Abstract

This paper studies the effects of foreign direct investment on labour productivity in manufacturing industries of two transition countries, Estonia and Slovenia. The emphasis is on the dimension of export/local market orientation. The study is based on firm-level panel data. It is shown that in Estonia the export oriented foreign investment enterprises have on average much lower labour productivity than the domestic market oriented foreign affiliates. In Slovenia, on the contrary, the export orientation of foreign affiliates is not correlated with lower labour productivity. No horizontal spillover of foreign direct investment to domestic firms is detected in Estonia. In Slovenia, however, positive spillovers to domestic firms are found. The findings show also that different types of foreign direct investment can have different effects on the host country and that the existence of positive spillover may depend on the level of economic development of the host country.

JEL Classification: F10, F21, F23

Keywords: foreign direct investment, productivity, spillovers, export oriented foreign direct investments

1. Introduction

1 This analysis has been originally published in the Working Paper series of Faculty of Economics and Business Administration of the University of Tartu as Working Paper No. 32 “The Effect of Foreign Direct Investment on Labour Productivity: Evidence from Estonia and Slovenia” (2004). In this volume, we give a summary of selected results of that study as presented at the conference Finnish–Estonian Meeting in Economics in Helsinki 2004.

Helpful comments and suggestions by Urmas Varblane, Jaan Masso, Karsten Staehr and Andres Võrk from the University of Tartu, Ari Kokko from Stockholm School of Economics, Andrei Kuznetsov from Manchester Metropolitan University, Johannes Stephan from the Institute for Economic Research in Halle and Martti Randveer from the Bank of Estonia are gratefully acknowledged. Any remaining errors are the responsibility of the author.
The aim of this analysis is to study the effects of foreign direct investments (FDI) on labour productivity in Estonia and Slovenia in the sector of manufacturing. This selection of countries allows us to use firm-level panel data at a level of aggregation and scope not often accessible to researchers: the research is based on firm-level panel data of the manufacturing industries of Estonia and Slovenia from the second half of 1990s until 2001. The analysis studies the correlation between foreign equity participation in a firm and the firm’s own productivity, i.e. the “own firm” effect - in the terminological tradition of Aitken and Harrison (1999). We also endeavour to provide an answer to whether there exist intra-industry (within the same sector) spillovers from foreign affiliates to the firms with no FDI and to other foreign affiliates in those two countries. Additionally, the analysis focuses on the issue whether the “own firm” productivity effects depend on the type of FDI. More specifically: is there a difference in “own firm” effects between the export oriented and the domestic market oriented FDI? The exporting/local market orientation dimension is usually (except e.g. Kokko et al. 2001; Sgard 2001; or Harris, Robinson 2001) neglected in the analysis of effects of FDI on productivity. Yet, the effects of these two types of FDI on the host economy may be fairly different. This distinction is in particular relevant for the debate on how governments should design their policies to attract FDI and whether export oriented FDI is preferable for the host economy as the policy literature sometimes assumes (e.g. World Investment Report 2002). This distinguishes the analysis from the bulk of other literature.

The two countries selected for the analysis have had different stages of development and hence imply likewise substantially different effects of FDI on their economies. Slovenia has the highest gross domestic product (GDP) per capita among the CEE transition economies. In Estonia the level of GDP per capita is lower, the inward FDI penetration rates have been far higher. In Estonia also the attitude, the government policies and the privatisation methods have been more FDI friendly. Hence, the reasons why investors choose the host country are different for Slovenia and Estonia.

Using panel data techniques, we account for the firm-specific time-invariant effects and also for the possible sample selection bias. An important issue mentioned by several authors is the non-random selection of FDI recipients. In the case the most productive local firms receive FDI and unless we account for this, the positive productivity effects of FDI might be overestimated. To account for this possibility, in addition to the usual methods of econometrics of panel data, we also employ a two-step procedure to correct for the sample selection bias.

One interesting finding in this paper is that in Estonia the export oriented foreign investment enterprises have on average much lower labour productivity level than the domestic market oriented foreign affiliates. In Slovenia, however, the faculty of export orientation of a foreign affiliate is not correlated with lower labour productivity. We detect no horizontal spillover of FDI to domestic firms in Estonia. In the case of Slovenia, positive spillovers to domestic firms were found.
2. Theoretical Background

In order for the FDI to materialise, the multinational enterprises (MNEs) must possess some firm-specific competitive advantages that allow them to compete successfully in foreign environment. These advantages – the firm-specific assets – can constitute production technologies, but they may also be related to special skills in management, distribution, product design, marketing, and other links in the value chain, or be made up of brand names and trademarks (Caves, 1996; Kokko et al. 2001). The theory of FDI stresses the positive links between firm-specific knowledge based assets and the decision to invest abroad (e.g. Dunning 1988; Caves 1974, 1996; Harris, Robinson 2001). These firm-specific assets have some characteristics of a public good and can be transferred at low cost between the subsidiary of the MNE and its parent company.

Technology transfer by FDI could result in “own firm” and spillover effects on host economies:

(i) the “own firm” effect, i.e. the average performance characteristics of foreign enterprises differ from those of the domestic enterprises (DE) in the host country (are presumably better than those of the DEs);

(ii) various spillover effects from the presence of foreign firms affect the performance of domestic firms (and other foreign affiliates active in the host country, spillovers are also usually presumed to be positive, at least for the DEs) (Aitken, Harrison 1999: 605–608; Smarzynska 2002).

