DISENTANGLING FDI SPILLOVER EFFECTS:

WHAT DO FIRM PERCEPTIONS TELL US?

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Introduction

Policy makers in developing countries place attracting foreign direct investment (FDI) high on their agenda, expecting FDI inflows to bring new technologies, know-how and thus contribute to increasing 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, they often cite positive externalities generated by FDI through productivity spillovers to domestic firms.

Despite being hugely important 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. The picture is more optimistic in the case of vertical spillovers, namely those taking place through contacts between multinationals and their local suppliers of intermediate inputs, as several existing studies demonstrate that the productivity of domestic firms is positively correlated with the presence of multinationals in downstream industries.

The purpose of this paper is to shed some light on the difficulties facing researchers tackling the issue of FDI spillovers. To motivate our discussion, 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 the fact that the same methodology and comparable data are employed. Then we proceed to discuss potential

explanations for these differences in findings arguing that a plethora of issues may have prevented researchers from reaching clear-cut conclusions on the subject.

In the context of intra-industry (or horizontal) spillovers the challenge facing researchers lies in disentangling the positive impact of knowledge flows from the potentially negative short-run effect an increase in competitive pressures due to foreign entry may have on some domestic firms.[1] Since it is difficult to capture each phenomenon separately, in a vast majority of cases 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 perceptions of local firms on 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 both through the demonstration effect and the movement of labor. They are also consistent with 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 lack of uniformity in the results obtained for different economies.

The situation is no less complex in the case of vertical spillovers from multinationals to their local suppliers, as several scenarios are possible here as well. The first possibility is "cherry picking," that is multinationals simply award contracts to the best local firms that already posses the required level of sophistication and thus no spillovers take place. The second scenario is that potential suppliers experience a positive productivity shock after which they reach the productivity level sufficient to obtain a contract from a multinational. This shock may be a result of help extended by the foreign customer before starting a sourcing relationship, a result of own

[1] One needs to keep in mind that spillovers are only one of many ways 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.

efforts on the part of a local firm motivated by the prospects of a new business relationship or may be completely unrelated to either. The third option is that local suppliers improve their performance after starting to supply a multinational due to higher requirements imposed on them or assistance provided by the foreign customer. 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 firms in the supplying industries. And all, apart from the "cherry picking" scenario, can be viewed as broadly defined spillovers. However, the analysis relying on industry-level proxies for vertical spillovers does not allow for pinpointing which of the above mentioned channels is at play. Doing so would be interesting and useful as each mechanism may have different policy implication. To learn about the plausibility of each scenario we again turn to the survey data for help.

Finally, we review several recent studies suggesting 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.

The Tale of Two Countries and Two Spillover Patterns

A brief look at the relevant literature

Spillovers from FDI take place 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 take place 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).

To the extent that domestic firms and multinationals operating in the same sector compete with one another, the latter have an incentive to prevent technology leakage and spillovers from taking place. This can be achieved through formal protection of their intellectual property, trade secrecy, paying higher wages to prevent labor turnover or locating in countries or industries where domestic firms have limited imitative capacities to begin with. Several studies, for instance, Aitken, Harrison and Lipsey (1996), Girma, Greenaway and Wakelin (2001), have documented that foreign firms pay higher wages than domestic enterprises. Multinationals have also been found to be sensitive to the strength of intellectual property rights protection in host countries (Javorcik, 2004a).

However, multinationals have no incentive to prevent technology diffusion to upstream sectors, as 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 take place through: (i)

direct knowledge transfer from foreign customers to local suppliers; (ii) higher requirements for product quality and on-time delivery introduced by multinationals, which provide incentives to domestic suppliers to upgrade their management or technology; and (iii) multinational entry increasing the demand for intermediate products, which allows local suppliers to reap the benefits of scale economies.

And indeed the 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 effect or produce evidence of negative spillovers. In other words, the presence of multinational corporations is found to either have no impact or to negatively affect domestic firms in the same sector. This result, however, does not appear to generalize to all developing countries, as for example, Damijan et at. (2003) detect the presence of positive intra-industry spillovers in Romania but not in six other transition economies, including the Czech Republic. At the same time, Kinoshita (2001) reports that R&D intensive sectors in the Czech Republic benefit from horizontal spillovers.[2]

The evidence on vertical spillovers taking place through contacts between multinationals and their local suppliers appears to be stronger. The results consistent with the existence of such spillovers in developing countries have been produced by Blalock and Gertler (2004) for Indonesia, Javorcik (2004b) for Lithuania, and Schoors and van der Tol (2001) for Hungary. However, as will be discussed in the later part of this chapter, not all types of FDI appear to be associated with vertical spillovers.

[2] For a survey of the literature on horizontal spillovers see Gorg and Strobl (2001).

Searching for spillovers in Romania and the Czech Republic

To give an example of differences in findings on horizontal and vertical spillovers we examine this question in the context of Romania and the Czech Republic. To make the results as comparable as possible, we draw on the same data source (*Amadeus* database), use the same time period (1998-2000) and the same methodology. Both countries share the common heritage of more than forty years of central planning, both started transformation to a free market economy in the early 1990s and both enjoy relatively high endowment of skilled labor. Their transition paths have, however, been different: as the Czech Republic made large strides 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 ten years while foreign investors have been more cautious with respect to 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. Further, 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 data set are at the firm level.[3]

The results for Romania, presented in the first two columns of Table 1, provide the evidence consistent with the existence of intra-industry spillovers from FDI. The magnitude of

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

the effect is economically meaningful as a one-standard deviation increase in the presence of multinationals in the same sector results in 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 (1994-1998) 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 3 and 4), contrast with the findings for Romania. The proxy for intra-industry effects is not statistically significant, which is again consistent with the results of Damijan et al. (2003). Further, there appears to be no evidence of spillovers operating through the vertical channel.

