, 48 percent of the interviewed Czech firms believed that the presence of multinationals increased the level of competition in their sector. The same was true of 41 percent of Latvian enterprises. About 29 percent of firms in each country reported losing market share as a result of FDI inflow. Six to ten percent of firms lost employees to multinationals. Finally, 15 percent of Czech firms and 3 percent of Latvian enterprises

believed that foreign presence worsened their access to credit. There is also some evidence in favor of knowledge spillovers. Almost 25 percent of respondents in the Czech Republic and 15 percent in Latvia learned about new technologies from multinationals. Similarly, 12 percent and 9 percent, respectively, of the respondents in the Czech Republic and Latvia benefited from learning about new marketing techniques by observing multinationals. Thus, the survey results indicate the presence of the demonstration effect. The movement of labor, however, seems to have been less prevalent as only 4 percent of firms in both countries reported hiring workers previously employed by multinationals.

The relative importance of the positive and negative impacts differs between the two countries. For instance, while 29 percent of firms in both countries believed they lost market share to multinationals, only 15 percent of Latvian firms seemed to benefit from the demonstration of new technologies compared to 24 percent of Czech companies.

How do these perceptions translate into actual firm performance? We use the Czech data to examine correlations between perceptions and firm performance in terms of employment changes and total factor productivity (TFP) growth between 1997 and 2000.⁴ While correlations do not tell us anything about the direction of causality, we still find them instructive. As illustrated in figure 3.2, firms reporting rising competitive pressures as a result of foreign entry experienced a larger increase in employment relative to companies that were not affected by FDI inflows. Moreover, they also had a faster productivity growth.⁵ On the other hand, firms reporting loss of market share, which they attributed to foreign presence in their sector, experienced a much larger decline in employment and a slower TFP growth than other firms (see figure 3.3). Companies that lost employees to multinationals saw a larger drop in employment and a higher increase in productivity (figure 3.4).

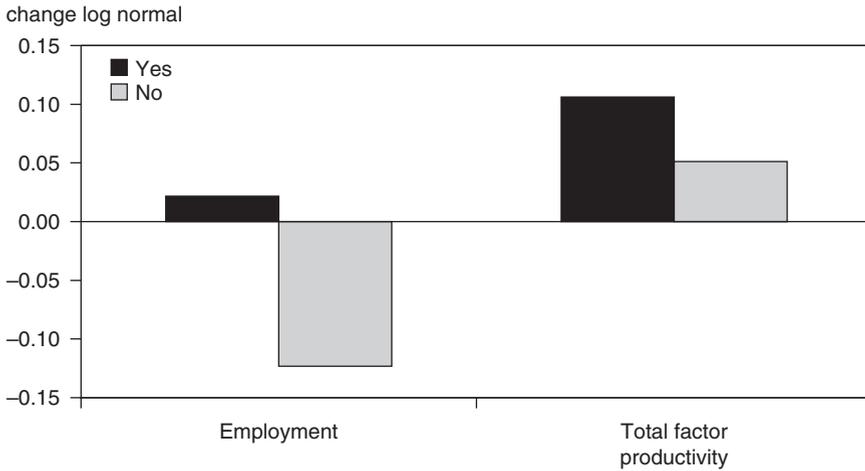
Turning to the firms' perceptions about knowledge flows, those that reported learning about new technologies from multinationals outperformed others in terms of employment and productivity growth (figure 3.5). The same was true of Czech enterprises that hired workers previously employed by multinationals (figure 3.6).⁶ Czech firms claiming to benefit from information about new marketing strategies used by multinationals did worse with respect to productivity (figure 3.7). We stress again that we

4. TFP levels are calculated based on the figures from the *Amadeus* database using the Olley-Pakes (1996) procedure applied to the pooled sample, since the small number of observations does not allow for estimation for each industry separately. The change in TFP is defined as $\ln TFP_{i2000} - \ln TFP_{i1997}$, and the change in employment is calculated analogously.

5. It is possible that foreign entry led to the exit of least productive firms and resulted in the survival of the firms with the greatest potential for productivity improvements. Unfortunately, we are unable to capture this in our sample.

6. The seemingly missing bar for the "yes" group in figure 3.7 is because the average change in employment was close to zero.

Figure 3.2 Entry of MNCs increased competition in the Czech Republic, 1997–2002 (average change)



MNC = multinational corporation

Source: Authors' calculations.

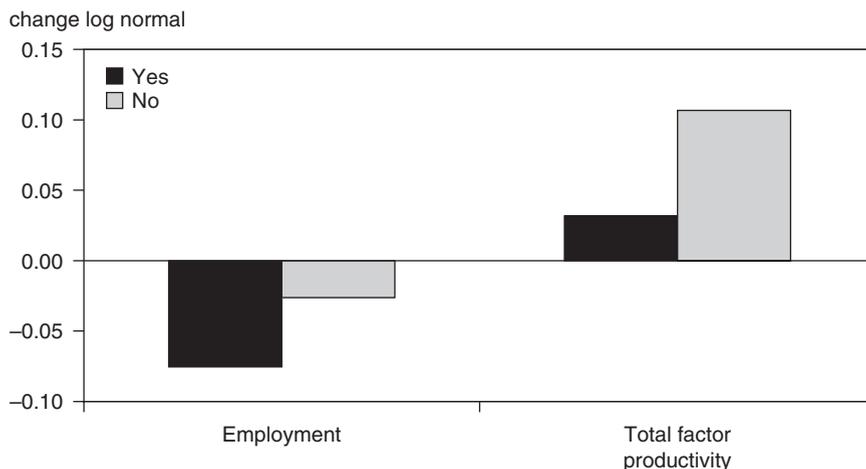
are unable to infer causality from these correlations since, for instance, firms that are in general better positioned to improve their productivity may also be able to take advantage of knowledge spillovers. Similarly, firms may improve their performance thanks to the knowledge brought by workers trained by multinationals or better-performing firms may attract employees previously working for multinationals.