The extent of technology transfer to a local affiliate depends on the reasons why FDI was made into the country (host country advantages), what role and probably also what extent of autonomy the local foreign investment enterprises (FIE) have in MNEs’ value added channel. If the main reasons for investment were the low cost level of the host economy, including cheapness of labour or other factors of production, then it is less likely that higher value-adding activities would be transferred to a local FIE. Thus, the “own firm” or “own-plant” effect of FDI depends on the international competitive advantage of the host country and the reasons why FDI was undertaken by this particular MNE. Higher value creating activities (e.g. the use of the results of R&D) are more likely to be allocated to local FIE in case there exists high enough level of absorptive capacity in the local firm and/or host economy as a whole (Damijan et al. 2003). The predominant conclusion from theoretical literature, however, is that the “own firm” effect of FDI on productivity is expected to be positive.

The presence of a MNE in a host country can lead to technology transfer to domestic firms, i.e. to spillovers of FDI to local enterprises (Aitken, Harrison 1999: 605). If foreign firms introduce new products and/or processes in their affiliates in a host country, domestic firms and other FIEs may benefit from accelerated diffusion of new technology. Spillovers are said to take place as MNEs, due to the public good characteristics of their firm-specific assets and due to these assets being at least to a certain extent non-excludable and non-rival goods, cannot reap all the benefits of their activities in a foreign location (Caves 1996: 185).

Usually, in both the theoretical and empirical literature, the spillovers to domestic capital based enterprises are discussed. However, in addition to the technology transfer to the MNE’s subsidiary and the productivity spillovers to the DEs, also other affiliates of MNEs in the host country may receive part of FDI productivity spillovers. If the share of FIEs is relatively large in the host economy, these other foreign affiliates
should not be left out of the analysis as possible receivers of spillover effects. It can be argued that external effects to other MNE affiliates can be increasingly important as the share of inward FDI in the host economy grows. In case the FIEs have more absorptive capacity than DEs, positive spillovers of FDI may sometimes benefit more the FIEs than the DEs.

The spillovers from inward foreign investment may be intra-industry (horizontal) or inter-industry (vertical) spillovers (Smarzynska 2002). Intra-industry spillovers take place between companies in the same industry, vertical spillovers flow in the direction of suppliers and customers (to backward and forward linkages) of the firm in consideration.

Based on articles by Caves (1974), Blomström and Kokko (1996), Smarzynska (2001), Aitken and Harrison (2001: 606–607), we can distinguish between the following main channels for spillovers: demonstration (or imitation), competition, worker mobility and supplier upgrading effects and exporting.

Demonstration effect is perhaps one of the simplest examples of a spillover, for instance the case when a local firm improves its productivity by simply observing nearby foreign firms and copying some technology used by MNE affiliates (Blomström, Kokko 1996; UNCTAD 2001: 131). In other cases, diffusion of new technologies and know-how may occur from labour turnover as employees move from FIEs to DEs.

Another type of spillovers is the one that functions through competition between enterprises. The competition effect, unlike demonstration and worker mobility effects that are presumably positive, can be both positive and negative (Ibid. 1999: 607; Görg, Greenaway 2001). Some kind of (competition) spillover is said to take place if the entry of an affiliate leads to more severe competition in the host economy, so that local firms are forced to use existing technology and resources more efficiently or to search for new efficient technologies or to exit the market (Blomström, Kokko 1996). This can have both positive (in the case a local firm manages to implement superior technologies due to the increase in competition) and negative effects on the productivity of domestic (or more generally other local) enterprises (Aitken, Harrison 1999). If the absolute value of the productivity decline due to diversion of demand towards FIE is larger than the positive effect due to transfer of technology from MNE affiliate to domestic firms, net productivity of DEs can decline.

3. Previous Empirical Literature

An important conclusion from both theoretical and empirical literature is that productivity spillovers are difficult to measure (Krugman 1990: 53). Paul Krugman points out that “Knowledge flows… leave no paper trail by which they may be measured and tracked” (Krugman 1990). However, exceptions to this are the patent citations in patent applications by firms. The empirical literature tries to avoid the issue for the reason that it is difficult to address, namely the issue of how productivity spillovers take place in reality, and rather focuses on the simpler question whether the presence of FDI affects the productivity of domestic enterprises (or local firms, i.e. also other MNE affiliates).

The estimation is often performed in the framework of econometric analysis based on the estimation of the production function. Labour productivity or total factor productivity of firms (or only domestic firms) in the host economy is regressed on a number of factors assumed to have an effect on productivity. One of these factors that are used to study the spillover effects is the presence of foreign firms in an economic
sector or region. Another factor is the variable indicating FDI presence at the firm level (e.g. FDI dummy that is equal to 1 in case the firm has FDI (Görg, Strobl 2001)). The presence of FDI at the sectoral/regional level is measured by the share of FDI in assets, sales, employment etc. The estimated econometric models in literature often use log-linear form of Cobb-Douglas production function.