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 paper we focus on other potential explanations.

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, knowledge transfer may be taking place as local producers observe technologies and marketing techniques used by foreigners or hire workers trained by multinationals and in this way increase their own productivity. 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 paper by Haskel et al. (2002) who include proxies for industry concentration, import penetration and a firm's market share in the estimation, but focus on the United Kingdom and not on a developing country.

Even though the explanation focusing on the two opposing effects appears to be plausible, is there any evidence confirming 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, for instance, to work with the population of 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 as both surveys have been conducted by highly reputable companies which guaranteed full anonymity to respondents. Moreover, respondents were free to decline being interviewed or answer 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 the approach, we believe that the survey results can inform the discussion on 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 were conducted by professional polling companies by means of face-to-face interviews taking place at respondents' workplaces. All respondents were guaranteed full anonymity. In Latvia, 407 firms were interviewed, fifty-two percent of which were located in the capital city of Riga with the rest distributed around the country. Sixty-seven percent of respondents were private firms, 19 percent privatized state-owned companies and 2 percent firms remaining in public hands. Eleven percent of the interviewed firms had received foreign investment. In the Czech Republic, 391 local companies and 119 multinationals were interviewed. About one-fifth of respondents was located in the capital city of Prague while the rest was distributed across all regions of the country. All of the companies considered were private. In both countries, the surveys focused on 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 a third of

local firms in the sample and encompasses 114 companies. The additional information covers mainly the period 1995-2000.

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 Chart 1, forty-eight percent of Czech firms interviewed believed that the presence of multinationals increased the level of competition in their sector. The same was true of two-fifth of Latvian enterprises. Almost thirty 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 a quarter of respondents in the Czech Republic and 15 percent in Latvia learned from multinationals about new technologies. Twelve and 9 percent, respectively, benefited from information on new marketing techniques, thus giving support to the demonstration effect. The movement of labor, however, seems to have been less prevalent as only four percent of firms reported hiring workers previously employed by multinationals.

The relative importance of the positive and negative forces differs between the two countries. For instance, while in both countries 29 percent of firms believed they lost market share to multinationals, only 15 percent of Latvian firms seemed to benefit from the demonstration of new technologies, as 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 TFP growth between 1997 and 2000.[4] While correlations do not tell us anything

[4] TFP levels are calculated based on the figures from the *Amadeus* database using the Olley-Pakes procedure applied to the pooled sample as the small number of observations does not allow us for estimation for each industry

about the direction of causality, we still find them instructive. As illustrated in Chart 2, firms reporting rising competitive pressures as a result of foreign entry experienced a larger increase in employment relative to companies which were not affected by FDI inflows. Moreover, they also had a faster productivity growth.[5] On the other hand, firms reporting loss of a 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 Chart 3). Companies which lost employees to multinationals saw a larger drop in employment and a higher increase in productivity (Chart 4).

Turning to the perceptions on knowledge flows (Charts 5-7), companies reporting learning from multinationals about new technologies outperformed others in terms of employment and productivity growth. The same was true of Czech enterprises which hired workers previously employed by multinationals.[6] On the other hand, firms claiming to benefit from information about marketing strategies used by foreign affiliates did worse with respect to productivity. We stress again that we are unable to infer causality from these correlations as, for instance, firms that are in general better positioned to improve their productivity due to better management may also be the ones able to take advantage of knowledge spillovers. Similarly, it could be that firms improve their performance thanks to the knowledge brought by workers trained by multinationals or that better performing firms attract employees previously working for foreign affiliates.

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separately. The change in TFP is defined as $\ln TFP_{i2000} - \ln TFP_{i1997}$, and the change in employment is calculated analogously.

[5] Of course, our sample does not capture firm exit that may have been stimulated by foreign entry and resulted in the survival of the firms with the greatest potential for productivity improvements.

[6] The seemingly missing bar for the 'yes' group Chart 7 is due to the average change in employment being close to zero.

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 at their disposal good controls for the level of competition or 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 magnitudes of the effects are likely to vary by country, different results obtained across a number of studies are not surprising.

How Do Vertical Spillovers Work?

While the existing literature is quite upbeat about the existence of vertical spillovers from FDI, as it has demonstrated that the productivity of domestic firms in upstream sectors is positively correlated with the presence of multinationals in the sourcing industries, the existing studies tell us little about the mechanism behind the observed correlation attributed to vertical spillovers. As mentioned in the introduction, there exist several possibilities.

First, it is possible (though less likely) that there are no vertical spillovers whatsoever. Multinationals "cherry pick" by simply awarding contracts to the best local firms that are already advanced enough to be able to fulfill the necessary requirements. Multinationals also choose to locate in countries and sectors where local sourcing is possible or if the host country's level of development does not allow for local sourcing they import intermediate inputs. However, to the extent that the existing studies were able to control for the latter phenomenon, their results suggest a limited plausibility of this scenario.

The second option is that potential suppliers experience a positive productivity shock after which they reach the productivity level sufficient to obtain contracts from a multinational.