In summary, the survey results are consistent with the existence of both positive and negative effects associated with foreign entry into an industry. Thus, they suggest that the econometric studies, which rely on estimating production functions and do not have good controls for the level of competition and the movement of labor between foreign and domestic firms, are most likely capturing the combined effect of the increased competition and knowledge transfer. Since the relative magnitude of the effects will likely vary by country, different results from various studies are not surprising.

How Do Vertical Spillovers Work?

While the existing literature is quite upbeat about the existence of vertical spillovers from FDI, the studies tell us little about the mechanism behind the observed correlation attributed to vertical spillovers. As mentioned in the introduction, several possibilities exist.

Figure 3.3 Czech firms lost market share due to entry of MNCs, 1997–2000 (average change)



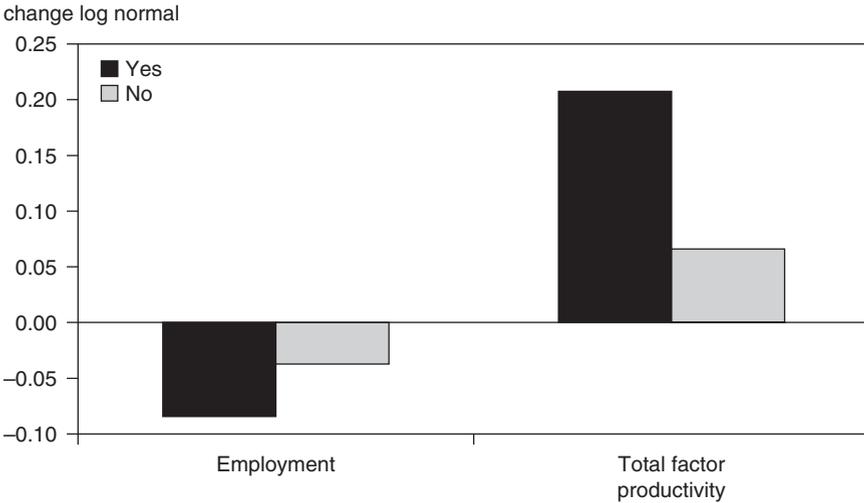
MNC = multinational corporation

Source: Authors' calculations.

First, it is possible (though less likely) that vertical spillovers do not occur. Multinationals “cherry pick” by simply awarding contracts to the best local firms that are already advanced enough to fulfill the necessary requirements. Multinationals may also choose to operate in countries and sectors where local sourcing is possible, or, if the host country’s level of development does not allow for local sourcing, multinationals may choose to import intermediate inputs. However, to the extent that the existing studies control for the latter phenomenon, their results suggest a limited plausibility of this scenario.

The second scenario is that potential suppliers experience a positive productivity shock and subsequently reach a sufficient level of productivity to work with a multinational. This shock may come from either the multinational’s assistance before starting a sourcing relationship or a local firm’s own efforts motivated by the prospect of a new business relationship. It may also be completely unrelated to either cause. The difference between this scenario and the one outlined above is that by offering the prospect of more lucrative contracts (thanks either to higher prices or greater reliability of payments) multinationals create incentives for local firms to improve themselves and in this way their presence becomes associated with spillovers. The self-selection of firms to supply multinationals would be analogous to the findings of the literature on exporting. For instance, Bernard and Jensen (1999) and Clerides, Lach, and Tybout (1998) show that more productive firms become exporters but no improvements in produc-

Figure 3.4 Czech firms lost employees to MNCs, 1997–2000
(average change)



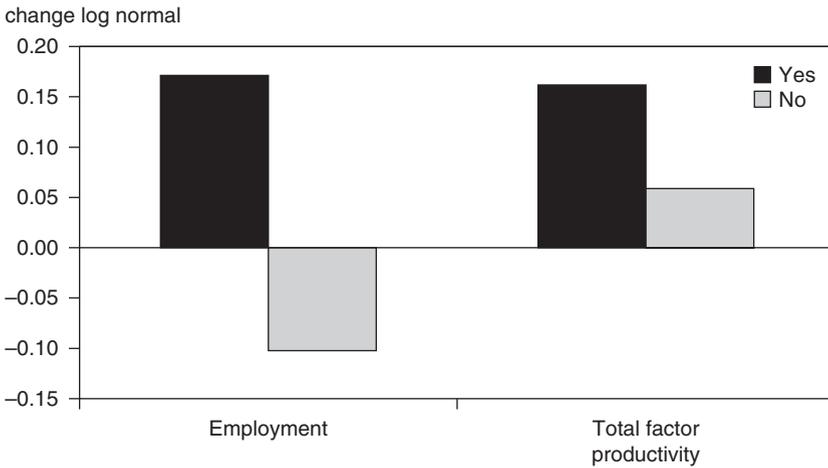
MNC = multinational corporation

Source: Authors' calculations.