Studies on the direct effects of FDI on its affiliate and spillover effects to the host economy have been made with different techniques, covering both high-income as well as developing and transition countries. Often one may find results significantly different from what one would expect based on theory or policy literature (also for transition countries). Policy makers in host countries of FDI often just assume that there exist positive “own firm” and spillover effects of FDI (UNCTAD 2001). The empirical literature with few exceptions usually confirms the former argument that affiliates of MNEs in the host country have on average higher productivity levels than purely domestic enterprises (e.g. Harris, Robinson 2001: 7). The picture is, however, far more diverse if one takes a look at the empirical analysis of FDI spillovers.

Empirical literature, including the literature on transition economies, shows that there is little conclusive evidence to support the view that for the host country only beneficial effects of FDI exist. Thus, there is little conclusive evidence to substantiate incentives to attract FDI (Görg, Strobl 2001; Smarzynska 2002). Some surveys reveal the existence of positive spillovers, others find negative ones, while the rest find “mixed” or not significant results (Görg, Strobl 2001; Chudnovsky et al.: 2003).

The way the research is conducted vastly influences the results obtained and therefore the policy implications made. The findings of the literature overview by Görg and Strobl (2001) underline that the results may be influenced by the ways of defining the presence of MNEs and by using either cross-section or panel data. In the works where case studies and/or cross-section data were used, significant positive spillover effects related to FDI were found. On the other hand, newer studies based on panel data, which account for firm-specific time-invariant effects often find also insignificant spillovers to DEs or negative spillovers (Smarzynska 2002).

4. Data and Descriptive Statistics for Estonia and Slovenia

Slovenia as a transition economy is more developed than Estonia. This is evident based on the comparison of GDP levels of these two countries. GDP per capita of Slovenia was, according to the Transition Report Update of European Bank for Reconstruction and Development (2004), estimated to be USD 13,851 in 2003. The corresponding level for Estonia was USD 6,120. These facts are supported by the investment development path theory of Dunning and Narula: in addition to the higher GDP per capita, Slovenia also started investing abroad long before Estonia and has far different track record of internationalisation (Rojec, Svetlicic 2003). Estonia and Slovenia have also adopted different privatisation strategies, have had different attitudes and policies towards FDI: Estonia has been much more FDI friendly than Slovenia (see e.g. Index of Economic Freedom 2003). Thus, based on these differences, one can argue that the effects of FDI on productivity can differ between Estonia and Slovenia and investigation of these two countries can offer interesting results and policy implications. The majority of FDI inflows to both Estonia and Slovenia originate from the neighbouring Western European countries.

We take a look at whether the “own firm” productivity effects depend on the type of FDI, i.e. whether there is a difference in the “own firm” effects of export
oriented versus domestic market oriented FDI. We distinguish between two dimensions: ownership, market (abroad, local); DE denotes a domestic enterprise \(DUMF_{ijt} = 0\); FIE denotes a foreign investment enterprise \(DUMF_{ijt} = 1\); DM denotes domestic market orientation \(DUMEXP_{ijt} = 0\); FM is foreign market orientation \(DUMEXP_{ijt} = 1\). Based on these two dimensions, we distinguish between four types of firms: domestic market oriented DEs \(DUMF_{ijt} = 0, DUMEXP_{ijt} = 0\); foreign market oriented DEs \(DUMF_{ijt} = 0, DUMEXP_{ijt} = 1\); domestic market oriented FIEs \(DUMF_{ijt} = 1, DUMEXP_{ijt} = 0\); and foreign market oriented FIEs \(DUMF_{ijt} = 1, DUMEXP_{ijt} = 1\).

Enterprise-level panel data on manufacturing industries in Slovenia and Estonia are used in order to study the productivity effects of FDI. The data from the Statistical Office of Slovenia and the Statistical Office of Estonia are used. For Estonia the (balanced) panel consisted of yearly data of 326 firms over the period of 1996–2001. The Slovenian panel was significantly larger, it covered the yearly data of 982 manufacturing industry firms for the period 1994–2000. In addition to the standard financial statement data, the datasets contain information on whether foreign capital has been invested in each firm. However, the definitions of a foreign investment enterprise and a domestic enterprise are different for the datasets of Estonia and Slovenia. For Slovenia, the usual definition of FDI recipient firms by OECD, IMF or World Bank is used. FDI recipient firms are defined as firms with foreign share equal to at least 10% of ordinary shares or voting power (IMF 1995). For Estonia, one cannot use the 10% level for all the years. Due to the lack of data it was not possible to calculate the share of FDI in ordinary shares or voting power for years 2000 and 2001. Thus, the FDI majority share dummy variable, available from the database of the Statistical Office of Estonia, is applied.

In the case of Estonia, the FDI penetration rate is for all years about two times higher than in Slovenia. In 2000, the share of FIEs in the total number of enterprises was 23.3% in the Estonian sample and 12.8% in the Slovenian sample. Also the penetration of FIEs, measured by various indicators like employment, sales or value added is lower for Slovenia. Like in Slovenia, FIEs in Estonia are larger than DEs and indeed more export oriented. They also tend to spend more on R&D per enterprise than DEs. Smaller FIEs are quite common in Estonia, whereas in Slovenia FDI has been concentrated into relatively small number of large enterprises.

In Table 1, the descriptive statistics on productivity in the manufacturing sector are presented, based on the enterprise-level panel data. Tables 2 and 3 describe differences between productivity levels of four types of firms included in this study. Labour productivity is measured as sales per employee or value added per employee. In the case of Estonia, it is also interesting to take a look at the data from which a very large foreign affiliate of Elcoteq (a well-known foreign electronics company active in Estonia, among the largest firms in Estonian manufacturing) has been excluded in this analysis.