This shock may be a result of help extended by the foreign customer before starting a sourcing relationship, deliberate efforts on the part of a local firm or may be unrelated to either. The difference between this scenario and the one outlined above is that by offering the prospect of more lucrative contracts (either thanks to higher prices or greater reliability of payments) multinationals create incentives for local firms to improve themselves and in this way their presence is associated with spillovers.

The self-selection of firms into supplying 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 productivity 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 (forthcoming) showed 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 MNC customers 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 foreign customer. There are several reasons why we would expect this to happen. By interacting with multinationals, local firms expose themselves to greater competition as they compete not only with other local firms but also with potential suppliers from abroad and are under pressure

to improve their performance in order to retain their supplier status. Further, as suggested by the anecdotal evidence (Moran 2001), they may also benefit from direct assistance 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. And all, apart from "cherry picking," can be viewed as broadly defined spillovers. However, the analysis relying on industry-level proxies for vertical spillovers does not allow to disentangle which of the mechanisms is at play. Doing so would be interesting and useful as each scenario may have different policy implication. For instance, if indeed local suppliers learn from their interactions with foreign affiliates then using policy instruments to attract FDI or establishing supplier development programs may be justified. If, on the other hand, what matters is having prospects of more lucrative contracts than those available from local customers then a similar outcome could be achieved by, for instance, facilitating 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.

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 foreign affiliates operating in the Czech Republic were included in the survey. The interviewed firms were majority-owned foreign subsidiaries

representing almost all manufacturing industries, namely, fabricated metals (19 firms); publishing and printing (14); rubber (11); machinery (10); apparel (9); electrical machinery (9); food products (8); textiles (7); non-metallic 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. Ninety percent of the multinational respondents reported purchasing inputs from at least one Czech company.[7] The median multinational in the sample has a sourcing relationship with 10 Czech suppliers while a multinational in the top quartile with at least 30. As illustrated in Table 2, Czech companies were the most important supplier group, followed by other European suppliers (located in the EU or Eastern Europe) and other multinationals operating in the Czech Republic. There was also a limited amount of sourcing from North America and Russia or the Commonwealth of Independent States.

When asked about the share of inputs purchased from each type of suppliers (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 EU/Eastern Europe and multinationals located in the Czech Republic, respectively (see Chart 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 114 multinationals, which answered this question, reported buying at least half of their inputs from Czech suppliers. More than a tenth of respondents acquired all of their intermediates from Czech enterprises. Around forty percent of multinationals expected to purchase more

[7] Note that the question specifically asked respondents not to include suppliers of services, such as catering or cleaning, etc.
[8] Note that multinationals with no sourcing from a particular group of suppliers are included in that group's average.

inputs from Czech suppliers in the future. However, the anticipated increase is unlikely to be large (see Chart 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 future increase in local sourcing is likely to come from multinationals which either do not purchase their intermediates locally or those with limited sourcing. Multinationals buying the majority of intermediates from Czech suppliers expect a slight decline in the coming years (see Table 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%), geographic proximity which allowed for a better relationship with a supplier (64%), savings on transport costs (56%) and savings on import duties (44%). On the other hand, 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%), offered more competitive prices (45%), higher quality products (29%) or products not available from Czech firms (29%). As before, savings on transport costs (34%) and benefits of proximity (30%) mattered as well. Finally, importing inputs from abroad was primarily driven by using company's global suppliers (46%), implementing the decision of the parent company (37%), unavailability of particular products from Czech firms (36%) or desire to purchase higher quality inputs (30%). In eighty percent of cases, the sourcing decisions were taken by the management of the multinational plant in the Czech Republic rather than foreign owners based abroad.

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

deliveries (19%), and lack of funding for investment necessary to become suppliers (16%). The fact that the decision to source inputs from suppliers other than Czech firms is in many cases due to lower quality of goods sold by domestic firms 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 successful performance as a supplier to 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.

While multinationals have high requirements vis-à-vis their suppliers, one-fifth 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 financial constraints being one of the obstacles to increasing sourcing from Czech firms, as indicated earlier. Employee training and help with quality control ranked second and third, which again reflects the importance of input quality in the multinational sourcing decision. 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 Chart 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 example from the Czech Republic may also serve as an illustration. After

a Czech company making 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 for an extended period of time 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 the overall productivity (Javorcik 2004b). 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 of the scenarios outlined earlier. They suggest that better performing firms tend to get contracts from multinationals, that local firms make improvements to their operations in anticipation of supplying multinationals and that in some cases they 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 a suitable quality. This view is consistent with the fact that eighty percent of survey respondents sell the same product to both multinationals and local customers, and only five percent of respondents sell an improved version of the product to multinationals and its basic version to local customers. Only twenty-one percent of firms reported developing the product specifically for the multinational customer and in only 5.5 percent of cases the foreign customer

helped in the development process. For a quarter of all firms the product was developed in house, and only in four percent of companies it is 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 past two years. In more than half of the cases, this change was due to the supplier making improvements independently of the multinational. In the remaining cases, the improvement was a result of the foreign customer introducing higher requirements. Only in a handful of responses (15%), multinationals indicated 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. The technical audits, while not considered by multinationals as a form of assistance, may be invaluable to prospective suppliers as they may point out to them operational deficiencies they were not previously aware 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 a deliberate effort is made on the part of the multinationals to transfer knowledge to their local suppliers, albeit its extent and form vary by country. For instance, one third of the suppliers in Latvia and 14.6 percent in the Czech Republic

reported receiving various forms of assistance from their multinational customers.[9] 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 4 and 5). It was closely 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, business strategy and production technology.