tivity are registered due to learning from selling in foreign markets. The plausibility of this mechanism has also been demonstrated in the theoretical literature. In a general equilibrium model with productivity heterogeneity across firms, Melitz (2003) shows that if there are sunk costs associated with export market entry, firms with higher ex ante productivity self-select into exporting, while those with lower productivity choose to supply only the domestic market. Given the fact that multinational corporations tend to have higher requirements in terms of quality, technological sophistication, and on-time delivery, especially when compared to domestic buyers in developing and transition economies, becoming a supplier to a multinational is likely to be associated with some fixed cost on the part of local firms.

The third possibility is that local suppliers improve their performance *while* doing business with a multinational due to more stringent requirements or knowledge transfer from the multinational. There are several reasons why we would expect this to happen. By interacting with multinationals, local firms expose themselves to greater competition, since they compete not only with other local firms but also with potential suppliers from abroad. Local firms are also under pressure to improve their performance in order to retain their supplier status. Further, as suggested by anecdotal evidence (Moran 2001), they may also benefit from direct assis-

Figure 3.5 Czech firms learned about new technologies from MNCs, 1997–2000 (average change)



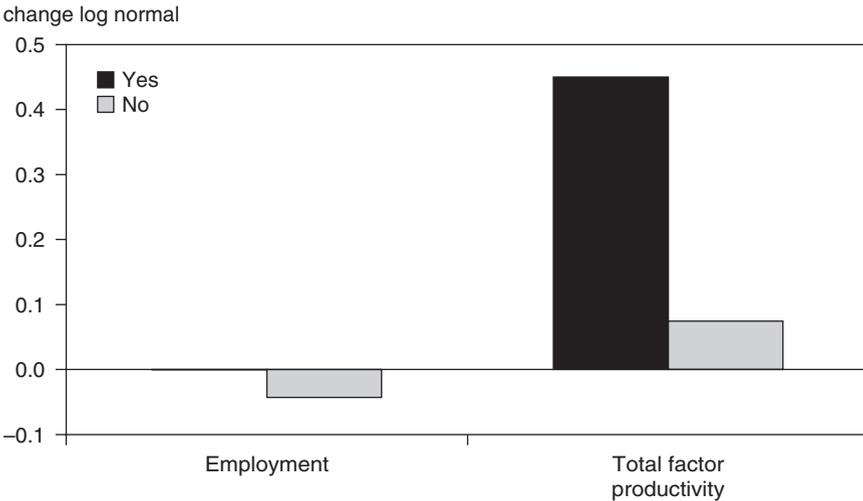
MNC = multinational corporation

Source: Authors' calculations.

tance and knowledge transfer from their multinational customers. Finally, a combination of these mechanisms may occur.

All except the first scenario would lead researchers to conclude that the presence of foreign firms in downstream industries is positively correlated with the productivity of domestic producers in the supplying sector. Again, all, apart from “cherry picking,” can be viewed as broadly defined spillovers. However, the analysis, which relies on industry-level proxies for vertical spillovers, does not pinpoint which of the above-mentioned mechanisms is at play. Doing so would be interesting and useful as each scenario may have a different policy implication. For instance, if indeed local suppliers learn from their interactions with multinationals, then using policy instruments to attract FDI or establishing supplier development programs may be justified. If, however, the improvements in productivity result from the prospect of receiving more lucrative contracts from foreign buyers, then a similar outcome could be achieved by securing better access to foreign markets through multilateral or preferential trade agreements and/or facilitating the flow of information about foreign markets and business opportunities available there. In the next section we return to the Czech survey to shed some light on this complex issue. First, however, we set the context by demonstrating that local sourcing is indeed widespread among multinationals operating in the Czech Republic.

Figure 3.6 Czech firms hired employees trained by MNCs, 1997–2000 (average change)



MNC = multinational corporation

Source: Authors' calculations.

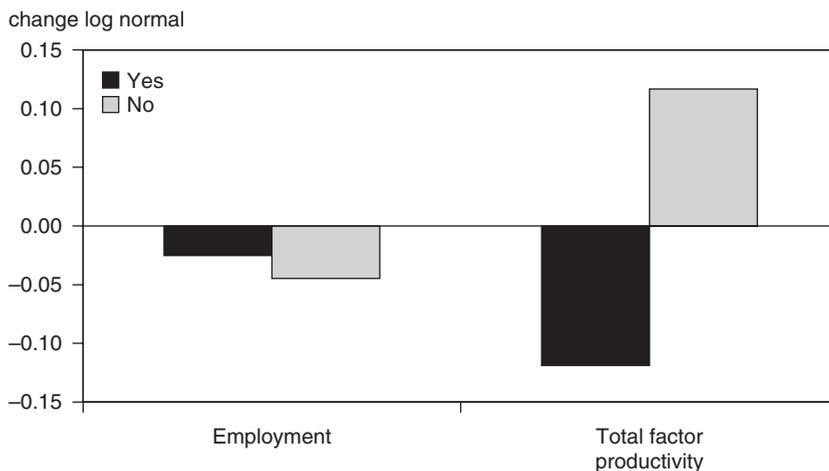
Determinants of Multinationals' Sourcing Patterns