The statistics in Table 2 show that foreign affiliates have significantly higher labour productivity in Estonia than domestic enterprises. This result holds also for the value added based approach to labour productivity measurement (Vahter 2004). In 2001, the labour productivity of FIEs as sales per employee in Estonian manufacturing was (based on the panel of 326 enterprises) on average 34% higher than the labour

\[ FDI \text{ dummy } DUMF_{ijt} \text{ is equal to one if the firm } i \text{ (in sector } j \text{ at time } t) \text{ is foreign investment enterprise, otherwise zero}; DUMEXP_{ijt} \text{ denotes the export orientation dummy, it takes the value of one if the firm } i \text{ exports at least 50\% of its sales and zero if it is more domestic market oriented.} \]
productivity level of DEs. In 1996, FIE productivity surpassed that of DEs even by 61%.

The big difference in productivity between those two types of enterprises is also seen when the value added per employee is studied. These results indicate that the FIE level surpasses the DE level almost by 50%; in 2001, the FIE/DE ratio was 1.457 and in 1996, it was 1.410. This big difference in productivity levels is to a large extent caused by the fact that FIEs employ more capital per employee than local domestic capital based firms. The gap in the capital-labour ratio is even larger than in the productivity of labour. The FIE/DE ratio of the capital-labour ratio was 1.834 in 2001 and at the beginning of the studied period, in 1996, the FIEs used even four times more capital per employee in production than the DEs. This FIE/DE ratio has, however, fallen significantly over the years, as the capital-labour ratio of DEs has, due to investments into physical capital, grown rapidly over the years (122% over the period 1996–2001), whereas that of FIEs has stayed roughly the same.

Table 1. Descriptive Statistics on the Share of FDI in Estonia and Slovenia (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Estonia</th>
<th>Slovenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>46.6</td>
<td>33.2</td>
</tr>
<tr>
<td>FDI share in sales</td>
<td>58.5</td>
<td>38.2</td>
</tr>
<tr>
<td>FDI share in employment</td>
<td>39.4</td>
<td>18.1</td>
</tr>
<tr>
<td>FDI share in value added</td>
<td>48.7</td>
<td>21.9</td>
</tr>
<tr>
<td>FDI share in tangible fixed assets</td>
<td>54.4</td>
<td>24.1</td>
</tr>
<tr>
<td>FDI share in number of firms</td>
<td>26.1</td>
<td>12.8</td>
</tr>
</tbody>
</table>

Source: own calculations based on enterprise level panel databases of Estonian and Slovenian manufacturing.

In the case of Slovenia, like in Estonia, we witness that the labour productivity level of FIEs is on an average much higher than that of DEs; in 2000 even 2.25 times higher. In Estonia, in 2000, it was only 1.34 times higher. Thus the difference between those two types of firms is even much larger in the case of Slovenia than in the case of Estonia. Also the capital-labour ratio of FIEs surpasses largely that of the DEs in Slovenia.

Among the four types of firms in Estonia, the lowest productivity in 2001 was found in domestic enterprises that produced predominantly for export markets. The ranking of the four types of firms under consideration in Estonian manufacturing (from the group with the highest level of the indicator to the one with the lowest level), based on sales per employee as a measure of labour productivity, proved to be the following (2001): first came domestic market oriented FIEs; second were domestic market oriented DEs; third foreign market oriented FIEs; and only forth foreign market oriented DEs.

This ranking has changed a little over the years as for the second and third place, the first and the last places have remained the same. The main conclusion from Table 2 is that in Estonia export orientation of a firm is correlated with lower labour productivity. In 2001 and 1996, the labour productivity of export oriented enterprises was about 73% of the corresponding level of domestic market oriented firms. What can also be inferred from these results is that the aim of FDI in the manufacturing sector, except for local market oriented FDI, has been to benefit from the low labour costs of Estonia.
Table 2. Estonia – Productivity Differences between the Four Types of Firms, thous. kroons

<table>
<thead>
<tr>
<th>Type of firms</th>
<th>Year</th>
<th>1996</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUMM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>298</td>
<td>398</td>
<td>447</td>
<td>436</td>
<td>499</td>
<td>538</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>217</td>
<td>275</td>
<td>264</td>
<td>277</td>
<td>350</td>
<td>425</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>623</td>
<td>739</td>
<td>884</td>
<td>802</td>
<td>944</td>
<td>1116</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>335</td>
<td>399</td>
<td>388</td>
<td>374</td>
<td>452</td>
<td>532</td>
</tr>
<tr>
<td>Without Elcoteq:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>366</td>
<td>458</td>
<td>435</td>
<td>426</td>
<td>522</td>
<td>588</td>
</tr>
</tbody>
</table>

Notes: DUMM denotes the FDI dummy (= 1, if at least 50% of voting power belongs to the foreign investor, else = 0); DUMEXP denotes the export orientation dummy (= 1, if share of exports in sales is at least 50%, else = 0.


Former empirical studies in Estonia have stressed (see e.g. Hannula, Tamm: 2001) that the FIEs have on average much higher labour productivity levels than the DEs. Now it is possible to see, based on this analysis, that there is this productivity difference in Estonia mainly due to domestic market oriented firms, whereas export oriented foreign affiliates have more than two times lower indicators (in the case of sales per employee, e.g. in 2001) than domestic market oriented firms with FDI. The productivity level of the export oriented FIEs is comparable to that of domestic market oriented DEs. In the period 1998–2001, it was even below that already relatively low level.