While there is some evidence of technology transfer taking place (through leasing of machinery, direct assistance with production technology or 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. It 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 there is a need for further research in order to gain a better understanding of 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

[9] 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.

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 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.[10] On the other hand, 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; and Javorcik and Saggi, 2002). Moreover, it has been demonstrated by Ramacharandran (1993) 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) pointed 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—and its sign is ambiguous.

Turning to determinants of vertical (or inter-industry) spillovers, it has been argued that affiliates established through joint ventures or mergers and acquisitions are more likely to source their inputs locally than those taking form of greenfield projects (UNCTAD 2001). While the latter need to put significant efforts into developing linkages with local suppliers, the former can

[10] 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).

take advantages of the supplier relationships of the acquired firm or the local partner. Empirical evidence to support this view has been found for Japanese investors (Belderbos et al., 2001) and for Swedish affiliates in Eastern and Central Europe (UNCTAD, 2000). On the other hand, anecdotal evidence suggests that foreign investors acquiring local firms in transition countries tend to dramatically reduce the number of local suppliers.

Several studies have explored this question. Two papers postulated that having a minority versus a majority stake in an investment project should translate into a different extent of horizontal spillovers. While Blomström and Sjöholm (1999) employing cross-section data on Indonesian firms found that there is no statistically significant difference between positive intra-industry spillovers associated with minority- and majority-owned foreign projects, Dimelis and Louri (2001) using cross-sectional data on Greek manufacturing firms, demonstrated that spillovers stemming from minority-owned foreign establishments are larger than those from majority-owned ones.

In contrast, Javorcik and Spatareanu (2003) focused on differences in spillovers associated with wholly-owned foreign affiliates and projects with joint domestic and foreign ownership. Their analysis, based on an unbalanced panel of Romanian firms during 1998-2000, produced the evidence consistent with positive intra-sectoral spillovers resulting from the former but not the latter type of FDI. This finding is in line 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, their results indicate that the presence of partially foreign owned projects is correlated with higher productivity of domestic firms in upstream industries suggesting that domestic suppliers benefit from contacts with multinational customers. The opposite was 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 (2004b) 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 characteristics of FDI inflows which 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 headquarters and the production plant in the host country (Rodrigues-Clare, 1996).[11] And 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

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

Romania signed the Association Agreements with the European Union (EU), its tariffs on imports from the EU and United States are sharply different. During 1999, the average tariff applied by Romania on manufacturing imports from the US and Japan was 15.78% whereas the corresponding tariff on imports from the EU was only 4.88%. 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 EU provided a sufficient share of their product's value was added within the area covered by the agreement. This implies that while for European investors intermediate inputs purchased from their home country suppliers comply with the rules of origin, this is not be 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.[12]

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 driving 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 intermediate inputs. Moreover, European investors entering Romania through acquisitions of local firms are likely to sever existing

[12] Of course, this will not be true of all American or Asian investors as many of them may still choose to import their inputs from countries covered by the Agreement. 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 as European multinationals can combine sourcing for their headquarters, 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 UNCTAC, 2001, p. 136).

linkages with local suppliers again lowering 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 cases studies from the automotive industry suggest that investor nationality may affect the extent of local sourcing. For instance, UNCTAD (2001, p. 166) reports that in the case of Suzuki's investment in Hungary rules of origin under the Association Agreement with the EU were a factor in the firm's decision to locate there, create local linkages and increase local value added, so as to enjoy duty-free access for car exports to EU markets. Similarly, Daewoo, which invested in Romania, stated that it intended to reach a 60 percent localization level of the production. In 1997, 16.9 percent of the components of Daewoo's Cielo model were produced in Romania, and these 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 which signed the Association Agreements with the EU. 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, eleven 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 et al. 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. The authors conclude that the observed pattern is consistent with the hypothesis that FDI inflows from far away source countries which 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. On the other hand, export-oriented affiliates may source higher quality inputs, thus leading to greater learning on the part of suppliers. Javorcik (2004b) 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

While finding convincing evidence on the existence of spillovers remains hugely important to informing public policy choices, it is a complex questions with no easy answers. As discussed above, producing conclusive evidence is hindered by the difficulties associated with disentangling various effects often working in opposite directions, taking into account the fact that the composition of FDI inflows as well as country characteristics may affect the extent of the