In order to gain some understanding of the factors driving the sourcing pattern and the decision making process of multinationals, 119 multinationals operating in the Czech Republic were included in the survey. The interviewed firms were majority-owned foreign subsidiaries representing almost all manufacturing industries: fabricated metals (19 firms); publishing and printing (14); rubber (11); machinery (10); apparel (9); electrical machinery (9); food products (8); textiles (7); nonmetallic mineral products (7); furniture (6); pulp and paper (4); wood products (3); chemicals (3); radio, TV, and communications equipment (3); leather (2); basic metals (1); medical equipment (1); motor vehicles (1); and other transport equipment (1).

The survey results suggest that multinationals are actively engaged in local sourcing in the Czech Republic. Of the multinational respondents, 90 percent reported purchasing inputs from at least one Czech company.⁷ The median multinational in the sample had a sourcing relationship with 10 Czech suppliers while a multinational in the top quartile had at least 30. As illustrated in table 3.2, Czech companies were the most important supplier group, followed by other European suppliers (located in the European

7. Note that the question specifically asked respondents not to include suppliers of services, such as catering or cleaning.

Figure 3.7 Czech firms learned about new marketing strategies from MNCs, 1997–2000 (average change)



MNC = multinational corporation

Source: Authors' calculations.

Union or Eastern Europe) and then other multinationals operating in the Czech Republic. There was also a limited amount of sourcing from North America, Russia, and the Commonwealth of Independent States (CIS).

When asked about the current share of inputs purchased from each type of supplier (in terms of value), multinationals indicated sourcing *on average* 48.3 percent of inputs from Czech enterprises, as compared to 33.3 and 12.6 percent from firms in the European Union/Eastern Europe and multinationals located in the Czech Republic, respectively (see figure 3.8).⁸ The share of inputs coming from the other regions appeared to be negligible. Since the average figures do not always give an accurate impression, it is worthwhile to report some more statistics. Fifty-five out of the 114 multinationals that answered this question reported buying at least 50 percent of their inputs from Czech suppliers. More than 10 percent of respondents acquired all of their intermediates from Czech enterprises. Approximately 40 percent of multinationals expected to purchase more inputs from Czech suppliers in the future. However, the anticipated increase is unlikely to be large (see figure 3.8).

The sourcing patterns of multinationals appear to be quite persistent. There is a large correlation (.9) between the share of local inputs sourced at present and that expected in the next 2 to 3 years. Having said that, the

8. Note that multinationals with no sourcing from a particular group of suppliers are included in that group's average.

Table 3.2 Distribution of MNC suppliers in the Czech Republic, 1997–2000

	Czech firms	MNCs operating in the Czech Republic	European Union or Eastern Europe	North America	Russia/ Commonwealth of Independent States
Number of multinationals reporting each type of suppliers	107	56	85	18	9
Multinational (25th percentile)	5	2	2	1	1
Median multinational (50th percentile)	10	4	5	1	2
Multinational (75th percentile)	30	10	10	4	2

MNC = multinational corporation

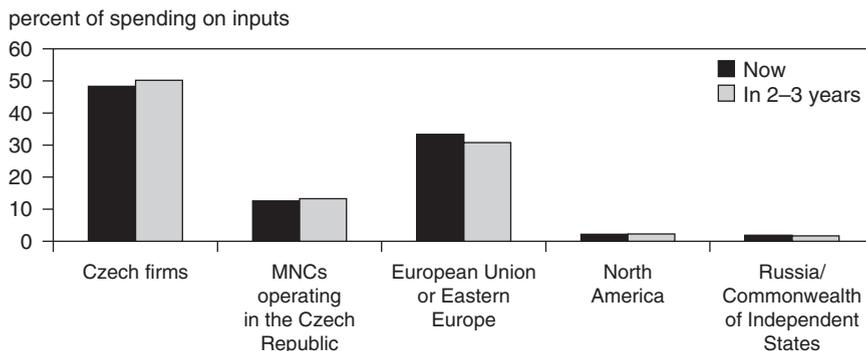
Source: Authors' calculations.

future increase in local sourcing is likely to come from multinationals that either do not purchase their intermediates locally or those with limited local sourcing. Multinationals buying the majority of intermediates from Czech suppliers expect a slight decline in the coming years (see table 3.3 for more details).

The multinational's decision to choose one type of supplier over another is driven by several factors. The top reasons reported for cooperating with Czech suppliers included: low prices (71 percent); geographic proximity, which allowed for a better relationship with a supplier (64 percent); savings on transport costs (56 percent); and savings on import duties (44 percent). Sourcing from foreign firms located in the Czech Republic was primarily driven by the fact that these firms were global suppliers of the multinationals (45 percent) and offered more competitive prices (45 percent), higher-quality products (29 percent), or products not available from Czech firms (29 percent). As before, savings on transport costs (34 percent) and benefits of proximity (30 percent) mattered as well. Finally, importing inputs from abroad was primarily driven by using a parent company's global suppliers (46 percent), implementing the decision of the parent company (37 percent), unavailability of particular products from Czech firms (36 percent), or desire to purchase higher-quality inputs (30 percent). In 80 percent of cases, management at the multinational plant in the Czech Republic rather than foreign owners based abroad made the sourcing decisions.