We have computed the productivity indicator for export oriented foreign affiliates in Estonia also without the electronics manufacturing services provider Elcoteq (a big company: in some years even more than 3000 employees). The reader can witness that without Elcoteq these indicators of export oriented FIEs are much higher than with it (Table 2). This means that Elcoteq, with relatively low productivity, has due to its size, a great impact on the analysis of productivity in our framework.

Let us now turn our discussion to Slovenia. The results for this transition country are given in Table 3. One can see here significant differences from Estonia. The rankings of firms by type differ also between the periods 1994–1998 and 1999–2000. In the former period, the ranking, starting from the group of firms with the highest labour productivity (sales per employee), is the following: first, foreign market oriented FIEs; second, domestic market oriented FIEs; third, domestic market oriented DEs; and fourth, foreign market oriented DEs.

In 1999, the first and second of these groups changed their positions (notice also differences in sales per employee in 1999 and 2000 from the Table): first, domestic market oriented FIEs; second, foreign market oriented FIEs; third, domestic market oriented DEs; and fourth, foreign market oriented DEs.
### Table 3. Slovenia – Productivity Differences between the Four Types of Firms, thous. tolers

<table>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DUMF</td>
<td>DUMEXP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0</td>
<td></td>
<td>6,759</td>
<td>7,553</td>
<td>8,724</td>
<td>10,509</td>
<td>10,883</td>
<td>11,639</td>
<td>13,321</td>
</tr>
<tr>
<td>0 1</td>
<td></td>
<td>5,498</td>
<td>6,065</td>
<td>7,044</td>
<td>8,356</td>
<td>9,222</td>
<td>9,483</td>
<td>11,779</td>
</tr>
<tr>
<td>1 0</td>
<td></td>
<td>11,849</td>
<td>14,702</td>
<td>16,198</td>
<td>18,420</td>
<td>20,522</td>
<td>22,633</td>
<td>(42,820)</td>
</tr>
<tr>
<td>1 1</td>
<td></td>
<td>13,985</td>
<td>15,137</td>
<td>18,683</td>
<td>20,456</td>
<td>22,941</td>
<td>21,987</td>
<td>25,074</td>
</tr>
</tbody>
</table>

**Notes:** DUMF denotes the FDI dummy (= 1, if at least 10% of voting power belongs to foreign investor, else = 0); DUMEXP denotes the export orientation dummy (= 1, if share of exports in sales is at least 50%, else = 0.

**Source:** own calculations, based on enterprise level panel data of Slovenian manufacturing 1994–2000.

Based on these figures, the conclusion is that in Slovenia export orientation – unlike in Estonia – is not associated with lower labour productivity levels. Export oriented and domestic market oriented firms have on average about the same level of productivity. If the years of 1999 and especially 2000 with peculiarly high indicators are excluded, we can conclude that export oriented FIEs have the highest level of productivity among the four types of firms. Quite similar levels (in 1999 and 2000 also higher) are found for the domestic market oriented FIEs. The DEs, regardless whether export oriented or domestic market oriented, lag far behind. The export oriented DEs have, however, the lowest productivity level among the firms. In analysis of the results from Table 3, some caution is advised for discussing implications concerning the results of 2000. The big leap in productivity level of top 1 group in 2000 – domestic market oriented foreign firms, can be attributed to the small number of firms (with minority foreign ownership) and to a possible measurement error in the case of these firms. If we take a look at only foreign investment enterprises with majority foreign share, then there is no that big growth of productivity of export oriented FIEs in 2000.

The results of the ranking of export oriented FIEs for Slovenia (Table 3) and for Estonia (Table 2) are in sharp contrast. The reasons for Slovenia having this group of enterprises as a top performer and Estonia having it as a low productivity group might to a large extent be the result of different location-specific advantages that these two countries provide for the investors. Based on the information from the investor motivation surveys from Estonia and Slovenia, we find that there are large differences in main motives of FDI between those two countries (e.g. survey “Foreign Investor 2000” for Estonia; Foreign direct investments in Slovenia 2002: 14). In Estonia, the relatively low production costs, including labour costs, have been one predominant factor affecting investment decisions into Estonia (Varblane 2001).

Surveys on the motivation of foreign investors in investing in Slovenia, on the other hand, show that as far as labour is concerned, it is clearly the quality and not the cost of labour that attracts foreign investors to Slovenia (OECD, 2003). In Slovenia, only 1.8% of foreign investors emphasise the motive of low cost of labour for investing in Slovenia, however, quality of labour is a motive for 26.9% of the FIEs (Ibid. 2003: 14). This is not surprising, as labour costs in Slovenia are the highest among the transition countries in Central and Eastern Europe. In 2002 the average monthly wages in Slovenian manufacturing were 2.3 times higher than in Estonia.
The surveys for Estonia also indicate that export oriented investors have different motivation for investing in Estonia than domestic market oriented investors. Exporters are more motivated by the costs of production and the labour force than by the market potential, as they do not plan to supply the domestic market. The non-exporters, in turn, are more motivated in tapping the new market and benefiting from the expected market growth. Exporters represent mainly the chemical, wood processing and furniture, electronics, textile, machinery and engineering industries, while non-exporters are mainly from the food and beverage and construction material industries (Varblane, Ziaicic, 2000).