phenomenon. In the face of difficulties associated with capturing the spillover effects, 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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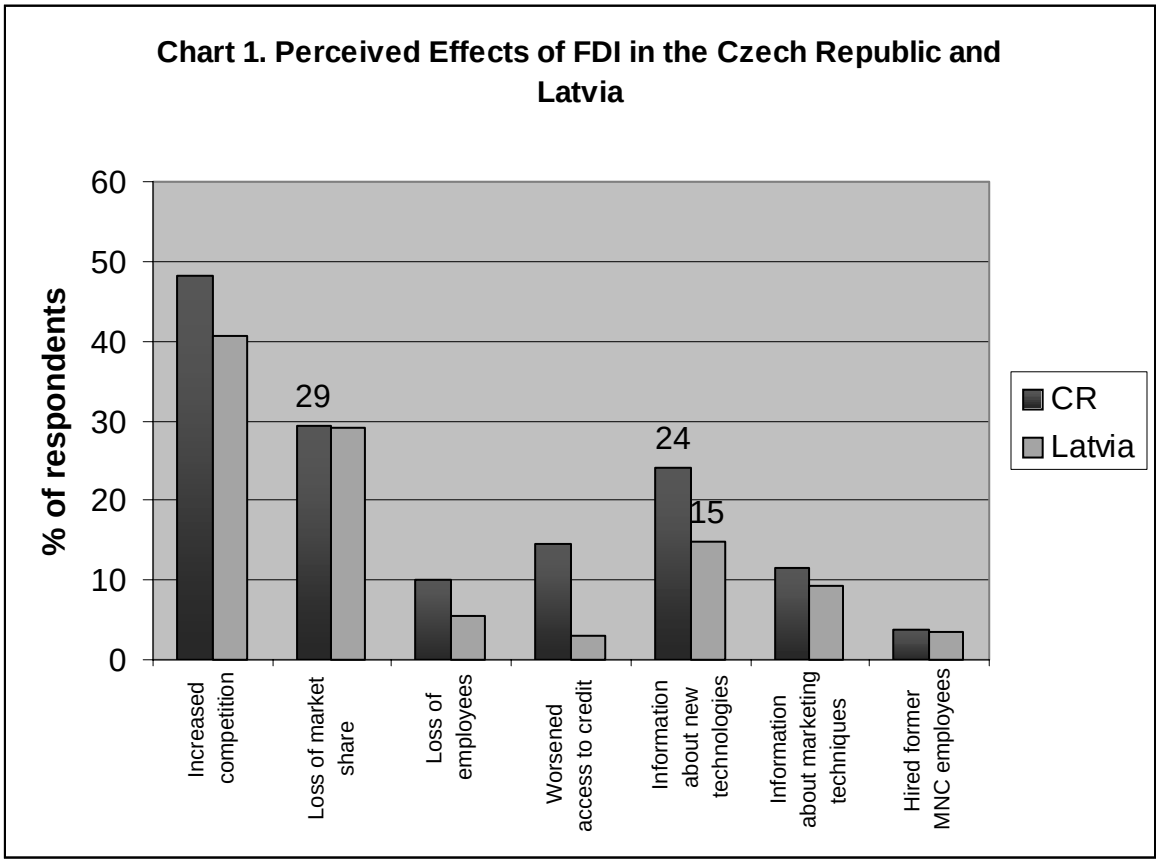
Chart 1. Perceived Effects of FDI in the Czech Republic and Latvia
% of respondents
60
50
40
30
20
10
0
29
24
15
CR
Latvia
Increased competition
Loss of market share
Loss of employees
Worsened access to credit
Information about new technologies
Information about marketing techniques
Hired former MNC employees

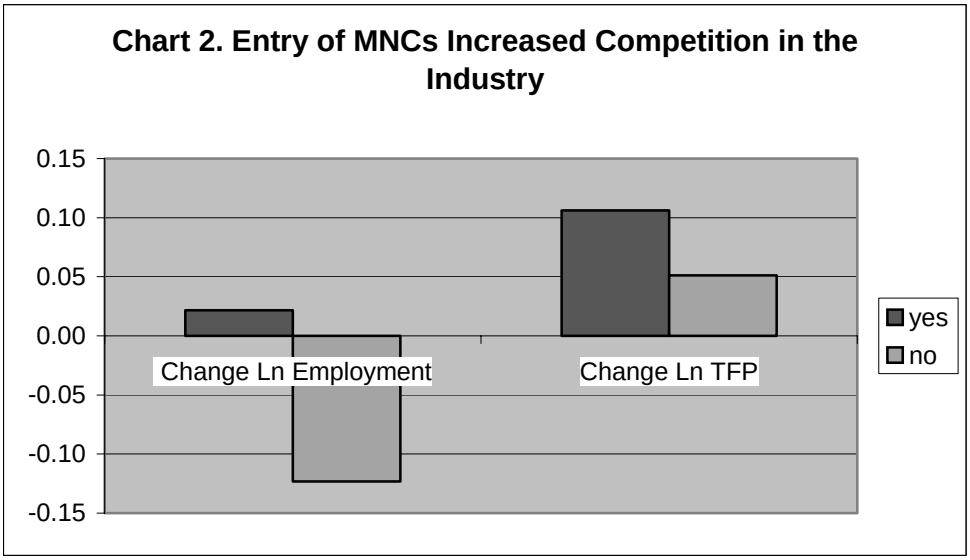
Chart 2. Entry of MNCs Increased Competition in the Industry
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
Change Ln Employment
Change Ln TFP
yes
no