When asked about the reasons for not sourcing more from Czech firms, multinationals pointed to the lack of suitable products (38 percent), the inability of Czech firms to make timely deliveries (19 percent), and local

Figure 3.8 Share of intermediate inputs sourced by supplier type in the Czech Republic, 1997–2000



MNC = multinational corporation

Source: Authors' calculations.

firms' lack of resources required to become a supplier (16 percent). The fact that the decision to source from suppliers other than Czech firms is in many cases due to lower quality of goods sold by domestic firms. This suggests that for many local firms upgrading their products is a precondition to supplying multinationals.

The composition of inputs sourced by foreign customers again highlights the importance of having a high-quality product and the necessity of frequent upgrading, both of which are essential to a supplier's success with a multinational. Almost half of all inputs purchased by multinationals consisted of parts and components or final products (on average 32.4 and 15.6 percent, respectively). Raw materials constituted 36 percent and packaging 14 percent of purchased inputs.

While multinationals have high requirements vis-à-vis their suppliers, 20 percent of them also offered some type of support to the Czech companies they source from. Advance payment and financing were the most popular form of assistance, which is consistent with the finding (indicated earlier) that financial constraints are an obstacle to increasing sourcing from Czech firms. Employee training and help with quality control ranked second and third, respectively, which again reflect the importance of input quality in multinational sourcing decisions. Other types of assistance included: supplying inputs, lending/leasing machinery, providing production technology, financial planning, organization of production lines, business strategy, and finding export markets (see figure 3.9).

While the incidence of direct assistance to suppliers is not very high, its impact should not be underestimated. The benefits of support provided by multinationals to their local suppliers have been documented in numerous case studies from around the world (see Moran 2001). The following

Table 3.3 Expected changes to local sourcing patterns of MNCs in the Czech Republic

Share of intermediates currently sourced from Czech firms (percent)	Expected increase in 2–3 years (percent)	Number of respondents
0	6.4	14
1–25	3.1	27
26–50	2.0	20
51–75	–2.1	17
76–100	–0.1	35
Total	1.5	113

Source: Authors' calculations.

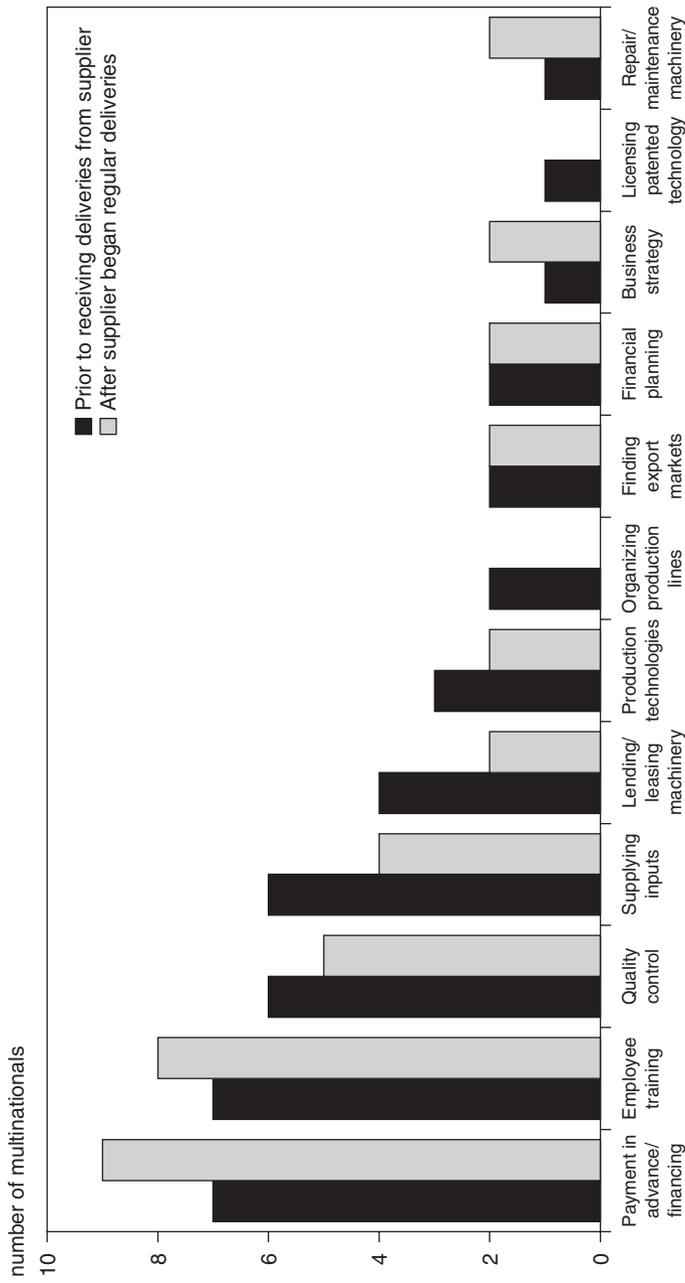
example from the Czech Republic may also serve as an illustration. After a Czech company, which makes castings of aluminum alloys for the automotive industry, signed its first contract with a multinational customer, the staff from the multinational visited the Czech firm's premises for two days each month to assist with the quality control system. Subsequently, the Czech firm applied these improvements to its other production lines (not serving this particular customer), thus reducing the number of defective items produced and improving overall productivity (Javorcik 2004a). Without doubt, such assistance contributes to the improved performance of the suppliers observed in the Czech Republic and other countries.