5. General Model and Econometric Concerns

In order to examine the effects of FDI on productivity, we follow the general model (production function approach) of literature, as specified in e.g. Aitken, Harrison (1999), with some added features. One difference in our study is that the inputs and the dependent variable are given per employee. I.e. the dependent variable is not output as (e.g. in Aitken, Harrison, 1999) but a measure of labour productivity, sales per number of employees. Input variables include thus capital-labour ratio, materials per employee etc. Also the export orientation dummy variable \( DUMEXP_{ijt} \) is included in order to account for export oriented firms. The following model is estimated:

\[
Y_{ijt} = C + \beta_1 DUMF_{ijt} + \beta_2 DUMEXP_{ijt} + \beta_3 DUMEXP_{ijt} DUMF_{ijt} + \beta_4 FDI\text{-sector}_{ijt} + \beta_5 DUMF_{ijt} FDI\text{-sector}_{ijt} + \beta_6 X_{ijt} + \beta_7 Z_{jt} + e_{ijt}.
\]

Logarithm of sales per number of employees, \( Y_{ijt} = \log(\text{sales}_{ijt}/\text{employees}_{ijt}) \), for firm \( i \) in sector \( j \) at time \( t \) (deflated by the Producer Price Index) is regressed on vector of inputs/control variables per employee (\( X_{ijt} \), these are given all in logarithms), sector dummies \( Z_{jt} \), export orientation dummy and its interaction dummy with measure of FDI, measures of foreign ownership \( DUMF_{ijt} \) and \( FDI\text{-sector}_{ijt} \). Vector of control variables \( X_{ijt} \) includes variables such as \( LNTFA_{ijt}, LNLABC_{ijt}, LN\text{MATER}_{ijt}, DUMINT_{ijt} \) (for Slovenia) or \( DUMRDI_{ijt} \) (for Estonia). These variable names used in regression analysis are defined below. \( C \) is a constant and \( e_{ijt} \) is the error term.

\( DUMF_{ijt} \) indicates a FDI dummy variable. This variable identifies whether or not a firm has FDI (the threshold level is 10% of voting power in the firm for Slovenia and 50% for Estonia); \( DUMF_{ijt} = 1 \) if the firm is a FIE, \( DUMF_{ijt} = 0 \) if it is a domestic firm. If foreign ownership in a firm increases that firm’s productivity, we should observe a positive coefficient of \( DUMF_{ijt} \). Variable \( DUMEXP_{ijt} \) is the export orientation dummy. It takes the value of 1 if a firm has the share of its exports in its sales at least as high as 50%, and the value of 0 otherwise. As exporting may have positive effect on labour productivity, we expect this variable to have a positive coefficient. The interaction dummy between \( DUMF_{ijt} \) and \( DUMEXP_{ijt} \) in order to capture interaction effects is \( DUMEXP_{ijt} DUMF_{ijt} \). It allows us together with the variables \( DUMEXP_{ijt} \) and \( DUMF_{ijt} \) to distinguish between the four types of enterprises. In case the export oriented FIEs have higher labour productivity level than the domestic market oriented FIEs, the coefficient of this variable would be positive.

\( FDI\text{-sector}_{ijt} \) is the share of FDI in a sector as measured by the ratio: sum of the assets of the foreign investment enterprises in a sector (with each FIEs’ own assets
subtracted) to the sum of the assets of all firms in the sector.\textsuperscript{3} Sectors are defined at Nace double-digit level. This indicator is used for measuring horizontal spillover effects. If productivity advantages of foreign capital spill over to domestic firms in the same sector, the coefficient of this variable should be positive.

The coefficient on the interaction between firm-level and sector level FDI is captured by $DUMF_{ijt} \cdot FDI_{sector_{ijt}}$. It allows us to determine if the effects of foreign presence on other foreign firms differ from the effects on domestic firms. $LNTFA_{ijt}$ is the log of the tangible fixed assets per employee, a proxy for logarithm of \((K/L)\) ratio. Also a proxy for the skill intensity of the employees of the firm is included and measured by $LNLABC_{ijt}$, log of the labour costs per employee. As the dependent variable is based on sales, the right-hand side of the equation must take account for materials, $LNMATER_{ijt}$ is the log materials per employee. Dummy variable $DUMINT_{ijt}$ takes the value of one if the firm has intangible fixed assets, the value of zero otherwise. An alternative to this variable is $DUMRD_{ijt}$, it is equal to 1 if the firm has R&D expenditures.

Sector dummy variables are also used in the regression model in order to capture sector specific effects and year dummy variables are used in order to account for trend effects. To take account of the possibility of non-random selection of FDI recipients, we continued, after estimating the usual RE and FE models, with the Heckman-type two-step procedure (also called Heckman model, see e.g. Heckman 1979). These results are not fully reported here, a summary is provided.

\textbf{6. Estimation Results}

The estimation results for FE and RE model are given in Tables 4–5 for Estonia and Slovenia. The model selection is based on the F-test, the Breusch-Pagan LM test and the Hausman test:

(i) pooled LS vs FE: F-test;
(ii) pooled LS vs RE: LM test;
(iii) FE vs RE model: Hausman test.