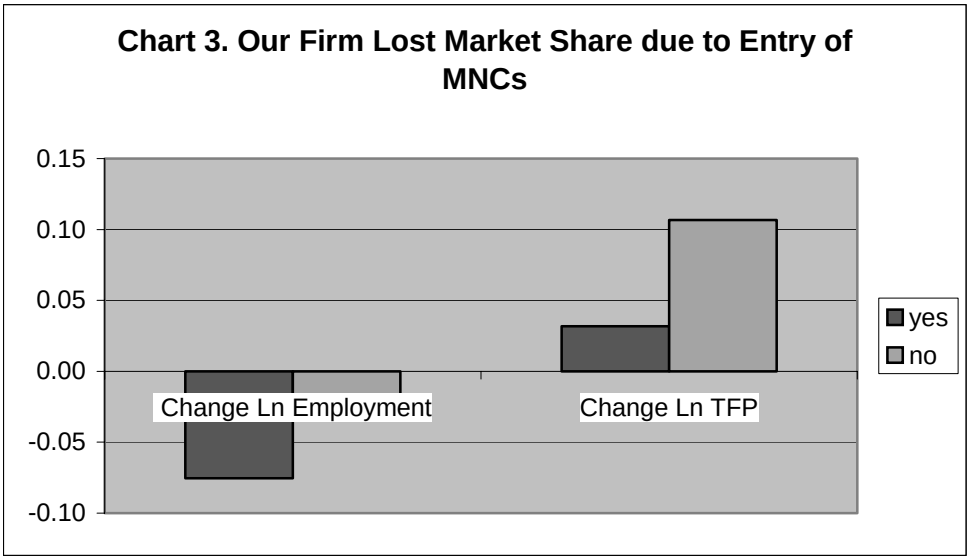
Chart 3. Our Firm Lost Market Share due to Entry of MNCs
0.15
0.10
0.05
0.00
-0.05
-0.10
Change Ln Employment
Change Ln TFP
yes
no

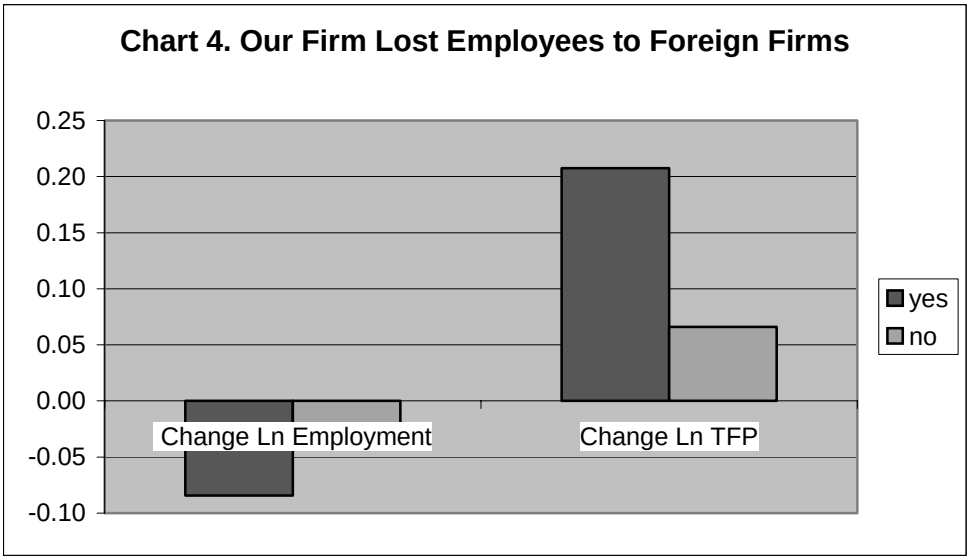
Chart 4. Our Firm Lost Employees to Foreign Firms
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
Change Ln Employment
Change Ln TFP
yes
no

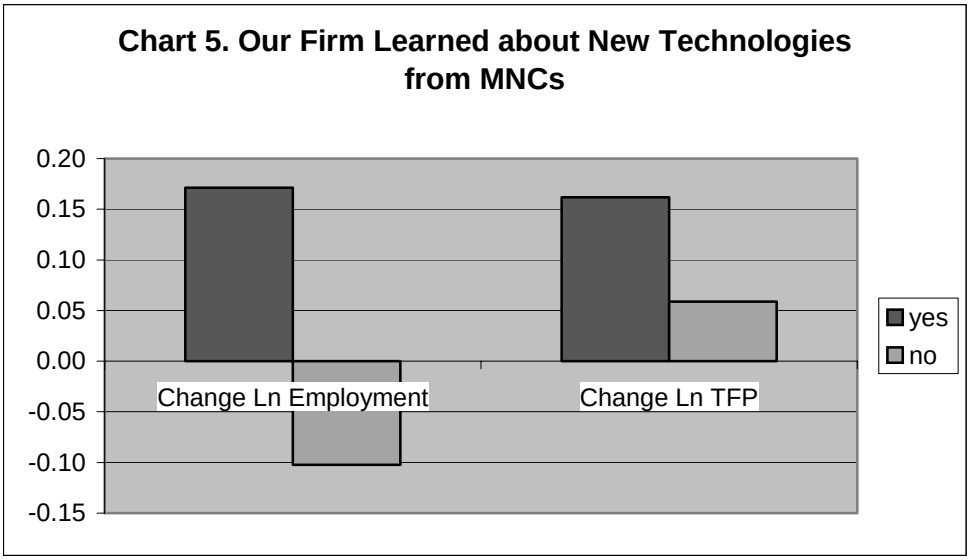
Chart 5. Our Firm Learned about New Technologies from MNCs
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
Change Ln Employment
Change Ln TFP
yes
no