Mechanisms Behind Vertical Spillovers: What Do Survey Results Tell Us?

The responses to the survey provide some support to all three scenarios outlined earlier. They suggest that better-performing firms tend to get contracts from multinationals. They also indicate that local firms make improvements to their operations in anticipation of supplying multinationals, and, in some cases, local firms are assisted in this process by their prospective customers. Finally, the results show that multinationals offer assistance to their suppliers but its extent is limited.

We begin our discussion with arguments demonstrating that suppliers to multinationals tend to exhibit superior performance and that firms make improvements in order to become suppliers. The key factor that allows Czech companies to make sales to multinationals is having a product of suitable quality. This view is consistent with the fact that 80 percent of survey respondents sell the same product to both multinationals and local customers and only 5 percent of respondents sell an improved version of the product to multinationals and its basic version to local customers. Only 21 percent of firms reported developing the product specifically for the multinational customer and in only 5.5 percent of cases the multinational helped in the development process. In 26 percent of firms the product was

Figure 3.9 Assistance extended to domestic suppliers by MNCs operating in the Czech Republic



MNC = multinational corporation

Source: Authors' calculations.

developed in-house, and only 4 percent of companies developed products based on technology licensed from abroad.

While Czech suppliers appear to be engaged in product upgrading, a vast majority of such activities is based on their own efforts. More than a quarter of multinationals reported that the complexity and/or quality of products bought from the Czech suppliers increased during the two years before the study. In more than half of the cases, the supplier made improvements independently of the multinational. In the remaining cases, the improvement was a result of the multinational imposing higher requirements on their suppliers. Only in a handful of responses (15 percent) did multinationals indicate that the change was a direct result of the assistance provided to the supplier.

Having a suitable product is a necessary but not a sufficient condition for becoming a supplier. Many multinationals perform technical audits of their prospective suppliers and/or require quality certification, such as ISO 9000 awarded by the International Organization for Standardization (ISO).⁹ The technical audits, while not considered by multinationals as a form of assistance, may be invaluable to prospective suppliers since they may point out operational deficiencies they were previously unaware of. The same may be true of the ISO certification process. The pressure from multinationals is often the driving force behind obtaining the quality certifications, as 17 percent of Czech companies surveyed reported getting an ISO certification *in order to become suppliers to multinationals*. These firms constituted 40 percent of all companies reporting having such a certification.

The survey results also suggest that multinationals make a deliberate effort to transfer knowledge to their local suppliers, although its extent and form vary by country. For instance, 33 percent of the suppliers in Latvia and 14.6 percent in the Czech Republic reported receiving various forms of assistance from their multinational customers.¹⁰ Given the fact that credit constraints faced by local companies were mentioned by multinationals as one of the factors preventing them from sourcing more inputs locally, it is not surprising that advance payment and financing topped the list in both countries (see tables 3.4 and 3.5). It was followed by leasing of machinery and employee training in the Czech Republic and supplying inputs and organization of production lines in Latvia. Other forms of assistance were related to quality control, obtaining licenses for new technology, and production technology.

9. ISO 9000 is a quality standard that has become an international reference for quality requirements in business-to-business dealings. It refers to what the organization does to enhance customer satisfaction by meeting customer and applicable regulatory requirements as well as to continually improve its performance in this regard. For more details, see www.iso.org.

10. To make the results comparable between the two countries, in this case suppliers were defined as local firms selling to multinationals operating in their country or abroad.

Table 3.4 Assistance received by Czech suppliers^a from multinational customers

Assistance	Number of firms	Number providing assistance for a fee
Advance payment and financing	14	2
Leasing/lending machinery	7	2
Employee training	7	1
Quality control	5	1
Business strategy	5	0
Supplying inputs	2	1
Production technology	3	1
Organization of production lines	3	1
Finding export markets	3	1
Obtaining licenses for new technology	2	1
Financial planning	2	0
Maintenance of machinery	2	1
Inventory management	1	0

a. 25 companies reported receiving assistance.

Source: Authors' calculations.

While there is some evidence of technology transfer taking place (through leasing of machinery, assistance with production technology, or new technology licensing), the picture is consistent with the earlier observation that most companies in the Czech Republic acquire production technology on their own. Thus, the knowledge transfer is more likely to pertain to general business practices rather than specific technologies. Knowledge transfer takes the form of employee training, help with quality control, organization of production lines, or inventory management. While fees are charged for some forms of support, the majority of it is free.

The complexity of the issues outlined above suggests that further research is needed in order to better understand the mechanisms involved in vertical spillovers and their policy implications.

Further Complications—Do Characteristics of FDI Projects Affect Spillovers?

Our discussion so far has ignored a further complication in studying FDI spillovers, namely, the effect of the composition of FDI inflows. In this section, we focus on three examples of how the degree of foreign ownership, investor nationality, and market orientation of investors affect spillovers.