\textsuperscript{3} There is a caveat in estimating the model as specified in this section, if the variable $FDI_{sector_{ijt}}$ instead of the definition used in this paper, were defined as simply the ratio of the sum of FIE assets to the sum of total assets of the sector. In that arguably inferior case, there might be difficulties in separating the “own firm” and spillover effects wholly from each other. Particularly this would be a problem for the sectors with a small number of firms and one or a small number of FIEs making up large proportion of that sector, or in the case of one very large FIE entering the sector. Therefore it is crucial to study and compare the estimation results also with the tables of descriptive statistics (Tables 2 and 3) and employ the measure of $FDI_{sector_{ijt}}$ where each FIEs’ own assets are subtracted from all FIE assets of the sector. Naturally, now this sector level FDI penetration variable has different values for different firms, not only for different sectors. We have thus improved the results, by establishing a more clear difference between the “own firm” and spillover effects in the analysis.
The following test statistics are given for the model as specified in Tables 4 and 5. The value of the F-test statistic is: a) for Estonia $F = 8.82$ ($p = 0.000$); b) for Slovenia $F = 23.23$ ($p = 0.000$). The null hypothesis (pooled LS) is rejected for both countries, in favour of the FE model. This means that there exists an unobserved heterogeneity effect. The value of the LM-statistic is: a) for Estonia $LM = 1316.72$ ($p = 0.000$); b) for Slovenia $LM = 10907.99$ ($p = 0.000$). The null hypothesis (pooled LS) is rejected for both countries in favour of the RE model. These results show again that there exists an unobserved heterogeneity effect. The Hausman test enables us to choose between the RE and the FE model. The Hausman test statistic is: a) for Estonia $\chi^2 = 65.42$ ($p = 0.000$); b) for Slovenia $\chi^2 = 146.99$ ($p = 0.000$). The null hypothesis (RE model) is rejected for the models of both countries, the RE model is not favoured, the FE model is favoured.

The Hausman test indicated that we should prefer the FE model over the RE model. Due to the fact that the FE model considers only these firms that have a change in dummy variables like e.g. $DUMF_{ijt}$ over the period, also the RE model is given, which considers all firms, also those that are FIE or DE for all the period in consideration. The results are not qualitatively very different between these two specifications and both models are presented, as they make use of a different amount of information in data, thus both could be of interest. The tables of the results of the Heckman two–step procedure are omitted from this version of the paper due to the length.

Based on the estimation results of the model, as in Table 4, but without variables $DUMEXP_{ijt}$ and interaction variable $DUMEXP_{ijt} \cdot DUMF_{ijt}$, we find that in Slovenia foreign equity participation is positively correlated with a firm’s productivity level (“own firm” effect). The coefficient of the FDI dummy was positive, relatively large and significant; but after including the export orientation dummy and the interaction dummy between FDI presence in a firm and its export orientation, it proved to be positive but not significant. We test for the differences in productivity related “own firm” effects between export oriented and domestic market oriented enterprises. In order to find the difference of the productivity of export oriented FIEs from the domestic market oriented DE level productivity, these three coefficients are to be added up; for finding the domestic market oriented FIE effect, the coefficient of $DUMF_{ijt}$ suffices. As in our Slovenian model, these variables are not statistically significant, we cannot draw further inference on the differences of the productivity related “own firm” effects of the export and domestic market oriented FDI, but have to rely on the results presented in previous sections of the paper.

Table 4. Slovenia – Regression Results of the Estimated Model, the Effect of FDI on Productivity, 1994–2000, the RE and FE models, the dependent variable is the logarithm of labour productivity ($sales_{ijt}/employees_{ijt}$)
For Estonia (see Table 5), export orientation together with the majority of foreign capital in a firm indicates, on an average, much lower labour productivity level – which is a different result from Slovenia. This difference shows again the different competitive advantages of these two countries: while Slovenia’s advantages are the higher value added, skilled labour and higher productivity related sectors, Estonia is attracting FDI more due to costs lower than in the investors’ home countries. Thus, the estimation results for Estonia, at least concerning the RE model, affirm the view based on descriptive statistics from Table 2.

We also tested for intra-industry (horizontal) spillovers from foreign affiliates to firms with no FDI (domestic enterprises) and to other foreign affiliates. The general assumption based on the theory is that this effect is positive (in the case the negative competition effects do not dominate).

For Slovenia: there were positive (horizontal) spillovers from FIEs to domestic firms; the coefficient of variable $DUMF_{ijt} \cdot FDI_{sector_{ijt}}$ indicating spillovers to other FIEs was negative but proved to be not significant after correcting the standard errors for heteroscedasticity. There were positive spillovers to DEs in the meaning that the presence of FIEs in the sector of manufacturing (at Nace double-digit aggregation level) affects the productivity of domestic enterprises in this sector. The results stay the same if a lagged spillover variable is used. Thus, the FIEs were not better than the DEs in absorbing and benefiting from FDI productivity spillovers. This may show that the absorptive capacity of the DEs in Slovenia is relatively high.