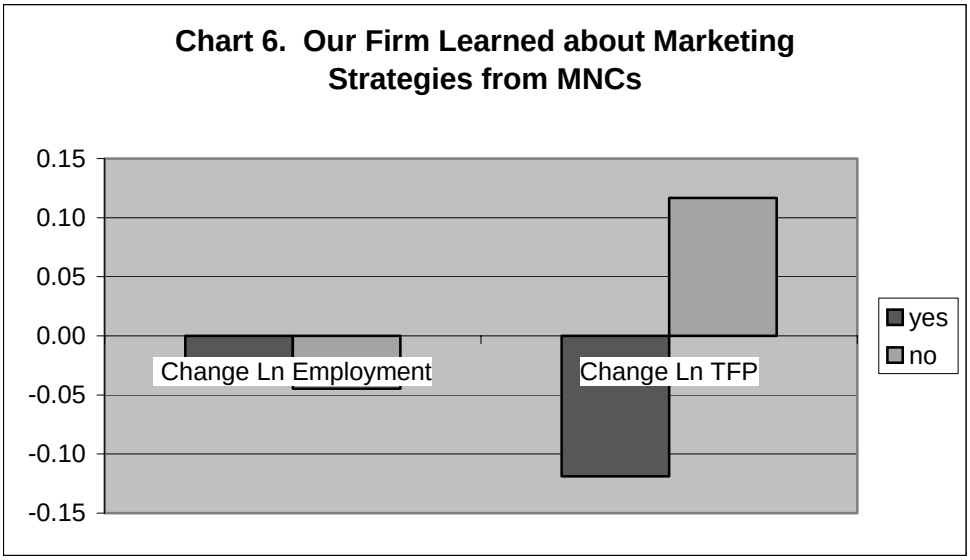
Chart 6. Our Firm Learned about Marketing Strategies from MNCs
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
Change Ln Employment
Change Ln TFP
yes
no

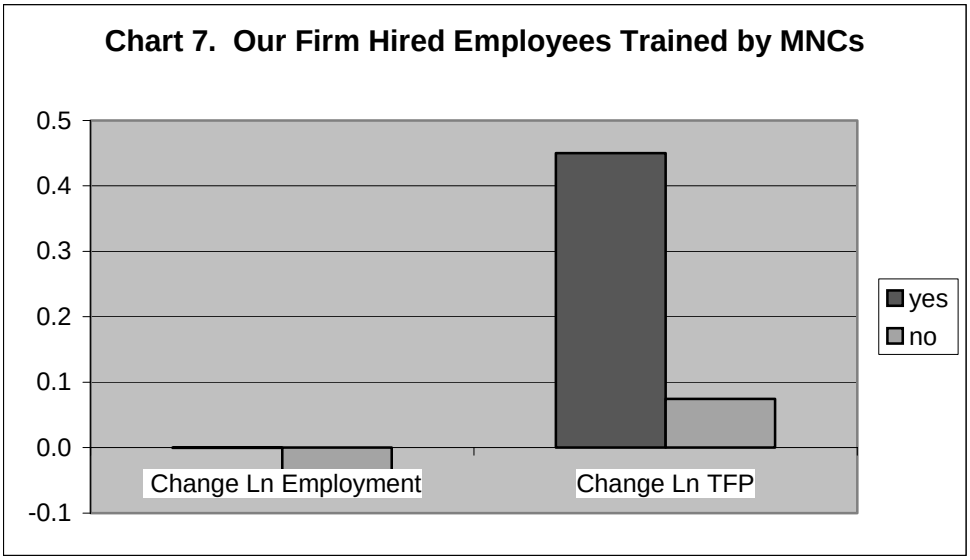
Chart 7. Our Firm Hired Employees Trained by MNCs
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
Change Ln Employment
Change Ln TFP
yes
no

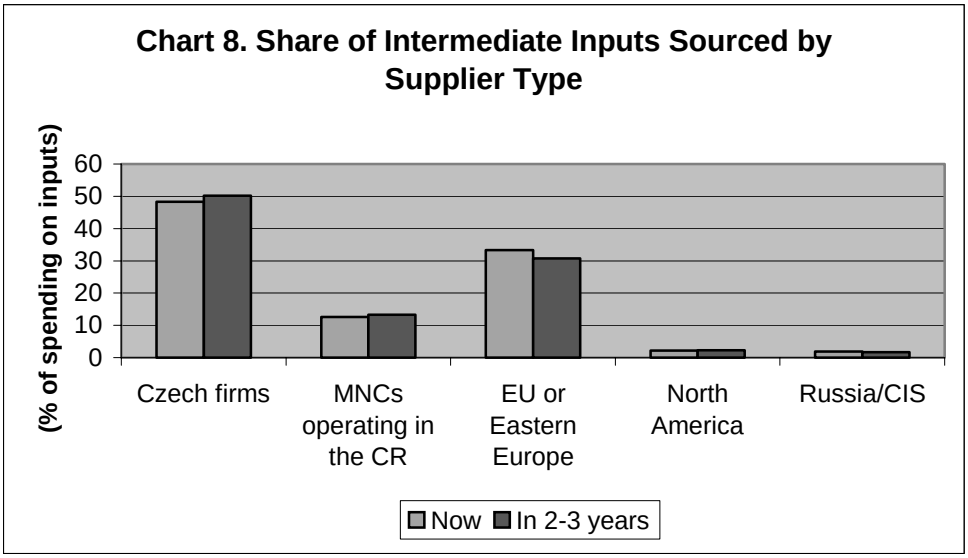
Chart 8. Share of Intermediate Inputs Sourced by Supplier Type
(% of spending on inputs)
60
50
40
30
20
10
0
Czech firms
MNCs operating in the CR
EU or Eastern Europe
North America
Russia/CIS
Now
In 2-3 years