Why should the degree of foreign ownership influence the extent of horizontal spillovers? First, it is generally believed that the participation of local capital in an FDI project reveals the multinational's proprietary technology

Table 3.5 Assistance received by Latvian suppliers^a from multinational customers

Assistance	Number of firms	Number providing assistance for a fee
Advance payment and financing	15	8
Supplying inputs	12	10
Organization of production lines	9	5
Leasing/lending machinery	8	8
Employee training	7	4
Finding export markets	7	2
Production technology	4	0
Quality control	1	0
Obtaining licenses for new technology	1	1
Maintenance of machinery	1	1

a. 36 companies reported receiving assistance.

Source: Authors' calculations.

and thus facilitates spillovers. This belief has led many governments in developing countries to introduce restrictions on the extent of foreign ownership allowed in firms operating in their country.¹¹ The fear of technology leakage, especially in countries with a limited rule of law, may induce multinationals with the most sophisticated technologies to shy away from shared ownership and instead choose to invest only in wholly owned subsidiaries (for evidence see Smarzynska and Wei 2000; Javorcik and Saggi 2004). Moreover, Ramachandran (1993) demonstrates that foreign investors tend to devote more resources to technology transfer to their wholly owned subsidiaries than to partially owned affiliates. In the same manner, Mansfield and Romero (1980) point out that the transfer of technology is more rapid within wholly owned networks of multinationals' subsidiaries than to joint ventures or licensees. Hence, the overall relationship between the share of foreign ownership and spillovers is a result of two forces—local participation as a mechanism facilitating knowledge transfers versus a higher technological content and, thus, greater potential for spillovers of wholly owned projects.

Turning to determinants of vertical (or interindustry) spillovers, it has been argued that affiliates established through either joint ventures or mergers and acquisitions are more likely to source their inputs locally than those taking the form of newly created (or greenfield) plants (UNCTAD 2001). While the latter need to put significant efforts into developing linkages with local suppliers, the former can take advantage of the supplier relationships of the acquired firm or the local partner. Empirical evidence

11. For instance, in the 1980s restrictions on foreign ownership were present in China, India, Indonesia, Malaysia, Mexico, Nigeria, Pakistan, the Republic of Korea, and Sri Lanka (UNCTAD 1987).

to support this view has been found for Japanese investors (Belderbos, Capannelli, and Fukao 2001) and for Swedish affiliates in Eastern and Central Europe (UNCTAD 2001). Anecdotal evidence also suggests that foreign investors acquiring local firms in transition countries tend to dramatically reduce the number of local suppliers.

Several studies explore this issue. Two studies postulate that having a minority versus a majority stake in an investment project should translate into different levels of horizontal spillovers. While Blomström and Sjöholm (1999), employing cross-section data on Indonesian firms, find that there is no statistically significant difference between positive intraindustry spillovers associated with minority- and majority-owned foreign projects, Dimelis and Louri (2001), using cross-sectional data on Greek manufacturing firms, demonstrate that spillovers stemming from minority-owned foreign establishments are larger than those from majority-owned ones.

In contrast, in a recent study (Javorcik and Spatareanu 2003), we focused on differences in spillovers associated with wholly owned foreign affiliates and projects with joint domestic and foreign ownership. That analysis, based on an unbalanced panel of Romanian firms during 1998–2000, produced evidence consistent with positive intrasectoral spillovers resulting from the former but not the latter type of FDI. This finding is consistent with the argument that foreign investors tend to put more resources into technology transfer to their wholly owned subsidiaries than to partially owned projects. As for vertical spillovers, our results indicate that the presence of partially foreign-owned projects is correlated with higher productivity of domestic firms in upstream industries, which suggests that domestic suppliers benefit from contacts with multinational customers. The opposite is true, however, in the case of wholly owned foreign affiliates, which appear to have a negative effect on domestic firms in upstream industries. These results are consistent with the observation that foreign investors entering a host country through greenfield projects are less likely to source locally than those engaged in joint ventures or partial acquisitions. They are also in line with the evidence suggesting that wholly owned foreign subsidiaries use newer or more sophisticated technologies than jointly owned investment projects, and thus it may be more difficult for them to find suitable suppliers locally.

Similarly, Javorcik's (2004a) study on Lithuania shows that positive vertical spillovers are associated with projects with shared domestic and foreign ownership but not with wholly owned foreign investments.

Another characteristic of FDI inflows that may affect spillovers is the nationality of foreign investors. Javorcik, Saggi, and Spatareanu (2004), who examine this question in the context of Romania, argue that such differences are likely to exist for two reasons. First, as the theoretical models of vertical linkages predict, the share of intermediate inputs sourced by multinationals in a host country is positively correlated with the distance between the multinational's headquarters and the production plant in the

host country (Rodriguez-Clare 1996).¹² A larger share of local sourcing implies more contacts between multinationals and local firms in upstream sectors and a greater potential for knowledge transfer. Therefore, they expect a higher degree of vertical spillovers to be associated with American and Asian investors than with European multinationals, since home countries of the former are located much farther away from Romania.