The results for Estonia regarding the spillover were again, similarly to “own firm” effects, different from the results for Slovenia: actually just the opposite of the results for Slovenia. The spillover effect of FDI penetration in the same sector in Estonian manufacturing was not significant for domestic enterprises in the same sector. Initially, positive and relatively large significant effects for other FIEs in the same sector were found. This could at first glance be taken for indication that other FIEs receive more positive spillovers of FDI than the DEs. However, this result, unlike the rest, is not robust to different specifications of the model. Using a lagged variable for spillover analysis indicated no significant spillovers to other FIEs. These results were
tested also by splitting the sample and running the regression model again only on domestic enterprises, thus naturally without variables indicating FDI presence at the firm. The results of that approach confirmed these findings for both Slovenia and Estonia, which have been presented here in the last couple of paragraphs.

**Table 5. Estonia – Regression Results of the Estimated Model, the effect of FDI on productivity, 1996–2001, the RE and FE models, the dependent variable is the logarithm of labour productivity (sales_{ij}t/employees_{ij}t)**

<table>
<thead>
<tr>
<th></th>
<th>RE model</th>
<th>FE model</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNTFA</td>
<td>0.0543</td>
<td>0.0141</td>
</tr>
<tr>
<td>LNLABC</td>
<td>0.6663</td>
<td>0.0475</td>
</tr>
<tr>
<td>DUMF</td>
<td>0.0572</td>
<td>0.0685</td>
</tr>
<tr>
<td>DUMEXP</td>
<td>0.0603</td>
<td>0.0247</td>
</tr>
<tr>
<td>DUMEXP-DUMF</td>
<td>–0.1268</td>
<td>0.0556</td>
</tr>
<tr>
<td>FDI_sector</td>
<td>–0.0404</td>
<td>0.0766</td>
</tr>
<tr>
<td>DUMF-FDI_sector</td>
<td>0.3018</td>
<td>0.1086</td>
</tr>
<tr>
<td>LNMATER</td>
<td>0.3154</td>
<td>0.0306</td>
</tr>
<tr>
<td>DUMINT</td>
<td>0.000699</td>
<td>0.0205</td>
</tr>
<tr>
<td>Constant</td>
<td>1.0518</td>
<td>0.1603</td>
</tr>
<tr>
<td>Sector dummies</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Year dummies</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No. of observations</td>
<td>1915</td>
<td></td>
</tr>
</tbody>
</table>

Note: Heteroscedasticity-autocorrelation robust standard errors.

These results stay basically the same for different specifications: for the RE and FE models and the Heckman-type two-step procedure used for accounting for a possible sample selection bias in data. Firms with higher labour productivity had higher probability of receiving FDI in Slovenia, but not in Estonia. The Mill’s ratio variable that was calculated and added to the model was significant for Slovenia (at 10% level). This suggests that there exists sample selection bias in the case of Slovenian data – firms with high productivity in Slovenia attract more FDI.

### 7. Conclusions

FDI can be an important source for productivity growth and swifter transformation process in transition countries. However, FDI can theoretically cause both positive and negative spillover effects to the host economy. Our analysis of the panel data from Slovenia and Estonia shows, in line with previous empirical studies, that the growing tendency of the governments in Central and Eastern Europe to offer special incentives for FDI has relatively weak grounds. Justifications (at least in policy literature) for these incentives (in countries other than Estonia and Slovenia) have mostly been the possible
beneficial effects caused by transfer of technology from a parent company to its local affiliate and the related (positive) spillover effects to the host country.

The different stages of development in Estonia and Slovenia imply also differences in the effects of FDI to the economy. Indeed, as this study indicates, there are different consequences for productivity related FDI effects; particularly when we employ also the export/local market dimension of the firms in analysis.

Foreign owned firms have, on an average, higher labour productivity levels than domestic enterprises both in Estonia and Slovenia. However, the results are more surprising when we divide these firms into subgroups by their export orientation. For Estonia the export orientation together with the majority of foreign capital in a firm indicates a much lower labour productivity level. This is the opposite of Slovenia. Export orientation of a FIE is not correlated with lower labour productivity and until 1998, export oriented foreign affiliates in Slovenia had even significantly higher productivity than local market oriented FIEs. This difference in the findings shows also the different competitive advantages of these two countries, whereas Slovenia’s advantage is in higher value added, skilled labour and higher productivity related sectors, Estonia attracts FDI more due to lower costs compared to investors’ home countries. This view is also supported by a look at labour cost data and investor motivation survey data from these two countries.

In this study we also tested for the intra-industry spillovers from foreign affiliates to firms with no FDI (domestic enterprises) and to other foreign affiliates. The results for Slovenia are: positive horizontal spillovers from FIEs to domestic firms were found, no significant difference from that result was found for spillovers from FIEs to other FIEs. The findings for Estonia regarding spillovers were just the opposite of the Slovenian case. The intra-industry spillover effect of FDI presence in Estonian manufacturing was insignificant for domestic enterprises in the same sector. These results stay basically the same for different specifications of the model. Our analysis also implies that there is no indication that other FIEs reap more possible benefits via FDI spillovers than the domestic firms.

A policy implication of the analysis of this paper is that providing incentives for FDI in general (or specifically for export oriented FDI) may be of dubious value for the FDI promotion strategies of transition economies, at least as far as the productivity is concerned. The existence of positive spillovers may depend on the level of economic development of the host country. Export oriented affiliates of MNEs are more than local market oriented FIEs interested in exploiting the host country’s abundant production factors (see also e.g. Kokko et al. 2001). For example, when these advantages have derived from relatively cheap labour rather than capital, then export oriented FIEs are not likely to have more positive effects on productivity of the host country than local market oriented FIEs.

References