Chart 9. Assistance Extended by Multinationals Operating in the Czech Republic to Domestic Suppliers

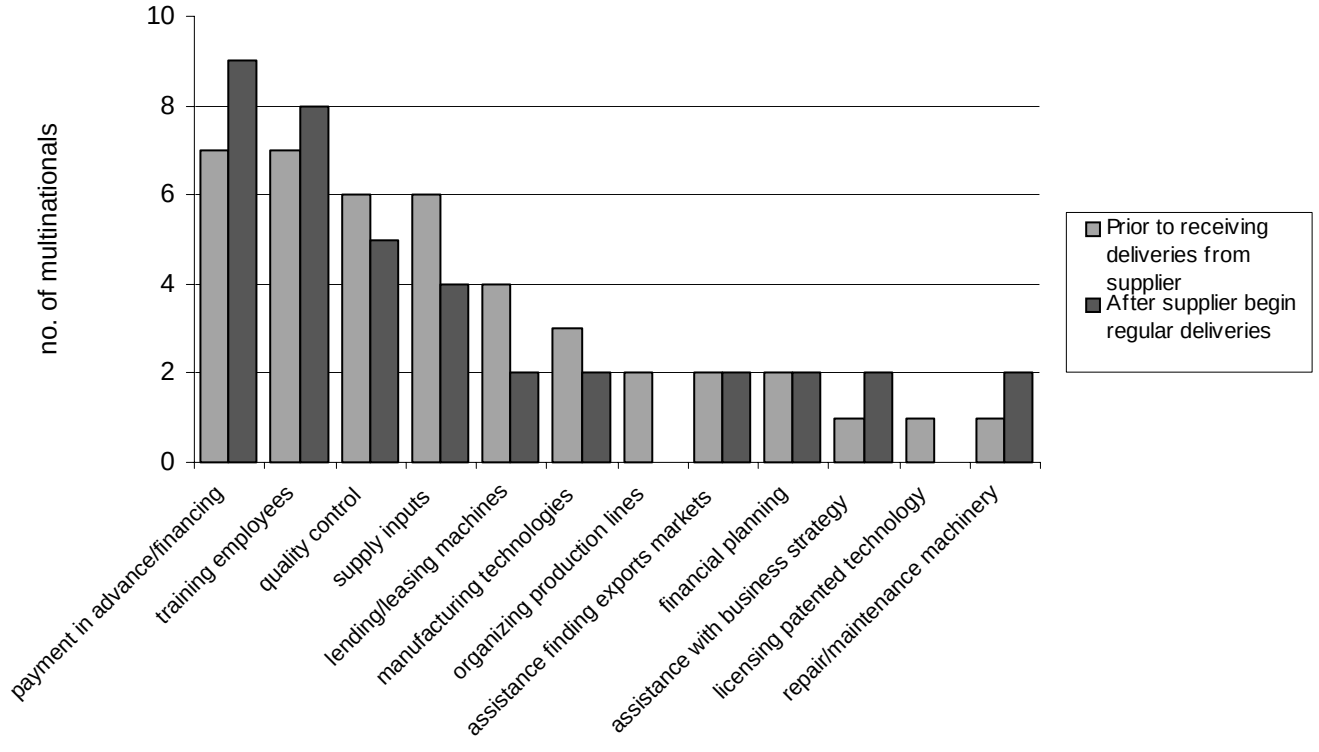

Table 1. Results for Romania vs. Czech Republic

	Romania		Czech Republic	
	Δ ln VA	Δ ln TFP	Δ ln VA	Δ ln TFP
Δ ln K	0.127***		0.116***	
	(0.004)		(0.022)	
Δ ln L	0.573***		0.313***	
	(0.010)		(0.077)	
Δ ln Horizontal	**0.0031***	**0.0028***	0.0047	-0.0003
	(0.0016)	**(0.0016)**	(0.0041)	(0.0043)
Δ Vertical	**-0.0043****	-0.0034	0.0095	0.0095
	(0.0021)	(0.0022)	(0.0167)	(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

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

Table 2. Distribution of Suppliers

	No. of suppliers which are				
	Czech	multinationals operating in the CR	EU or Eastern Europe	North America	Russia/CIS
No of multinationals reporting each type of suppliers	107	56	85	18	9
multinational in the 25th percentile	5	2	2	1	1
median multinational (50th percentile)	10	4	5	1	2
multinational in the 75th percentile	30	10	10	4	2

Table 3. Expected Changes to Local Sourcing

Share of intermediates currently sourced from Czech firms (in percent)	Expected increase in 2-3 years (in percentage points)	No. 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

Table 4. Assistance Received by Czech Suppliers from Multinational Customers

	No. of firms reporting receiving assistance*	
	Total	of which assistance for a fee
advance payment and financing	14	2
leasing/lending of 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 license for a new technology	2	1
financial planning	2	0
maintenance of machinery	2	1
inventory management	1	0

* 25 companies reported receiving assistance

Table 5. Assistance Received by Latvian Firms from Multinational Customers

	No. of firms reporting receiving assistance*	
	Total	of which assistance for a fee
advance payment and financing	15	8
Supplying inputs	12	10
organization of production lines	9	5
leasing/lending of machinery	8	8
Employee training	7	4
finding export markets	7	2
production technology	4	0
quality control	1	0
obtaining license for a new technology	1	1
maintenance of machinery	1	1

* 36 companies reported receiving assistance