Second, preferential trade agreements, which cover some but not all investors' home countries, are likely to affect the sourcing patterns of multinationals. For example, since Romania signed the Association Agreement with the European Union, its tariffs on imports from the European Union on the one hand, and United States and Japan on the other hand, are sharply different. During 1999, the average tariff applied by Romania on manufacturing imports from the United States and Japan was 15.78 percent, whereas the corresponding tariff on imports from the European Union was only 4.88 percent. Obviously, such a tariff structure creates a disincentive for American investors to source intermediates from their home country. Further, multinationals using Romania as an export platform can enjoy preferential (or even duty-free) access to the European Union provided a sufficient share of their product's value was added within the area covered by the agreement. This implies that while European investors' intermediate inputs purchased from their home country suppliers comply with the rules of origin, this is not the case for home country suppliers of American or Asian multinationals. Therefore, if multinationals cater primarily to export markets, American and Asian investors may have a greater incentive than European multinationals to source from Romania, and thus their presence may be associated with greater knowledge spillovers to Romanian firms in the supplying sectors.¹³

Further, the low propensity of European investors to source intermediate inputs from Romania may actually hurt domestic firms in upstream sectors. Entry of foreign investors is likely to increase the level of competition in downstream industries and drive weaker firms out of business. As they exit, part of their market share may be acquired by European multinationals, resulting in lower demand for domestically produced interme-

12. This prediction is confirmed by empirical evidence. Hanson, Mataloni, and Slaughter (2003) demonstrate that sales of intermediate inputs by US multinationals to their overseas affiliates decline with the trade costs.

13. Of course, this will not be true of all American or Asian investors, since many of them may still choose to import their inputs from the European Union. Nevertheless, a broad trend following this pattern could be expected. Similarly, a certain number of European investors could engage in local sourcing. Overall, however, one would expect that importing intermediate inputs would be more advantageous to European than to other multinationals, since they can combine sourcing for their headquarters, the Romanian plants, and possibly sister companies in Europe in order to enjoy volume discounts. It has been pointed out that centralized or pooled group sourcing arrangements may encourage affiliates to use foreign sources even when local suppliers are available (see UNCTAD 2001, 136).

mediate inputs. Moreover, European investors entering Romania by acquiring local firms are likely to sever existing linkages with local suppliers, which again lowers the demand for domestically produced intermediates. A drop in demand for intermediates will force producers in the supplying sectors to spread their fixed cost over a smaller market share and thus will lower their productivity.

Several case studies from the automotive industry suggest that investor nationality may affect the extent of local sourcing. For instance, UNCTAD (2001, 166) reports that in the case of Suzuki's investment in Hungary, the rules of origin under the Association Agreement with the European Union were a factor in the firm's decision to operate in the country, create local linkages, and increase local value added, in order to enjoy duty-free access for car exports to the European Union. Similarly, Daewoo, which invested in Romania, stated that it intended to reach a 60 percent localization level of production. In 1997, 16.9 percent of the components of Daewoo's Cielo model were produced in Romania, and the 300 Romanian components were supplied by 43 Romanian companies. In 1997, about 40 percent of Cielos produced in Romania were exported, mainly to other Eastern European countries that signed the Association Agreement with the European Union. On the other hand, when the French multinational Renault purchased an equity stake in Dacia, the Romanian car maker, in 1999, it promised to continue sourcing inputs from local suppliers provided they lived up to its expectations. This, however, does not seem to have been the case. In 2002, 11 foreign suppliers of the French group were expected to start operating in Romania, thus replacing the Romanian producers from whom Dacia used to source (*Ziarul Financiar* [Financial Newspaper], April 19, 2001).

Javorcik, Saggi, and Spatareanu (2004) test their hypothesis using Romanian data from the *Amadeus* database for the period 1998–2000. They find a statistically significant and positive association between the presence of American and Asian companies in downstream sectors and the productivity of Romanian firms in the supplying industries. At the same time, the productivity of Romanian firms in the supplying sectors is negatively correlated with the operations of European investors in downstream industries. The differences between the effects associated with investors of different origin are statistically significant. The findings are robust to controlling for firm-specific fixed effects. Moreover, the results do not change after implementing the Olley and Pakes (1996) correction for endogeneity of input selection. Javorcik, Saggi, and Spatareanu (2004) conclude that the observed pattern is consistent with the hypothesis that FDI inflows from distant source countries and from countries that are not part of preferential trade agreements are more likely to be associated with local sourcing and vertical productivity spillovers.

Finally, there is yet another factor that may influence the degree of vertical spillovers—the market orientation of foreign investors. Case studies and the evidence from specific sectors suggest that domestic market-oriented

affiliates tend to source more locally than foreign affiliates focused on exporting. Export-oriented affiliates may source higher-quality inputs, thus leading to greater learning on the part of suppliers. Javorcik (2004a) looked at this question in the context of Lithuania and found that there is some indication that domestic market-oriented FDI projects are correlated with greater productivity spillovers to local suppliers in upstream sectors, but the evidence is not very robust.

Conclusions

Despite its importance to public policy, there is little conclusive evidence on the existence of spillovers in developing countries. It is a complex issue with no easy answers. As discussed above, in the face of difficulties associated with capturing the spillover effects and the multitude of factors that can influence the extent of spillovers in each country, we caution researchers about using limited evidence to draw generalized conclusions about the existence of externalities associated with FDI in developing countries.

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